



GE VERNOVA

**PROFICY® SOFTWARE & SERVICES**

# PROFICY OPERATIONS HUB

User Guide

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doc@ge.com



# **Operations Hub**

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# Chapter 1. Release Notes

## Operations Hub Release Notes

This topic provides a list of product changes in Operations Hub for this release.

**Version: 2024**

### What's New

**Table 1. Enhancements and New Features**

*The following enhancements and new features have been added.*

Description	Tracking IDs
High availability enabled through on-premises Windows clustering.  See <a href="#">Set up a High Availability Cluster (on page 158)</a> .	F74492
HMI screens can now adapt to different screen sizes. You can preserve aspect ratios while defining custom values for positioning and sizing of page elements.  See <a href="#">Coordinate Card (on page 248)</a> .	F72586
Several enhancements for improved functionality, flexibility, and user experience: <ul style="list-style-type: none"><li>• You can now request opaque tokens.</li><li>• Operations Hub and Proficiency Authentication (UAA) are separated into distinct sub-domains.</li><li>• Quality/Sub-quality field is exposed for Historian queries.</li><li>• Easily import and export individual application pages.</li></ul>	F70676
Updates to the Trend card: <ul style="list-style-type: none"><li>• Greater flexibility with external time and pen selection options.</li><li>• Experience a cleaner Trend view with minimized whitespace across stacked and tabular views.</li></ul>	F70676

**Table 1. Enhancements and New Features**

*The following enhancements and new features have been added.*

(continued)

Description	Tracking IDs
<ul style="list-style-type: none"> <li>• Gain insight into your data with 'Value' and 'Engineering Units' (EGU) displayed in the statistics section.</li> <li>• Ensure clarity with independent title display.</li> </ul>	
<p>Updates to SVG Request Handling:</p> <ul style="list-style-type: none"> <li>• Enhanced interactivity with the introduction of click zones.</li> <li>• Additional animations.</li> <li>• String animations based on value thresholds are now supported, adding more versatility to your visualizations.</li> </ul>	F70676
<p>Updates to Plug-in/Widget functionality:</p> <ul style="list-style-type: none"> <li>• Widgets are improved with a margin and padding, enhancing their overall aesthetics for a more polished look.</li> <li>• Dropdown widget offers convenience with support for search functionality. This feature streamlines asset selection, making it easier to find what you need.</li> </ul>	F70676

**Known Issues and Limitations**

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

Description	Tracking ID
<p>Changes made to the tag query criteria condition are not reflecting in the trend plot.</p> <p><b>Workaround:</b> To resolve the issue, do the following:</p>	530223

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
<ol style="list-style-type: none"> <li>1. Open the <b>Tag Query Criteria</b> dialog, delete all query conditions, and select <b>Apply</b>.</li> <li>2. Reopen the <b>Tag Query Criteria</b> dialog, recreate the conditions for the tag query, and select <b>Apply</b>.</li> <li>3. Select <b>Apply Changes</b> in the Trend Configuration dialog.</li> </ol>	
<p><b>Missing page globals after importing a page that has been renamed in the system:</b></p> <p>When you rename an existing page in the Operations Hub system that was previously exported and then reimported to the same Operations Hub system, globals bound to the renamed page disappear in the Operations Hub designer layout. However at runtime, the renamed page displays the global values. This issue occurs because the page globals are not duplicated for each page. Instead, both pages (renamed and original) reference the same global via the page ID assigned to the global when it was originally created.</p> <p>To address this issue:</p> <ul style="list-style-type: none"> <li>• Avoid renaming pages whenever possible.</li> <li>• In case the existing page is renamed and the original page gets imported to the system, then manually create any missing globals. Rebind the globals on the page to restore their visibility in the Operations Hub designer layout.</li> </ul>	503735
<p>Attempting to install the Historian Web-based Clients on Windows cluster nodes may fail, resulting in the rollback and deletion of some existing files, including Java Runtime Environment (JRE) and PostgreSQL files. This issue can lead to the unexpected shutdown of the Proficy Authentication (UAA) service.</p> <p><b>Workaround:</b> Do the following:</p>	DE212736

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
<ol style="list-style-type: none"> <li>1. Keep the node where the installation is being performed active (up), and ensure that all other nodes in the cluster are down.</li> <li>2. Deactivate Proficy Authentication, Configuration Hub, and Operations Hub services.</li> <li>3. Install Historian Web-based Clients.</li> </ol>	
<p>At times, the common components (Proficy Authentication and Configuration Hub) may encounter installation issues on installing from the Operations Hub <a href="#">integrated installer package (on page 34)</a>. Although the installation process may appear successful, the common components are not properly installed. This issue is intermittent and arises due to untranslated product names, resulting in the display of string placeholders.</p> <p><b>Workaround:</b> To ensure the correct installation of common components, simply run the installer again.</p>	DE211900
<p><b>Limitation in Marker Shape Customization in Interactive Map Designer:</b></p> <p>Currently there is a limitation in the capability to alter marker shapes seamlessly within the Interactive Map Designer. In the Interactive Map Designer properties, if you attempt to change the shape of the marker from round to square, the expected change does not occur.</p>	DE208208
<p>Applies to the following plug-ins when importing applications from an older version of Operations Hub Classic to Operations Hub 2023.</p> <ul style="list-style-type: none"> <li>• <a href="#">Image (on page 743)</a></li> <li>• <a href="#">Indicator (on page 746)</a></li> </ul> <p><b>Issue:</b> When you import an App to the new system, the plug-in's image source settings are altered.</p> <ul style="list-style-type: none"> <li>• In the Image plug-in, <b>Image Source &gt; Type</b> is altered.</li> <li>• In the Indicator plug-in, <b>Background Image Mode &gt; Type</b> is altered.</li> </ul>	DE198548

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
<p><b>Workaround:</b> Access the Image/Indicator plug-in in the imported App and change the altered <b>Type</b> back to its original type settings. The original source information (if exists) is retrieved.</p>	
<p>In a trend chart, if you add a tag that is identical to the one that is already plotted but the case of the tag name does not match the case of the tag name in Historian, a straight line appears in the trend chart. To resolve this issue, modify the tag name to match the case of the tag name in Historian.</p>	DE123833
<p>During Operations Hub installation, when you provide the tenant user ID, the following conditions apply:</p> <ul style="list-style-type: none"> <li>• If you are installing Operations Hub for the first time, do not provide StudioAdmin as the tenant user ID because it is used by Operations Hub.</li> <li>• If you want to use a shared Proficy Authentication (UAA) to work with Operations Hub, do not provide the user ID of an existing user of the UAA instance. If you do so, the installation fails.</li> <li>• If you are installing Operations Hub after uninstalling it without purge, do not provide a tenant user ID that matches any previously used user ID (including any previously used tenant ID). This is because after you uninstall Operations Hub without purge, previous Operations Hub users (along with tenant administrators, their groups, and privilege assignments) still exist in the database.</li> </ul>	DE123770
<p>When you create a data source, you can provide a certificate only in the base-64-encoded format. A DER-encoded certificate is not supported.</p>	DE116706
<p>If you encounter intermittent responsiveness issues with the Operations Hub runtime environment when using the Safari browser on your mobile device, it is recommended that you use the Chrome browser instead.</p>	DE131011
<p>When adding environment variables to Windows System Variables, be aware that environment variables are case-sensitive. If your environment variables in Operations Hub do not match the case of the ones used by the target His-</p>	DE130896

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
<p>torian Server, the data source will fail when tested. Be sure that you use the same case when configuring data sources in Operations Hub. A data source target in Operations Hub should match the case in the environment variables, as the variables are case-sensitive.</p>	
<p>Historian REST response time increases exponentially when there are over 30 users logged into Operations Hub accessing an End app that utilizes Historian REST queries.</p>	DE134904
<p>When using Safari 13+ on iOS, trend card functionality like adding tags to the trend, favorites, and annotations perform inconsistently. The workaround is to use the Chrome browser on the iPad.</p>	DE136597, DE149433
<p>If a Historian data point being trended transitions to a bad quality (such is the case when a collector goes down or loses communications), the trend card displays a flatline for the last known good value. If you experience one or more flatlines in your trends, and all the various requests from the same source, you should check the communication chain for an issue with Historian, a collector, or a SCADA driver, for instance.</p>	DE138128
<p>There are currently some page printing issues. For instance, if you have iframe that spills over to a second page, that can cause an issue.</p>	DE146462
<p>The <code>uaa-provisioning.log</code> file generates in a new folder if the location path provided during Operations Hub installation contains a space in it. For example, <code>C:\Custom Logs</code>.</p>	DE148827
<p>As a workaround to address VC++ (x64) failure, follow these steps to install Task Client on Operations Hub.</p> <ol style="list-style-type: none"> <li>1. Uninstall the VC++ 2015-20xx Redistributable (x64) version installed with Operations Hub.</li> <li>2. Open the Workflow install media, navigate to the <code>\Installers\Re-sources\Microsoft\2015_2019</code> folder, and run the <code>vc_redist.x64.exe</code>.</li> <li>3. Open the Services console dialog and restart these services:</li> </ol>	DE161643, DE161690



**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
<ul style="list-style-type: none"> <li>◦ GE Operations IQP PostgreSQL Database</li> <li>◦ GE Proficy Authentication PostgreSQL Database</li> </ul> <p>4. <a href="#">Install Workflow Task Client.</a></p> <p>5. Install the VC++ 2015-20xx Redistributable (x64) version that got installed with Operations Hub. (Download of VC++ Redistributable may be required)</p>	
<p>If the Data Distributor service started at a time when the datasource was offline, reload the end application.</p>	DE158762
<p>When importing a model containing a second CIMPLICITY namespace table, it overwrites the values in the first namespace table.</p> <p>Workaround: Combine the server and namespace information from the two namespace tables into one namespace table, and then import the model again.</p>	DE47669
<p>The inline mimic write operations performed in Operations Hub are indicated as successful even if the entries did not meet the criteria of these CIMPLICITY attributes.</p> <ul style="list-style-type: none"> <li>• WARNING_LOW_N</li> <li>• WARNING_HIGH_N</li> <li>• ALARM_LOW_N</li> <li>• ALARM_HIGH_N</li> </ul> <p>The values do not get updated to the CIMPLICITY point control panel.</p>	DE156030
<p>Error message does not appear when you perform a write operation on a CIMPLICITY tag value that is outside of a given range.</p>	DE157698
<p>If you select <b>Acknowledge All</b> in Operations Hub to acknowledge 5000 iFIX alarms, an internal error occurs in the iFIX application.</p>	DE161742
<p>Only a single instance of the CIMPLICITY HMI WebSpace widget per app is supported. If using multiple instances of webSpace widgets across multiple</p>	

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
pages, you may encounter access error messages when navigating between pages that contain webspace instances. After confirming the message, the widget loads as expected.	
The <code>typeName</code> parameter in the custom widget's <code>manifest.json</code> file does not support special characters.	DE162893
For Operations Hub 2022 release, Proficy Authentication server validation fails while installing Workflow Task Client. As a workaround to fix this issue, please refer to <a href="#">Resolving Proficy Authentication Issue During Workflow Task Client Install (on page 874)</a> .	DE174960
In Operations Hub 2022.4.1, line chart legend is not updating based on the updated parameters for the chart. The line chart always shows only the initially fetched data for a query.	
If an App uses multiple nested containers and a large number of queries, it impacts the page load performance.	DE170644
While using the trend card on iOS 15 Safari browser, the tags in a drop-down menu are not displaying properly. This occurs when there is more than one page in an App.	DE184797
<p>The following issues are noticed in Operations Hub on Android device:</p> <ul style="list-style-type: none"> <li>• Unable to select data sources from the <a href="#">Add Sources (on page 629)</a> dialog to configure a trend card.</li> <li>• Unable to navigate between multiple pages in the End App.</li> </ul>	DE184895, DE184901
If you create a display condition for a widget (or container), the widget (or container) is hidden regardless of the condition not being met. Condition always defaults to true at runtime.	DE184491
In Histogram, when X-axis range is provided manually, the bins towards the left and right end of the chart get truncated.	DE186605

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
Unable to publish iFIX / CIMPLICITY screens to Operations Hub using a remote Proficy Authentication (UAA) instance.	DE197305, DE197304
Unable to publish model from CIMPLICITY project to Operations Hub using a remote Proficy Authentication (UAA) instance.	DE197366
Currently in Operations Hub page designer, every undo and redo action causes a redraw of all the elements on the page.	DE196399
New Designer - When a large number of Solid Gauge plug-ins are added and configured within a layout, a performance issue arises, resulting in higher response times. This issue is particularly observed when configuring the Solid Gauge with "Preview Data ON" condition.	DE202270, DE199246
Currently, the date format received from the server can only be parsed by the client without considering the time zone, resulting in the client displaying its own time zone time.	DE123419
During a load test on the Auto Sync application, which uses OPC UA as the data source, a significant number of failures (8-9%) occur, particularly during peak load. The majority of these failed calls/APIs are related to the login process, resulting in a '503 Service Unavailable' error.	DE160706
Batch widgets - To ensure compliance with 21CFR11 regulations for e-signatures, the full user name (not just the user account name) needs to be logged when calling the <code>addsecurityevent</code> function.	DE175035
When attempting to add or perform any operation on the Batch plug-ins, a server error dialog appears.	DE189081
New Designer - At runtime, the actions 'Next Page' and 'Previous Page' do not work as expected.	DE190509
New Designer - If you switch from the Details panel to Components panel, the plug-in selection is lost. The current workaround is to select the plug-in again, which will refresh the Details panel and show the relevant information properly.	DE195533

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
When designing a page with multiple cards using the fit option for the grid layout, and subsequently changing the page width and height at runtime, the gutter space between the cards scales along with the page.	DE197417
The behavior of the 'Undo' functionality on the <a href="#">Display Panel (on page 231)</a> does not work as expected.	DE197540
When you make changes on a page, the save button is highlighted prompting to save the modifications. However, if those changes are reversed, effectively returning the page to its previously saved state, the save button continues to remain highlighted. The absence of changes does not deactivate the save button, as there are no pending modifications to be saved.	DE199776
New/Classic Designer - Actions defined for the Interactive Marker are not working properly in the end app.	DE199825
The Toggle plug-in's appearance differs between the runtime environment and the page designer.	DE199838
New Designer - There is no cancel button to discard changes made on a page.	DE199847
The <b>Hidden</b> property is not functioning correctly for plug-ins within a repeater. Despite being marked as 'hidden', plug-in/s continue to be visible at runtime.	DE200150
Operations Hub 'About' section version information does not reflect the SIM1 version.	DE200665
The 'Undo' button undoes the most recent keystroke instead of reverting to the original state of the HMI graphic. The problem also extends to other properties, as changing them and using the undo button may require multiple undo actions before reaching the original value.	DE200918
When you import an app and choose the 'replace' option, the UUIDs (Universally Unique Identifiers) of the queries in the imported application are different from the UUIDs present on the page.	DE200978

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
<p>When an undo operation is performed, the preview of the plug-ins may not load properly.</p> <p><b>Workaround:</b> Select the refresh icon on the toolbar to display previews properly.</p>	DE201052
<p>Copy pasting multiple instances of plug-ins on a page does not increment the plug-in IDs. As a result, multiple plug-ins can have identical IDs.</p>	DE201197
<p>The Dropdown plug-in ID is not reflected or paired with the dropdown name on the <a href="#">Page Visuals Tab (on page 229)</a>.</p>	DE201198
<p>Performance delays occur when multiple operations are performed within a span of 5 to 10 seconds in Operations Hub Page Designer. The application becomes slow or unresponsive.</p>	DE201452
<p>When a line connector width is modified, the arrow attached to the line is not getting updated proportionally to match the line width.</p>	DE201514
<p>While updating plug-in properties using multi-selection on a page, some properties remain unchanged.</p>	DE201824
<p>If you modify the default properties of the <a href="#">page grid (on page 239)</a> layout in an app, the default grid layout properties do not appear anymore for any additionally added pages. Instead, the settings from the previously created page are carried over to the newly created pages.</p>	DE201934
<p>New Designer - The query output binding view feature is not available. In the classic designer, users can select a query output and view where it was used on the page. It was also possible to easily unbind a query, if needed.</p>	DE202013
<p>Entering the plug-in height and width values less than the defined minimum values does not trigger a warning message. Min Height and Min Width field value validations are not working for all plug-ins on both the flex and coordinate layouts.</p>	DE202207
<p>Using the line connector tool, if you attempt to draw a line from any corner of a rotated plug-in, then the line is positioned differently and does not honor</p>	DE202225

**Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

(continued)

Description	Tracking ID
the desired starting position. The line should originate from the exact location where the user intended to draw it, regardless of the rotation of the plug-in.	
<p>When dealing with a large tag database, the tag browser pop-up dialog is challenging to use due to the following reasons:</p> <ul style="list-style-type: none"> <li>• lack of a search function</li> <li>• limited scrolling capabilities</li> <li>• absence of a keyboard to perform page up/down, or use the arrow keys</li> </ul>	DE202265
<p>When plug-ins and line connectors are added to the page, selecting multiple elements and hiding the lines retains the selection properly. However, when hiding plug-ins, the selection is lost.</p> <p>The selection of both lines and plug-ins is not consistent when hiding and un-hiding elements from the page visuals. When hiding a plug-in and then un-hiding it, the selection is automatically restored. However, when performing the same actions with lines, the selection is not automatically restored upon un-hiding.</p>	DE202416
The Camera plug-in will only work in runtime for keys enabled for custom plug-ins.	DE202984
Attempting to modify the <b>Generate ID</b> property in the Camera plug-in leads to an error.	DE202991

## Fixed Defects

**Table 3. Fixed Defects**

*The following fixed defects have been addressed with this version of Operations Hub.*

Description	Tracking ID
<p>Previously, the camera functionality was provided by a native widget. However, it was unclear how to retrieve the image captured by the camera plug-in. To address this, a new camera plug-in has been introduced. This plug-in includes an Image (base/64 encoded) output and features Image ID generation. When this property is enabled, a unique ID can be included when submitting the image. This ID can then be used to retrieve and display the image using the image plug-in.</p>	01069645
<p>Previously, when two different datalinks were used in plug-ins, both referencing the same source tag but using different queries, only plug-ins linked to one data source were refreshing in the run mode. This issue has been resolved.</p>	01076961
<p>Previously in Trend Card, when providing a JSON input for Historical data, the control rapidly switched between 'Live' and 'Historical' modes, causing some parts of the header to flash between two states. The trend itself never appeared. This issue occurred specifically with Historical JSON input, while it worked fine with Live JSON input. The issue has been resolved.</p>	01081841
<p>Previously, in Pivot Grid, the horizontal scrollbar was missing when the list was long. Users had to scroll down to the end of the list to get the horizontal scrollbar. This issue occurred when there was a long list and many columns, requiring both vertical and horizontal scrolling.</p> <p>From Operations Hub 2023.1 onwards, plug-ins will not honor the JSON manifest height &amp; width. Instead, use the widget properties.</p>	01083314
<p>There was an issue with rounding values in Pivot Grid when the query used to populate the plug-in returned both numeric and string values.</p> <p>The problem occurred because we tried to round values in the Pivot Grid using its built-in format feature, which includes setting the "precision" parameter to specify the number of decimal places. However, this parameter on-</p>	01083372

**Table 3. Fixed Defects**

*The following fixed defects have been addressed with this version of Operations Hub.*

(continued)

Description	Tracking ID
<p>ly works with numbers. When the query returned numeric values as strings, the precision setting did not work.</p> <p>This issue has been resolved.</p>	
<p>Error messages appear for users belonging to the <code>igp.studioAdmin</code> group after logging into Operations Hub. Removing the user from this group resolves the issue.</p> <p>By design, users logging into Operations Hub should not be added to the <code>igp.studioAdmin</code> group.</p>	01083439
<p>Previously in Favorite Organizer, when dragging a favorite from the 'Unorganized' folder and attempting to drop it into another folder, the focus of the favorite remained in the 'Unorganized' folder. This issue occurred when working with long lists that required scrolling.</p> <p>To temporarily resolve the issue, a right-click context menu is added to allow users to cut/paste favorites as a workaround.</p>	01068335
<p>Previously in Datagrid, the horizontal scrollbar was missing when the list is long. The scrollbar only appeared when scrolling down to the end of the list. This issue occurred due to the way the Datagrid height is set. If the height is set in pixels and is larger than the card height itself in the designer, the browser scroll takes over. This means that without scrolling to the bottom, you will not see the horizontal scrollbar. To fix the issue, a menu has been introduced. Users can right-click on the column header and fix any column to the left or right.</p>	01078908
<p>Previously, while exporting applications from one server and importing them into another led to loss of images. This issue occurred due to missing application and image mappings in the database, resulting in the application not exporting all the images used within it. This issue has been resolved.</p>	01086089



**Table 3. Fixed Defects**

*The following fixed defects have been addressed with this version of Operations Hub.*

(continued)

Description	Tracking ID
Previously, the Trend card was losing the visibility settings for individual tags configured through the eye icon in the legend when switching from normal trending to stacked trending. This issue has been resolved.	01072257
When using a data query with the tag display format parameter defined as input field (not fixed value) for Color animation link, a warning was displayed in Run mode even if the tag display format input was defined. This issue could be worked around by defining the tag display format parameter as fixed value at the data query definition.	01076959
Adding a UAA user with the <code>iqp.studioAdmin</code> group mapping did not bring the user to the Operations Hub designer as expected. This issue has been resolved.	01081867
Previously, the Button widget did not work properly to set the value of a global using the formula option (as data source). This issue has been resolved.	01088159
Previously, animations were not working properly because of how the program handled 'False' or the number '0' values. Instead of recognizing 'False' as a specific value, the program interpreted it as 'undefined', which led to the incorrect behavior. This issue has been resolved.	01091391
Previously, the Sparkline widget was not adjusting its size to fit the available space in the browser window, regardless of the browser size. This issue has been resolved by upgrading to the latest version.	01089088
Previously, the plug-in upgrade process was not correctly passing the command line arguments to the console program, resulting in the program not receiving any inputs. This issue has been resolved.	01091554
Previously in Trend card, when trying to create a Historical trend, it took a very long time for the data to load. This made the web browser slow down or even crash, especially when using Google Chrome or Firefox. This issue has been resolved.	01091823

**Table 3. Fixed Defects**

*The following fixed defects have been addressed with this version of Operations Hub.*

(continued)

Description	Tracking ID
Previously, the Datagrid displayed incorrect values if an alias with a dot in its name is used along with Column Cell Animation. This issue has been resolved.	01092998
Previously, when displaying the last updated or modification date for applications, the timezone abbreviation was assumed to be 3 characters long. This assumption caused issues when displaying timezones with abbreviations that were 4 characters long, such as those in Europe. Code has been modified to correctly handle timezone abbreviations with 4 characters, ensuring that the dates are displayed accurately regardless of the timezone abbreviation length.	01094598
Previously, the line connectors were not scaling properly causing misalignment of line connectors with other objects on the page when the application is opened in a different browser window size or on a different screen. This issue has been resolved.	01094596
Previously, when using Solid Gauge with the text position set to 'Center' and an Engineering Unit added, the text is not centered, and the Engineering Unit is displayed below the value instead of on the right side. This issue has been resolved.	01091268
After importing multiple .csv files to the Asset model in Operations Hub 2023.1 server, the customer is unable to export assets (full export). The error messages indicate issues with GET requests to certain endpoints, resulting in HTTP status codes 404 and 503, indicating "Not Found" and "Service Unavailable" respectively. This issue has been resolved.	01102688
When multiple rows are selected in the Datagrid, and then one or more rows are unselected, the output global does not update correctly. It retains the ID of the last unselected row instead of removing it. This issue has been resolved.	01098558
Previously, the radio button was not functioning correctly. This is fixed now.	01106068

**Table 3. Fixed Defects**

*The following fixed defects have been addressed with this version of Operations Hub.*

(continued)

Description	Tracking ID
The Datagrid widget is not cleared when moving between pages, even when nothing is selected in the dropdown. This issue has been resolved.	01106079
Previously, graphical objects were not displaying correctly in Operations Hub. This issue has been resolved.	01078488
When there are multiple charts on the same page, such as a Trend Card and a Histogram, their configuration interfaces appear on the same layer as the chart. This can result in the configuration interface hiding below the other chart. This issue has been resolved.	1086298
When two pages within Operations Hub use equal OPC UA write queries connected to input visuals, only one page works correctly at a time. The other page displays an exception error. This issue has been resolved. Each page's 'Page Data' is independent of other pages, even if they use the same queries.	01098726
Previously, there was a discrepancy between the update of the input field's global value and its displayed value. This issue has been resolved.	01098711
Adding more than six trend charts on a page enables vertical scroll bars, even when there is sufficient space to display the charts without scrolling. This issue has been resolved allowing for a better display of multiple charts on a page.	01100338
After importing an application into a different system and selecting the 'Replace' option, the query configuration within the application is lost. Although the query appears under the Query tab, selecting or opening it results in an empty page. This issue has been resolved. The import process replaces the query configuration as part of the application import, ensuring that the query is correctly configured in the new system.	01096584
After upgrading to Operations Hub 2023.1 SIM1, the solid gauge widgets were not appearing as expected in the application. This issue has been resolved.	01099341

**Table 3. Fixed Defects**

*The following fixed defects have been addressed with this version of Operations Hub.*

(continued)

Description	Tracking ID
Previously, images were lost during the export/import operations between the production and test servers in Operations Hub. This issue has been resolved.	01086089
When the pie chart widget has a larger number of labels, the labels overlap, making it impossible to read all of them. This issue has been resolved.	01102683
Previously, clicking the help icon on the Trend Card widget did not lead to the correct page on the online help. This issue has been resolved.	01102080
After upgrading to SIM2, several issues have been identified with the Drop-down widget. This issue has been resolved.	01106003
Previously, the Dropdown widget would set a "null" value to the global if used as a target. This impacts the conditions applied to pages, as a condition may require the global to have a value. However, with the current behavior, the condition renders true since "null" is considered a value. This issue has been resolved.	01106267
Previously, users with the freemium tier were incorrectly forced into demo mode with 2-hour time limits. This issue has been resolved.	01109852
Previously, users were incorrectly forced into demo mode after updating to the latest sales demo 2023.1 key. This occurred when the new sales demo key contained new licensing tiers such as canvas, insights, or ultimate. This issue has been resolved.	01110391
Upgrading Operations Hub to the latest version resolves port starvation issues.	01114544, 01072610
When attempting to execute a PUT request that requires the Content-Type header to be set to <code>application/vnd.ge.mes.v1.full+json</code> , the request fails to be processed as expected. The issue has been resolved by updating the request processing logic to correctly handle the Content-Type header parameters for PUT requests.	01090895

**Table 3. Fixed Defects**

*The following fixed defects have been addressed with this version of Operations Hub.*

(continued)

Description	Tracking ID
<p>When attempting a partial export of assets, the process sometimes lasted for several hours, with the export process appearing to hang intermittently. This behavior was inconsistent, with export times varying between one to two hours. The issue has been resolved by identifying and addressing the root cause of the extended export times and hang-like behavior. Partial exports now complete in a reasonable amount of time, providing a smoother experience.</p>	01100372
<p>After attempting to import an application exported from the Operations Hub within the Configuration Hub system using the import function, the import process fails. This issue has been resolved by identifying and addressing the root cause of the import failure.</p>	1112337
<p>After applying the SIM4 patch to Operations Hub 2022.6, the application no longer supports the Dropdown widget version 1.0.0. Attempts to upgrade the widget to version 1.0.1 using the application upgrade utility were unsuccessful. The issue was resolved by updating the Dropdown widget specification in SIM5, allowing the application to properly support and utilize the upgraded version of the widget.</p>	01117814
<p>When attempting to import an application in Operations Hub 2022.06 SIM4, an error message appears: "Error while publishing application: null." This issue is related to the server not finding the image file in the images folder, causing an exception and halting the import process. The fix implemented for this issue catches the error, logs it, and allows the import process to continue and complete successfully.</p>	01119819
<p>Widgets in applications developed in Operations Hub Classic did not render properly, exhibiting issues such as:</p> <ul style="list-style-type: none"> <li>• scrollbars appearing in containers</li> <li>• inconsistent layout across different computers</li> </ul>	01105598

**Table 3. Fixed Defects**

*The following fixed defects have been addressed with this version of Operations Hub.*

(continued)

Description	Tracking ID
<ul style="list-style-type: none"> <li>• unexpected scrollbar behavior when adding padding or margins to a control</li> <li>• margins not being applied as expected</li> </ul> <p>This issue has been resolved.</p>	
<p>The issue affects the functionality of show/hide conditions assigned to visual objects in the new layout in Configuration Hub (Classic Operations Hub does not have this issue). When a show/hide condition includes a constant on the right side of the equation (e.g., 'Flow1.value &gt;= 1200'), the condition works as expected. However, when the condition includes a flow on the right side (e.g., 'Flow1.value &gt;= Flow2.value'), the condition never works, and the object always remains hidden. This issue has been resolved by implementing a fix that ensures show/hide conditions work correctly in all scenarios, including when flows are used on the right side of the equation.</p>	01107773
<p>Currently, errors returned by an Extension query are not displayed on the page at runtime unless a plug-in from the Integration suite is present on the page. This behavior has been identified and resolved in the latest update, ensuring that Extension query errors are always displayed on the page for improved visibility and troubleshooting.</p>	01117522
<p>When a map is configured on a page, the marker icon and position settings are automatically reset every time the page reloads. This issue has been resolved in the latest update, ensuring that the marker icon and position settings are retained even after the page is reloaded.</p>	01118631
<p>When using a repeater to generate check boxes, the array length generated by there repeater for check boxes varies inconsistently. This led to unexpected behavior when used as input for SQL parsing. Code has been modified to resolve the issue.</p>	01118937
<p>When multiple Dropdown widgets are present on a page, changing the value of one Dropdown widget does not reset the subsequent dropdowns to a blank state as intended. To resolve this issue, a new property called 'De-</p>	01106844

**Table 3. Fixed Defects**

*The following fixed defects have been addressed with this version of Operations Hub.*

(continued)

Description	Tracking ID
pendency' has been introduced. This property allows us to link all the dependencies to a particular dropdown, ensuring that when the value of that dropdown changes, the subsequent dropdowns are reset to a blank state.	
When using the 'Historical By Interval-Calculated Mode' query in a page to calculate a minimum value in a time interval, the configuration was not getting saved in Page Data. Code has been modified to fix the issue.	01123540
Users were incorrectly forced into demo mode with a 2-hour time limit on the Freemium Tier. Code has been modified to fix the issue.	01109852
Creating and editing a custom graphic in the new Operations Hub caused the page to crash. This issue has been resolved.	01113884
Previously in Trend card, selecting 'Stacked Y-Axis' mode does not work as expected. Instead of splitting into multiple trends with each having its own tag, it behaves the same as 'Trend Card' mode, showing just one trend with all the tags. This issue occurs in both Live and Historical modes. This issue has been resolved.	01120966
When attempting to set the input query to 'none' after it has been previously set to a specific query, an error occurs. The input query reverts back to the previously selected query. This issue has been resolved.	01119329
Widgets and graphics were not displaying while editing a page. This issue has been resolved.	01124748

## Compatibility Matrix

**Table 4. Compatibility Matrix**


*The following products are compatible with Operations Hub.*

Product	Required Version
Proficy Historian	<ul style="list-style-type: none"> <li>• Historian 2024</li> <li>• Historian 2023</li> </ul>

**Table 4. Compatibility Matrix**

*The following products are compatible with Operations Hub.*

(continued)

Product	Required Version
	 <b>Note:</b> Historian REST APIs are required for REST integration between Operations Hub and Historian. Historian REST APIs are installed automatically when you install Historian web-based clients.
Proficy Plant Applications	<ul style="list-style-type: none"> <li>• Plant Applications 2023</li> <li>• Plant Applications 2022</li> </ul>
Configuration Hub	Configuration Hub 2024
Proficy Authentication (UAA)	Proficy Authentication 2024
Proficy iFIX	<ul style="list-style-type: none"> <li>• iFIX 2024</li> <li>• iFIX 2023</li> </ul>
Proficy CIMPLICITY	<ul style="list-style-type: none"> <li>• CIMPLICITY 2023</li> <li>• CIMPLICITY 2022</li> </ul>
Industrial Gateway Server	IGS OPC Server 7.68 and later
Proficy Workflow	Workflow Task Client 2.6 SP2
GE Common Licensing	Version 20.7.2423 and later



# Chapter 2. Getting Started with Operations Hub

## Getting Started with Operations Hub

This topic describes how to work with Operations Hub using the latest (HMI powered designer) and the classic version.

With 2023 release, Operations Hub is now available as a plug-in in Configuration Hub. The latest version is equipped with a HMI designer layout, and has enhanced plug-in functionality. All the features from the classic version of Operations Hub are also available in this latest version.

1. Install the latest version of Operations Hub. Refer to [Installation Process Overview \(on page 34\)](#).
2. [Log in to the Operations Hub classic \(on page 80\)](#) and set up the following:
  - [Data Sources \(on page 420\)](#) (required)
  - [Queries \(on page 314\)](#)
  - [Entities \(on page 292\)](#)
  - [Themes \(on page 478\)](#) (optional)
3. Log in to the latest version of Operations Hub via Configuration Hub.
  - a. Double-click the Configuration Hub desktop shortcut.
  - b. Log in with the credentials that you specified during installation.
  - c. On the Configuration Hub navigation panel, navigate to the Operations Hub home page. For more information on using the Operations Hub new layout, refer to [Panels Layout \(on page 213\)](#).
4. [Create an application \(on page 265\)](#).
5. [Create pages for your application \(on page 450\)](#).
6. Use the following features to design your application pages:
  - [Grid \(on page 239\)](#)
  - [Design a layout using the coordinate card \(on page 248\)](#).
  - [Design a layout using the flexbox card \(on page 240\)](#).
  - [Apply format tools to design your pages \(on page 232\)](#).
  - [Connect plug-ins with a line connector \(on page 234\)](#).
  - [Animate HMI graphics \(on page 788\)](#).
  - [Bind data to your plug-ins \(on page 224\)](#).
7. Save the application pages, and preview the end application.

# Installing Operations Hub

## Installation Process Overview


This topic provides an overview of installing Operations Hub successfully.

You can install Operations Hub from the Proficy Installer package (ISO), which is distributed as follows:



- **Standalone ISO:** Includes common components (Proficy Authentication, Configuration Hub) and Operations Hub.
- **SCADA ISO:** Includes iFIX or CIMPLICITY, common components (Proficy Authentication, Configuration Hub), and Operations Hub.

The following table outlines the key milestones involved in installing Operations Hub.

#	Task	Description
1	Ensure that your system meets the minimum requirements.	Refer to <a href="#">System Requirements (on page 36)</a> for the necessary hardware, software, and network configurations to run Operations Hub successfully.
2	Verify the features included with your license.	Refer to <a href="#">Understanding Operations Hub Licensing Tiers (on page 38)</a> .
3	Run the Proficy installer to install Proficy Authentication and Configuration Hub.	For step-by-step instructions, refer to <a href="#">Install Common Components (on page 42)</a> .

 **Note:**  
To ensure accessibility for users, Operations Hub must be registered with Configuration Hub.

- Registration can be completed either during installation or post-installation via the Configuration Hub Node Manager.
- If you choose to register during installation, make sure to establish authen-

#	Task	Description
	 <p>entication for Configuration Hub with Proficy Authentication prior to installing Operations Hub. Failure to do so may result in an error when attempting to access Operations Hub Designer.</p> <ul style="list-style-type: none"> <li>• However, if such an error occurs, post-install registration remains an available solution.</li> </ul>	
4	Run the Proficy installer to install Operations Hub.	For step-by-step instructions, refer to <a href="#">Install Operations Hub (on page 49)</a> .
5	<p>If you opted to register Operations Hub with Configuration Hub after install, then do it now.</p>  <p><b>Note:</b> You cannot have multiple instances of Operations Hub in Configuration Hub.</p>	For more information, refer to the topic <i>Install Time Registration</i> in the <i>Configuration Hub documentation</i> .

You will need to install a security certificate on each client where you want to access Operations Hub. For step-by-step instructions, refer to [Install the Certificate on your Clients \(on page 76\)](#).



**Note:**

If installing Operations Hub remotely from Configuration Hub, make sure that the Operations Hub certificate is trusted by Configuration Hub. If not trusted, then the request to load plug-ins gets blocked.

To install a newer version of Operations Hub over an existing installation, refer to [Upgrade Operations Hub \(on page 74\)](#).

To perform a command-line installation of Operations Hub, refer to [Install Operations Hub in Unattended Mode \(on page 75\)](#).

## System Requirements

This topic provides the requirements for hardware components, browsers, and operating systems.

When you install Operations Hub, all the required components are automatically installed.

### Minimum Hardware Requirements

You can install Operations Hub on a processor with 4-core configuration and a RAM of 16 GB.

To support up to 300 concurrent users, you need a hardware configuration of at least 32GB and an 8-core CPU.

### Supported Operating Systems

You can install Operations Hub on any of the following desktop operating systems:

- Microsoft Windows Server 2019
- Microsoft Windows Server 2022

***Operations Hub can also be installed on VMs deployed on Azure and AWS.***

### Supported SQL Versions

You can use Operations Hub with external data sources from the following relational databases:

- Microsoft SQL Server 2016
- Microsoft SQL Server 2017
- Microsoft SQL Server 2019

### Supported Browsers

You can access Operations Hub using any of the following web browsers:

- Google Chrome (recommended)
- Mozilla Firefox
- Apple Safari
- Microsoft Edge

We recommend using a resolution of 1600 x 1200 for the browser. In addition, use a relatively modern device so that the browser has enough resources to render the visualizations and respond to user interactions with adequate performance.

The following mobile devices are supported for client access (end-app support only):

- iOS 12.0 and later
- Android 9.0 and later




**Note:**

We recommend using a device with medium to high resolution, and in landscape mode.

### Compatibility Matrix

*The following products are compatible with Operations Hub.*

Product	Required Version
Proficy Historian	<ul style="list-style-type: none"> <li>• Historian 2024</li> <li>• Historian 2023</li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <p><b>Note:</b> Historian REST APIs are required for REST integration between Operations Hub and Historian. Historian REST APIs are installed automatically when you install Historian web-based clients.</p> </div>
Proficy Plant Applications	<ul style="list-style-type: none"> <li>• Plant Applications 2023</li> <li>• Plant Applications 2022</li> </ul>
Configuration Hub	Configuration Hub 2024
Proficy Authentication (UAA)	Proficy Authentication 2024
Proficy iFIX	<ul style="list-style-type: none"> <li>• iFIX 2024</li> <li>• iFIX 2023</li> </ul>
Proficy CIMPLICITY	<ul style="list-style-type: none"> <li>• CIMPLICITY 2023</li> <li>• CIMPLICITY 2022</li> </ul>
Industrial Gateway Server	IGS OPC Server 7.68 and later

Product	Required Version
Proficy Workflow	Workflow Task Client 2.6 SP2
GE Common Licensing	Version 20.7.2423 and later

## Understanding Operations Hub Licensing Tiers

This topic describes the different license options available for Operations Hub.

The Licensing Client is automatically installed with the [Operations Hub installation \(on page 34\)](#).

These are the different license levels for using Operations Hub.

- **Demo:** This is a limited version to try out the application for 2 hours. You can explore the features and functionalities of Operations Hub before making a purchase decision.
- **Freemium:** This is a commercial license packaging offering Historian or Plant Applications customers an opportunity to try out Operations Hub out of the box content.
- **Canvas:** This is our entry-level HMI offering, providing capability and connectivity to create basic HMI applications for monitor and control on top of our SCADA products.
- **Insights:** This is our mid-level offering, designed to provide capability and connectivity to create customized MES application on top of Proficy Plant Applications.
- **Ultimate:** This is our premium offering, granting complete access to Operations Hub. You will enjoy unrestricted access to all features, tools, and application capabilities in order to create a wide variety of operational interfaces and enable Connected Worker initiatives across an enterprise.

## Available Components for Licenses

The following table describes the Operations Hub components available for each license level.

Category	Component	Demo (No License)	Freemium	Canvas	Insights	Ultimate
Layouts	<a href="#">Grid (on page 239)</a>	✓	✓	✗	✓	✓
	<a href="#">Flexbox (on page 240)</a>	✓	✓	✗	✓	✓
	<a href="#">Coordinate (on page 248)</a>	✓	✓	✓	✗	✓
	Classic	✓	✓	✓	✓	✓
GE Data Source	Proficy CIMPLICITY	✓	✗	✓	✓	✓
	Proficy iFIX	✓	✗	✓	✓	✓

Category	Component	Demo (No License)	Freemium	Canvas	Insights	Ultimate
Connectivity	Proficiency Historian	✓	✓	✓	✓	✓
	Proficiency Plant Applications (MES)	✓	✓	✗	✓	✓
	Proficiency Workflow	✓	✗	✗	✓	✓
Additional Data Source Connectivity	SQL	✓	✗	◆ <sup>1</sup>	✓	✓
	REST API	✓	✗	◆ <sup>1</sup>	✓	✓
	OPC UA	✓	✗	◆ <sup>1</sup>	◆ <sup>1</sup>	✓
	MQTT	✓	✗	◆ <sup>1</sup>	◆ <sup>1</sup>	✓
Extensions	Custom Plug-in SDK	✓	N/A	◆ <sup>1</sup>	◆ <sup>1</sup>	✓
Operations Hub Plug-ins	<a href="#">Button (on page 575)</a>	✓	N/A	✓	✓	✓
	<a href="#">Line Chart (on page 592)</a>	✓	N/A	✗	✓	✓
	<a href="#">Pie Chart (on page 596)</a>	✓	N/A	✗	✓	✓
	<a href="#">Check Box (on page 577)</a>	✓	N/A	✗	✓	✓
	<a href="#">CIMPPLICITY HMI Webpace (on page 645)</a>	✓	N/A	✓	✓	✓
	<a href="#">DataGrid (on page 715)</a>	✓	N/A	✓	✓	✓
	<a href="#">Date Picker (on page 578)</a>	✓	N/A	✓	✓	✓
	<a href="#">Gauge Bar (on page 723)</a>	✓	N/A	✗	✓	✓
	<a href="#">Gauge Circular (on page 725)</a>	✓	N/A	✗	✓	✓
	<a href="#">Gauge Linear (on page 727)</a>	✓	N/A	✗	✓	✓
	<a href="#">Alarm Card (on page 685)</a>	✓	N/A	✓	✓	✓
	<a href="#">Alarm Count (on page 697)</a>	✓	N/A	✓	✓	✓
	<a href="#">Batch Alarms (on page 780)</a>	✓	N/A	✓	✗	✓
	<a href="#">Batch Binding Prompts (on page 779)</a>	✓	N/A	✓	✗	✓
<a href="#">Batch Control (on page 782)</a>	✓	N/A	✓	✗	✓	

Category	Component	Demo (No License)	Freemium	Canvas	Insights	Ultimate
	<a href="#">Batch List (on page 777)</a>	✓	N/A	✓	X	✓
	<a href="#">Batch Menu (on page 776)</a>	✓	N/A	✓	X	✓
	<a href="#">Batch Parameter (on page 785)</a>	✓	N/A	✓	X	✓
	<a href="#">Batch Phase Control (on page 781)</a>	✓	N/A	✓	X	✓
	<a href="#">Batch Prompts (on page 778)</a>	✓	N/A	✓	X	✓
	<a href="#">Batch Recipe Info (on page 785)</a>	✓	N/A	✓	X	✓
	<a href="#">Batch Reports (on page 785)</a>	✓	N/A	✓	X	✓
	<a href="#">Batch SFC (on page 777)</a>	✓	N/A	✓	X	✓
	<a href="#">Batch Step Control (on page 786)</a>	✓	N/A	✓	X	✓
	<a href="#">Batch Step List (on page 787)</a>	✓	N/A	✓	X	✓
	<a href="#">Breadcrumb (on page 756)</a>	✓	N/A	✓	✓	✓
	<a href="#">Bullet Graph (on page 598)</a>	✓	N/A	X	✓	✓
	<a href="#">DateTime Range Picker (on page 581)</a>	✓	N/A	✓	✓	✓
	<a href="#">Dropdown (on page 583)</a>	✓	N/A	X	✓	✓
	<a href="#">Favorite Organizer (on page 759)</a>	✓	N/A	✓	✓	✓
	<a href="#">Histogram (on page 601)</a>	✓	N/A	X	✓	✓
	<a href="#">HTML Editor (on page 763)</a>	✓	N/A	X	✓	✓
	<a href="#">iFrame (on page 765)</a>	✓	N/A	X	✓	✓
	<a href="#">Mimic Card (on page 697)</a>	✓	N/A	✓	✓	✓
	<a href="#">Pareto Chart (on page 607)</a>	✓	N/A	X	✓	✓
	<a href="#">Pivot Grid (on page 729)</a>	✓	N/A	X	✓	✓



Category	Component	Demo (No License)	Freemium	Canvas	Insights	Ultimate
Plant Appli-	Solid Gauge <i>(on page 734)</i>	✓	N/A	X	✓	✓
	Sparkline <i>(on page 609)</i>	✓	N/A	X	✓	✓
	Spider Chart <i>(on page 611)</i>	✓	N/A	X	✓	✓
	Timeline <i>(on page 614)</i>	✓	N/A	X	✓	✓
	Trend Card <i>(on page 619)</i>	✓	◆ <sup>2</sup>	✓	✓	✓
	Value Display <i>(on page 738)</i>	✓	N/A	X	✓	✓
	Variwide Chart <i>(on page 642)</i>	✓	N/A	X	✓	✓
	HMI Graphics <i>(on page 788)</i>	✓	N/A	✓	X	✓
	iFIX HMI Webpace <i>(on page 673)</i>	✓	N/A	✓	✓	✓
	Image <i>(on page 743)</i>	✓	N/A	✓	✓	✓
	Indicator <i>(on page 746)</i>	✓	N/A	X	✓	✓
	Simple Indicator <i>(on page 745)</i>	✓	N/A	X	✓	✓
	List <i>(on page 750)</i>	✓	N/A	X	✓	✓
	Radio Button <i>(on page 586)</i>	✓	N/A	X	✓	✓
	Slider <i>(on page 588)</i>	✓	N/A	X	✓	✓
	Text <i>(on page 509)</i>	✓	N/A	X	✓	✓
	Text Area <i>(on page 589)</i>	✓	N/A	X	✓	✓
	Text Input <i>(on page 590)</i>	✓	N/A	✓	✓	✓
	Toggle <i>(on page 591)</i>	✓	N/A	✓	✓	✓
	Interactive Map <i>(on page 252)</i>	✓	N/A	X	✓	✓
	Repeater <i>(on page 254)</i>	✓	N/A	X	✓	✓
	Line Connector <i>(on page 234)</i>	✓	N/A	✓	X	✓
List of Plug-ins	✓	◆ <sup>2</sup>	X	✓	✓	

Category	Component	Demo (No License)	Freemium	Canvas	Insights	Ultimate
Applications Web Client						

- ◆ Optional add-on components available for the respective license for an additional cost.
- ◆ Plug-ins are available during runtime only for the Freemium tier. Users get out-of-the-box applications installed with a freemium license (Analysis App with Historian freemium, Plant Applications Web Client Apps with Plant Applications freemium, etc.)

N/A - Not applicable to a Freemium license as users are not allowed to create, edit, or save Apps and pages.

## Install Common Components

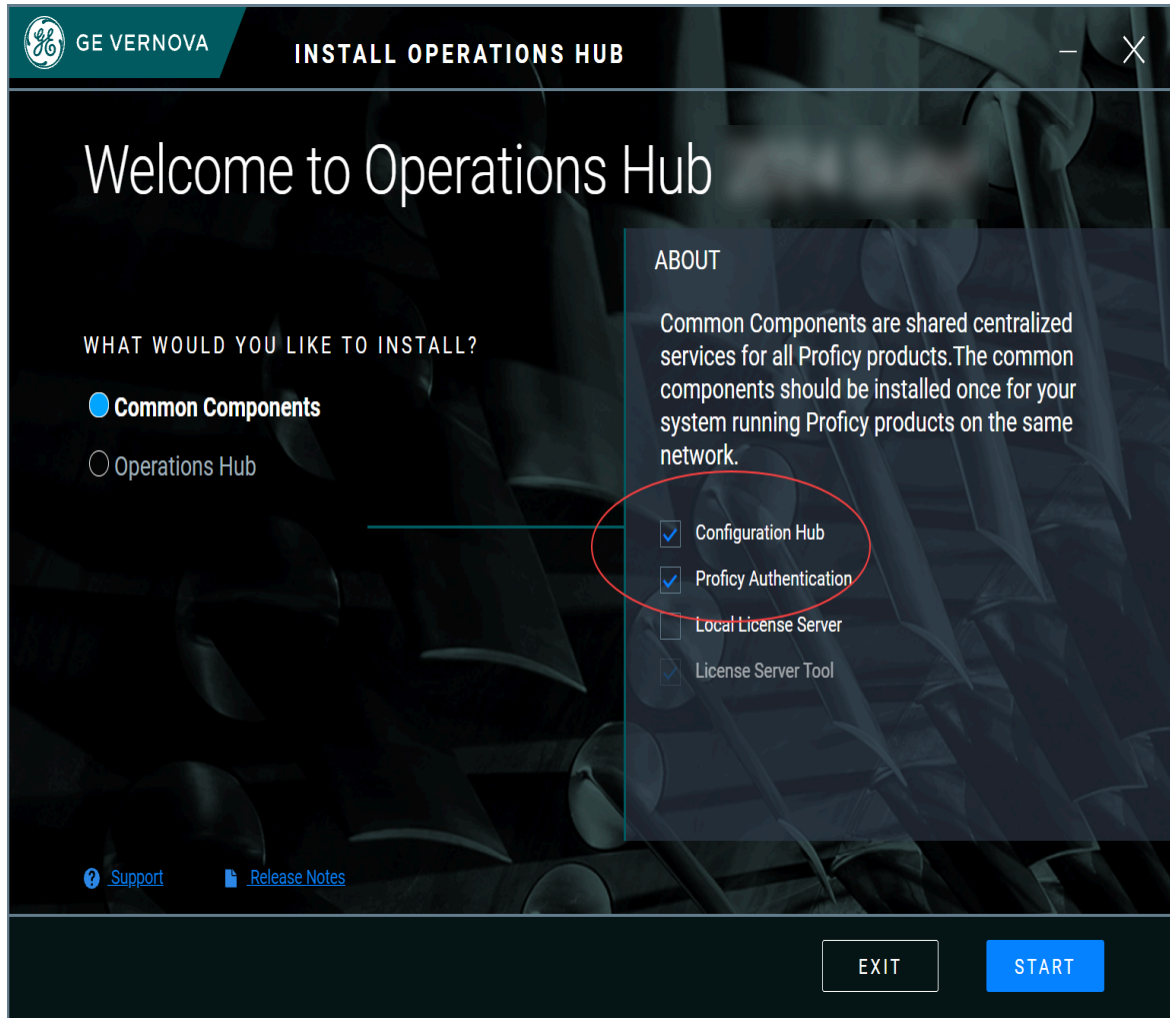
This topic describes how to install Proficy Authentication and Configuration Hub.

Ensure that you have administrative privileges to the machine on which you want to perform the installation.

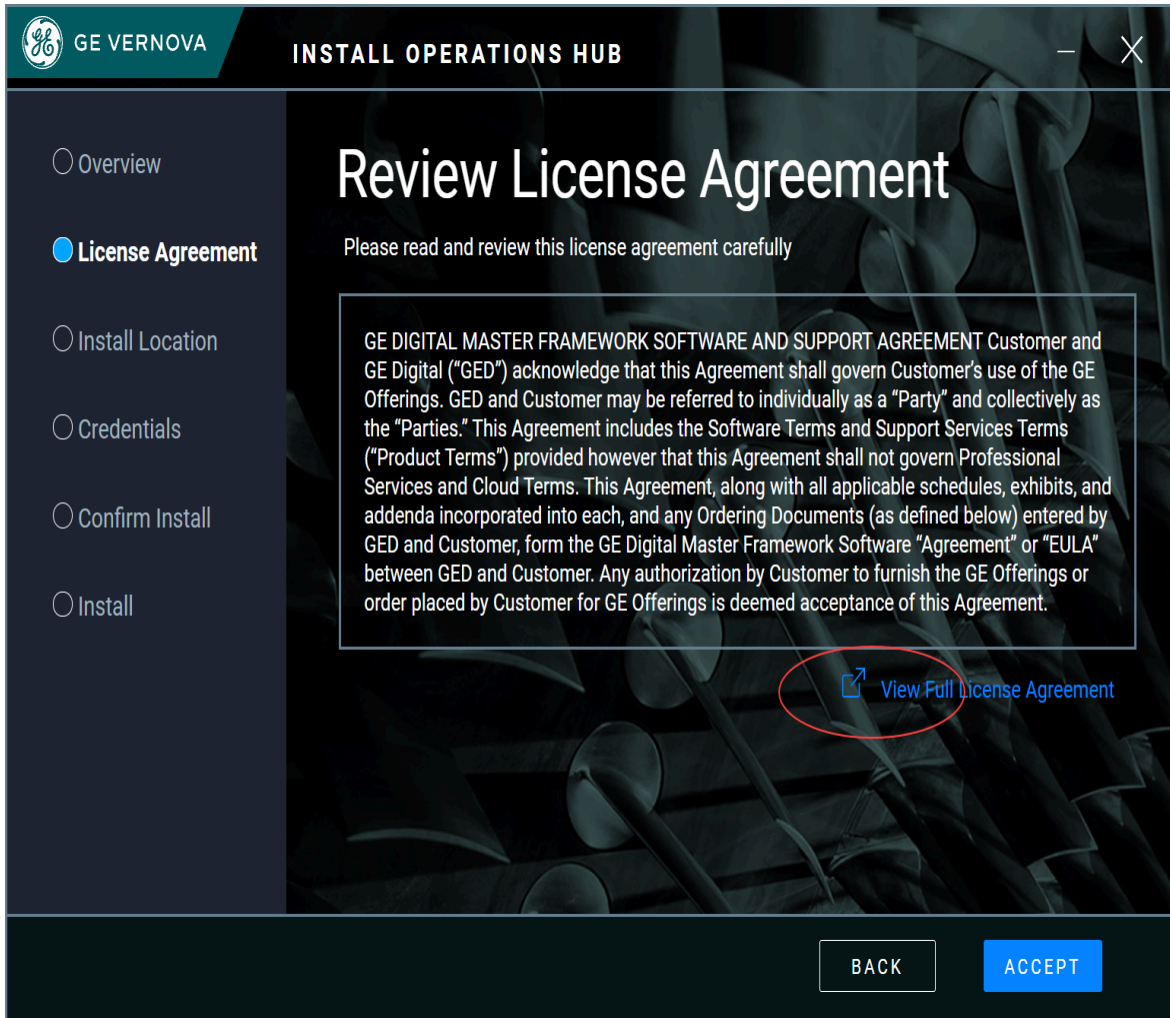
Download the latest Operations Hub ISO installation media from Salesforce and mount the file.

Common components are Proficy Authentication and Configuration Hub. It is recommended to install common components before proceeding with any additional product installations.

- In the mounted ISO, navigate to the **Setup** folder and execute the `setup.exe` file.  
The welcome screen appears.
- Select **Common Components > START**.



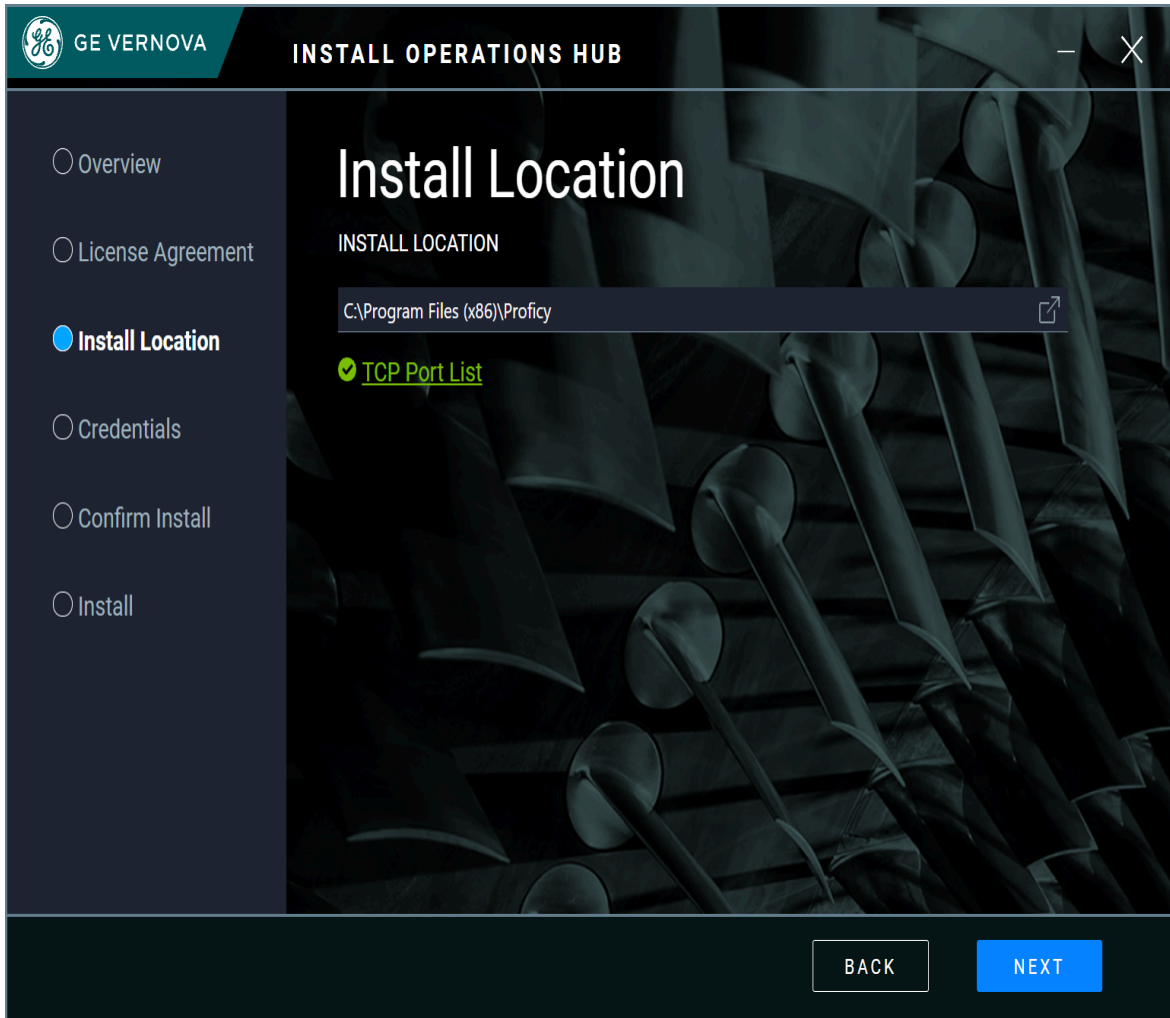
3. Read and accept the license agreement to continue with the install.



The **Install Location** screen appears and validates for port conflicts.

4. Continue to the next screen with the default install location.

If port conflicts are detected, you must fix them before proceeding to the next screen.



If there are no conflicts, the **Credentials** screen for Configuration Hub and Proficy Authentication appears.

5. Complete the following and proceed to the next screen.



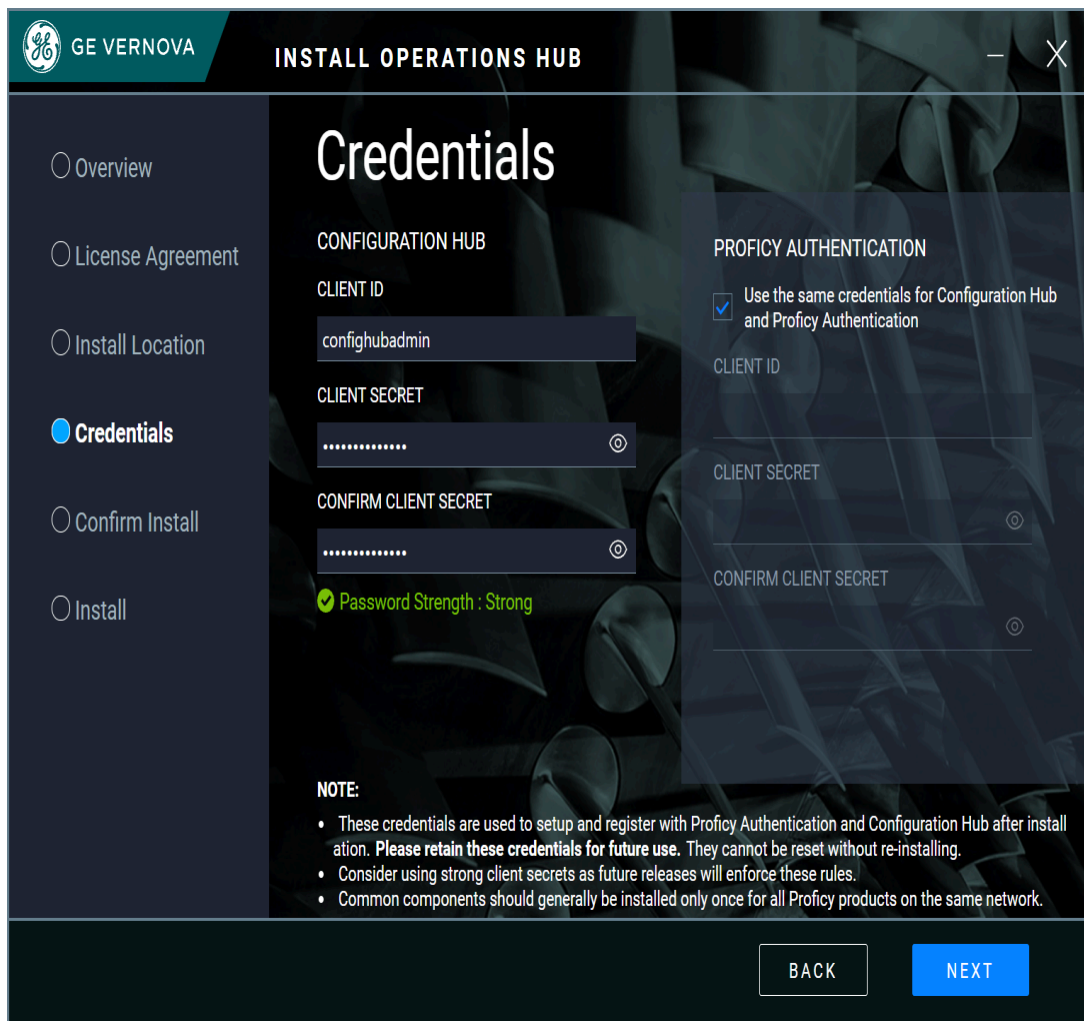
**Note:**

Keep a record of the information you enter here, as you will need it later to log in to the applications. If you forget the credentials, you will have to reinstall common components to configure them again.

a. Create these login credentials for Configuration Hub:


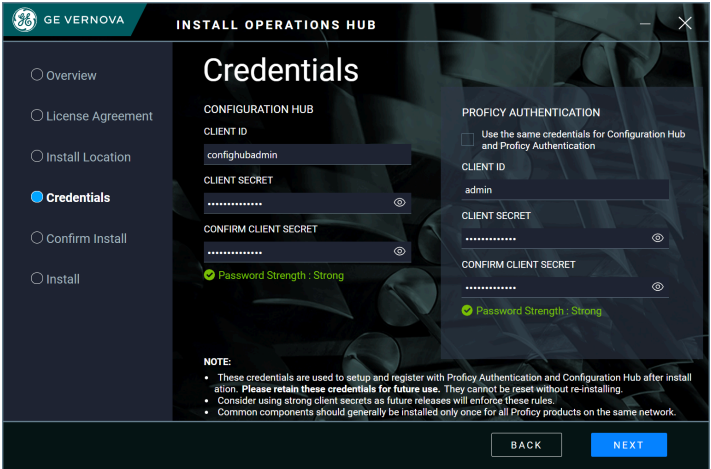
<b>CLIENT ID</b>	Enter a client id, which you can use to login to the Configuration Hub application.
------------------	---

	For example, <code>confighubadmin</code>
<b>CLIENT SECRET</b>	Enter a secret password for your Configuration Hub client id.
<b>CONFIRM CLIENT SECRET</b>	Enter the secret password again to confirm.



b. Create these login credentials for Proficy Authentication:

<p><b>Use the same credentials for Configuration Hub and Proficy Authentication</b></p>	<p>If you select this check box, then you do not have to enter any additional credentials for Proficy Authentication. The login credentials you entered for Configuration Hub is automatically applied to Proficy Authentication.</p>
---	---

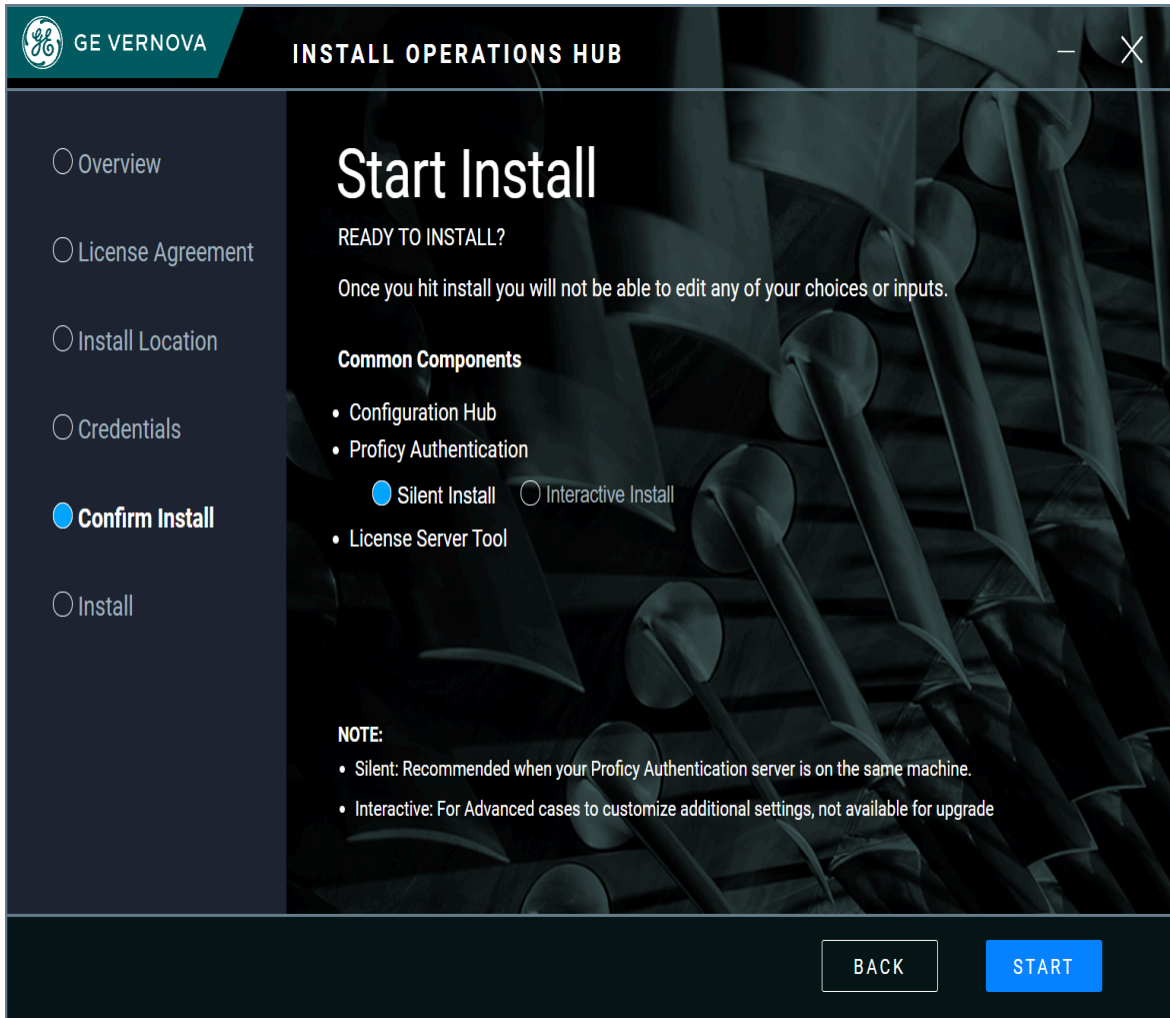
<p> <b>Note:</b> It is recommended to install common components (Configuration Hub, Proficy Authentication) with the same client id/secret.</p>	<p>This is a useful feature if you do not want to remember two sets of login credentials.</p> <p>However, if you want to set unique login credentials for Proficy Authentication, then clear the check box and proceed to enter additional details.</p>
<p><b>CLIENT ID</b></p>	<p>Enter a client id, which you can use to login to the Proficy Authentication application.</p>
<p><b>CLIENT SECRET</b></p>	<p>Enter a secret password for your Proficy Authentication client id.</p>
<p><b>CONFIRM CLIENT SECRET</b></p>	<p>Enter the secret password again to confirm.</p> 

The **Start Install** screen appears.

6. Choose from the following install options and select **START**.

<p><b>Silent Install</b></p>	<p>Selecting this option initiates an automated installation using pre-configured settings, without prompting for additional information.</p>
<p><b>Interactive Install</b></p>	<p>Selecting this option enables you to configure settings for Proficy Authentication.</p>





7. After the installation is complete, select **CLOSE**.

A message appears asking whether you want to restart your computer, or install more products.

Select from these options:

<b>Install More Products</b>	You are redirected to the installation welcome screen, from where you can choose to install more applications. For example, Operations Hub.
<b>Reboot Later</b>	Closes the installation setup screen without restarting your computer.
<b>Reboot Now</b>	Restarts your computer.



**Note:**

You must reboot for applications to function properly. You may choose to do this after installing all the applications, or at a later time.

If you restart the machine after installing common components, you can set up authentication and test whether you are able to log into Configuration Hub. For more information, refer to Proficy Authentication documentation. You can also skip setting up authentication at this stage and do it later after installing Operations Hub.

After installation, shortcut icons for the installed applications will appear on your desktop.

[Set up Proficy Authentication.](#)

## Install Operations Hub

This topic describes how to install Operations Hub from its standalone installer package.

See [Installation Process Overview \(on page 34\)](#).

Ensure that you have administrative privileges to the machine on which you want to install Operations Hub.

Download the latest Operations Hub ISO installation media from Salesforce and mount the file.

Consider these points:

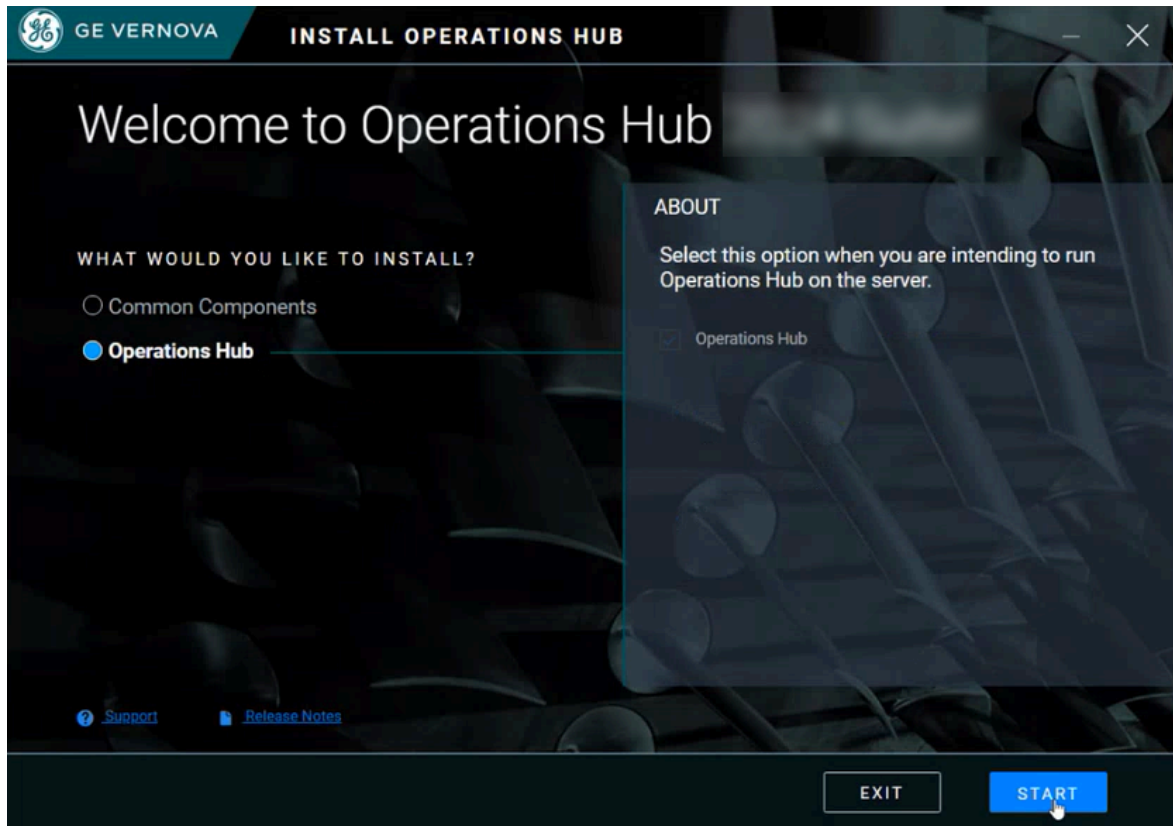
- **First time installation:** You can choose to provide the same user name and password for Operations Hub tenant admin and Configuration Hub. This will allow you to use the same credentials to log in to both the applications.
- **Re-installation:** If re-installing Operations Hub [without DB purge \(on page 96\)](#), provide the same user name and password as the earlier install. If you provide a different set of credentials other than the tenant admin credentials used in the initial install, the user ID will not match what already exists in Proficy Authentication (UAA). As a result, users will not be able to log in to Operations Hub.
- Use a host name that contains up to 24 characters and any of the following characters:

- Alphabetic characters
- Numeric characters
- Minus
- Period

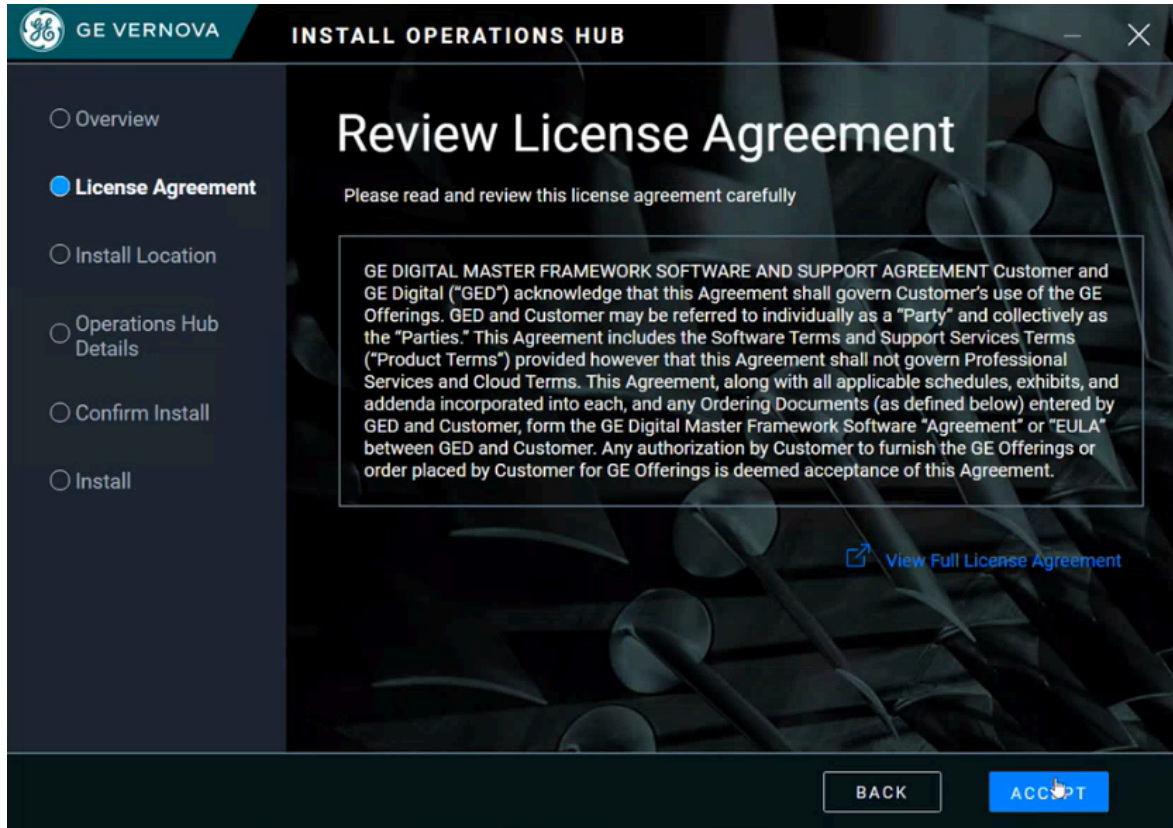
1. In the mounted ISO, navigate to the **Setup** folder and execute the `setup.exe` file.

The welcome screen appears.

2. On the welcome screen, select **Operations Hub**.



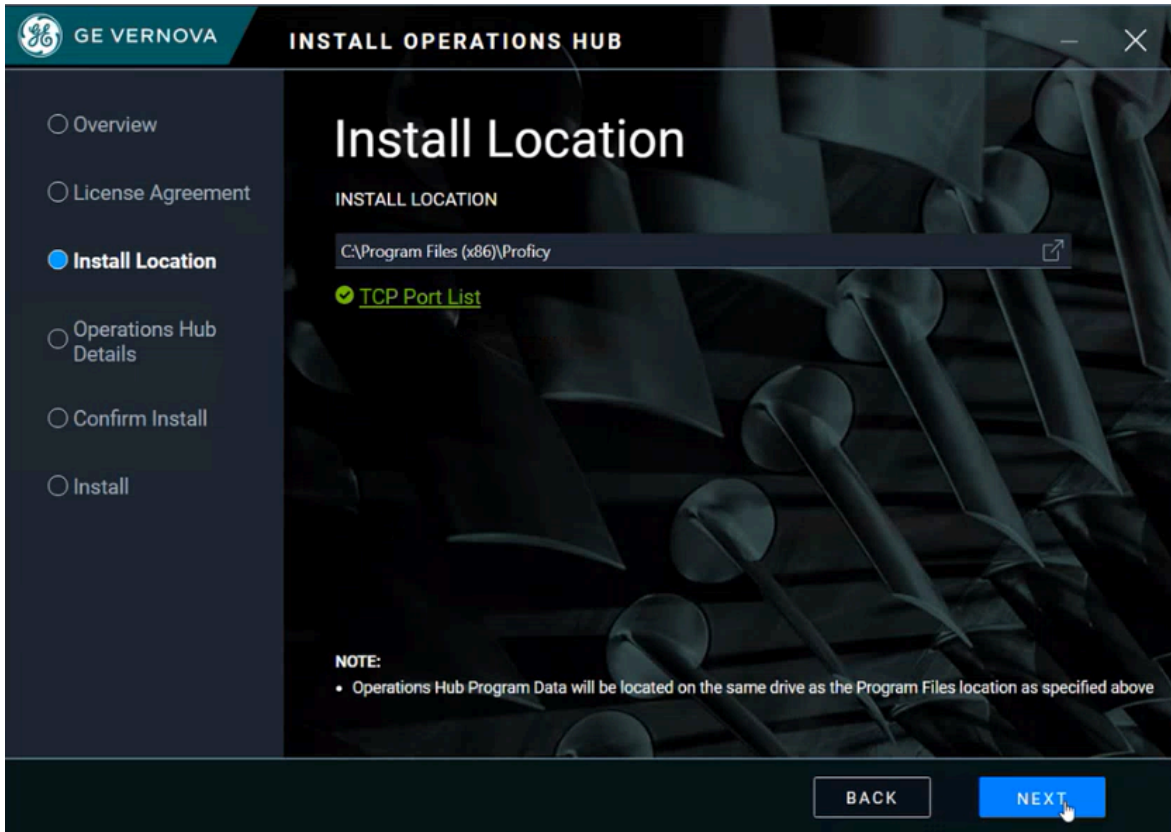
3. Read and accept the license agreement to continue with the install.



The **Install Location** screen appears and validates for port conflicts.

4. Browse and select a location for installation, then continue to the next screen.

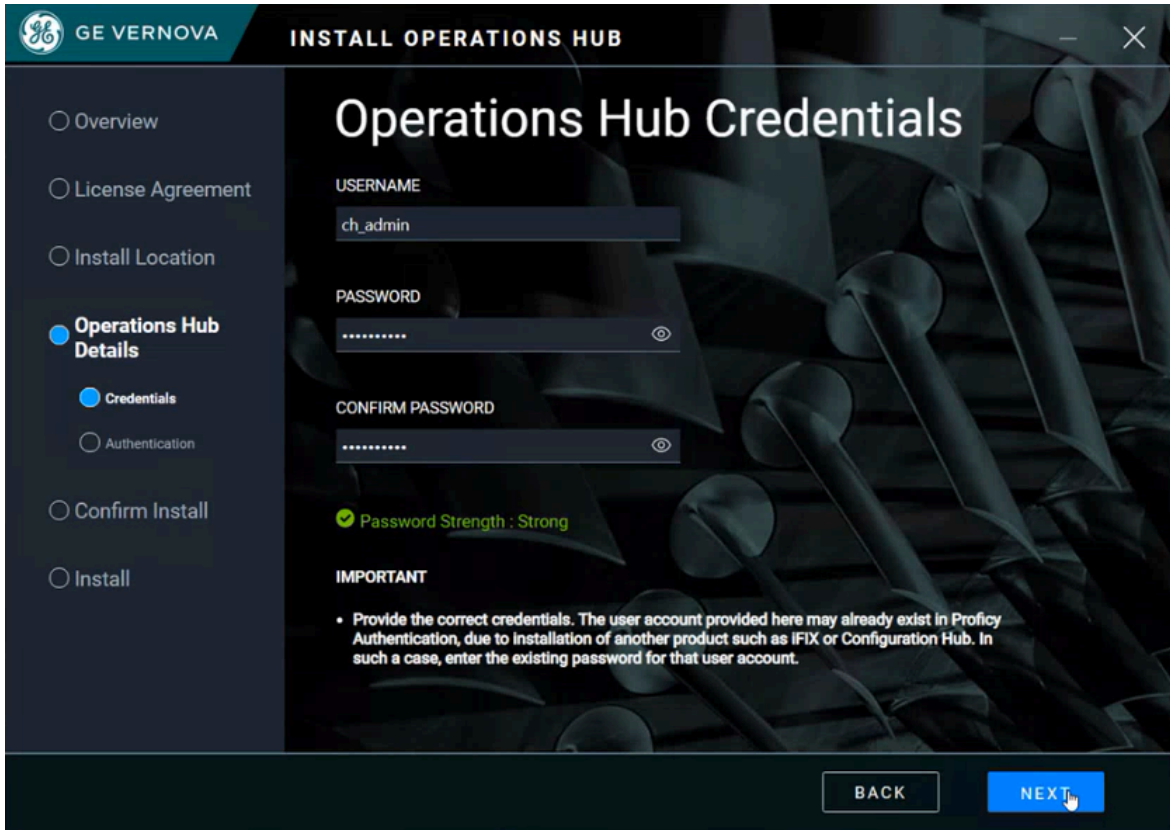
If port conflicts are detected, you must fix them before proceeding to the next screen.



If there are no conflicts, the **Operations Hub Credentials** screen appears.


5. Create these login credentials for Operations Hub and proceed to the next screen.


<b>USERNAME</b>	Enter a user name, which you can use to login to the Operations Hub application.  For example, <code>ch_admin</code>
<b>PASSWORD</b>	Enter a password for your Operations Hub user login.
<b>CONFIRM PASSWORD</b>	Enter the password again to confirm.



The **Registration with Configuration Hub** screen appears.

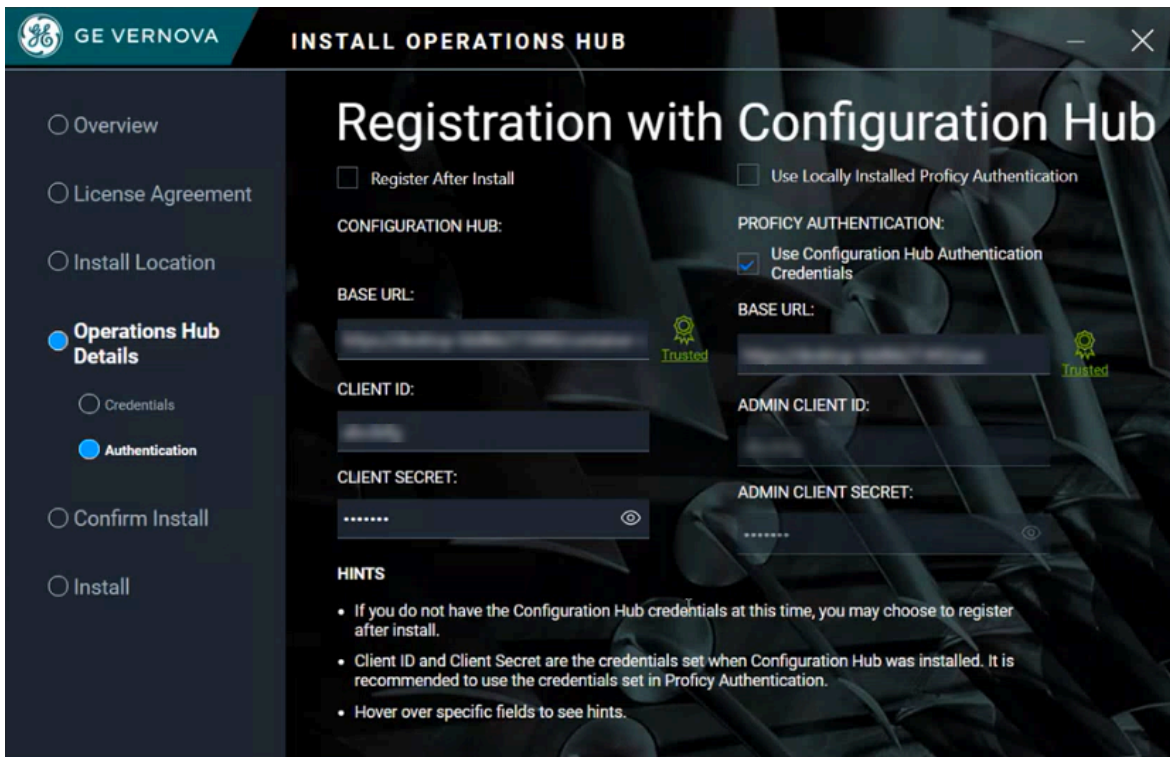
6. Complete the following and proceed to the next screen.

<p><b>Register After Install</b></p>	<p>If you want to skip registering Operations Hub with the Configuration Hub application in the ongoing installation session, then select this check box.</p> <p>To register later, refer to the topic <i>Install Time Registration</i> in the <i>Configuration Hub</i> documentation..</p>
<p>Configuration Hub credentials</p>	<div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px;"> <p> <b>Note:</b></p> <p>We provide Configuration Hub login credentials that we already created. Refer to step 4a in the <a href="#">Install Common Components (on page 42)</a> topic.</p> </div>

	<ul style="list-style-type: none"> <li>◦ <b>BASE URL:</b> Enter the URL address to access the Configuration Hub application. For example, <code>https://sbbuaah-co.meridium:5000/container-svc</code>.</li> <li>◦ <b>CLIENT ID:</b> Enter the client id created for logging in to Configuration Hub. For example, <code>admin</code></li> <li>◦ <b>CLIENT SECRET:</b> Enter the secret password created for your Configuration Hub client ID.</li> </ul> <p>If the URL security certificate is <b>Not trusted</b>, then select the option to verify and trust.</p>
<p><b>Use Locally Installed Proficy Authentication</b></p>	<p>You have two options to choose from:</p> <ol style="list-style-type: none"> <li>a. <b>Use a locally installed Proficy Authentication (UAA)</b> &gt; select the check box. No need to provide any additional details.</li> </ol> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p> <b>Note:</b> If you select this option and a local instance is not detected, the installation will not continue. Therefore, ensure that prior to Operations Hub installation, you have a local or remote instance of Proficy Authentication already installed.</p> </div> <ol style="list-style-type: none"> <li>b. <b>Use external Proficy Authentication (UAA)</b> &gt; leave the check box blank. Provide Proficy Authentication credentials.</li> </ol>
<p><b>Use Configuration Hub Authentication Credentials</b></p>	<p>If you opted for external UAA, provide credentials to log into Proficy Authentication. Choose from:</p> <ol style="list-style-type: none"> <li>a. <b>Use the same credentials as specified for Configuration Hub</b> &gt; select the check box. No need to provide any additional details.</li> <li>b. <b>Specify unique credentials for Proficy Authentication</b> &gt; leave the check box blank. Provide Proficy Authentication credentials.</li> </ol>



<p>Proficy Authentication credentials</p>	<ul style="list-style-type: none"> <li>◦ <b>BASE URL:</b> Enter the URL address to access the Proficy Authentication application. For example, <code>https://win10vm2/uaa</code></li> <li>◦ <b>CLIENT ID:</b> Enter the administrator client id to log in to Proficy Authentication. For example, <code>admin</code></li> <li>◦ <b>CLIENT SECRET:</b> Enter the secret password for the Proficy Authentication administrator client ID.</li> </ul> <p>If the URL security certificate is <b>Not trusted</b>, then select the option to verify and trust.</p>
---	--



The **Start Install** screen appears.

7. Select from the following install options:

<p><b>Silent Install</b></p>	<p>If you select this option, the installation proceeds automatically, using pre-configured settings, without prompting for additional information.</p>
<p><b>Interactive Install</b></p>	<p>Select this option, if you want to do the following:</p>

- Assign different domain names for Proficiency Authentication and Operations Hub when the two products are installed on the same host server.
- Install the Dataflow Editor tool.

For step-by-step instructions, refer to [Configure Operations Hub Installation in Interactive Mode \(on page 56\)](#).

8. Select **START** to start the installation.

9. After the installation is complete, select **CLOSE**.

A message appears asking whether you want to restart your computer, or install more products.

10. Select **Reboot Now** to restart your computer.

After installation, shortcut icons for the installed applications will appear on your desktop.



**Important:**

If a firewall is running on the server, configure the firewall to make sure the public https port used by Operations Hub Public is not blocked. Typically, the port is 443, but can be a different value that you have selected or that was changed to avoid a conflict. If you are not sure of the port number, the shortcut (URL) placed on the desktop should contain it.

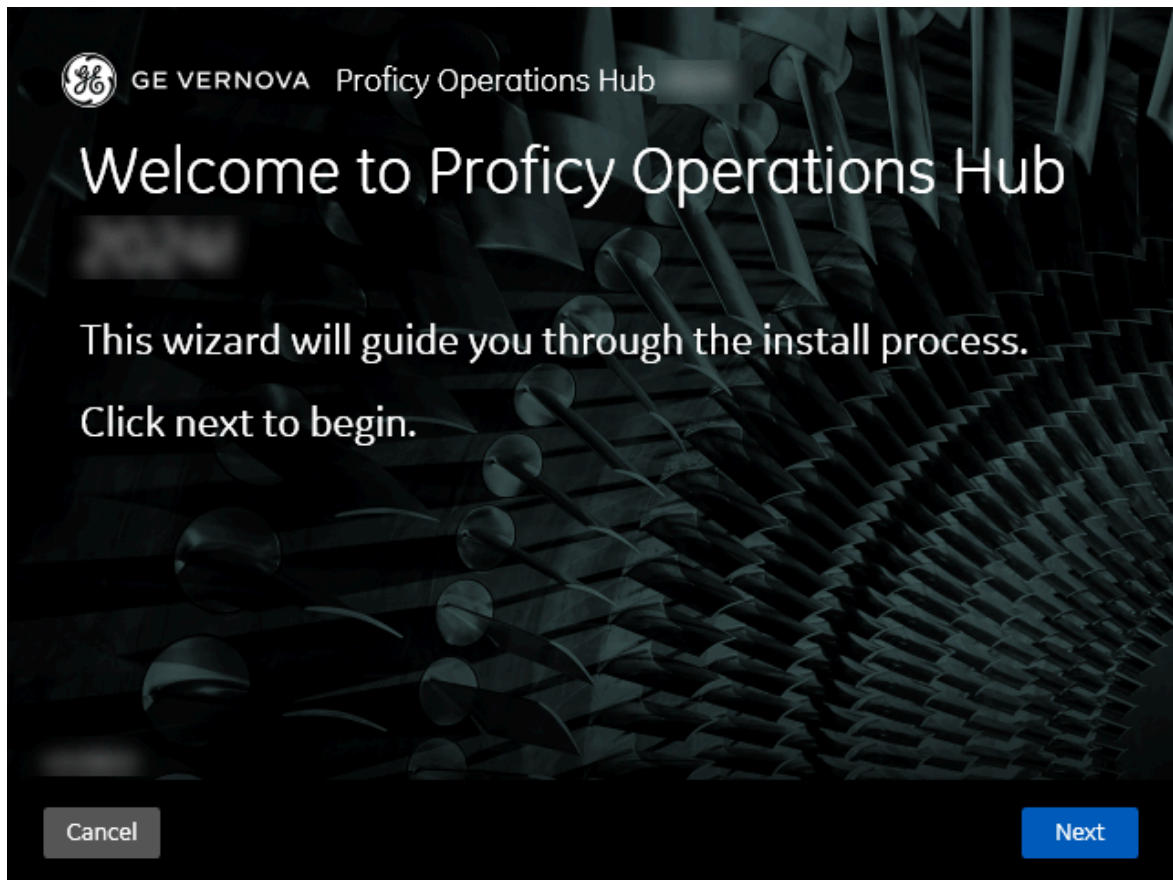
## Configure Operations Hub Installation in Interactive Mode

This topic provides step-by-step instructions on how to continue the Operations Hub installation in interactive mode.

See [Install Operations Hub \(on page 49\)](#).

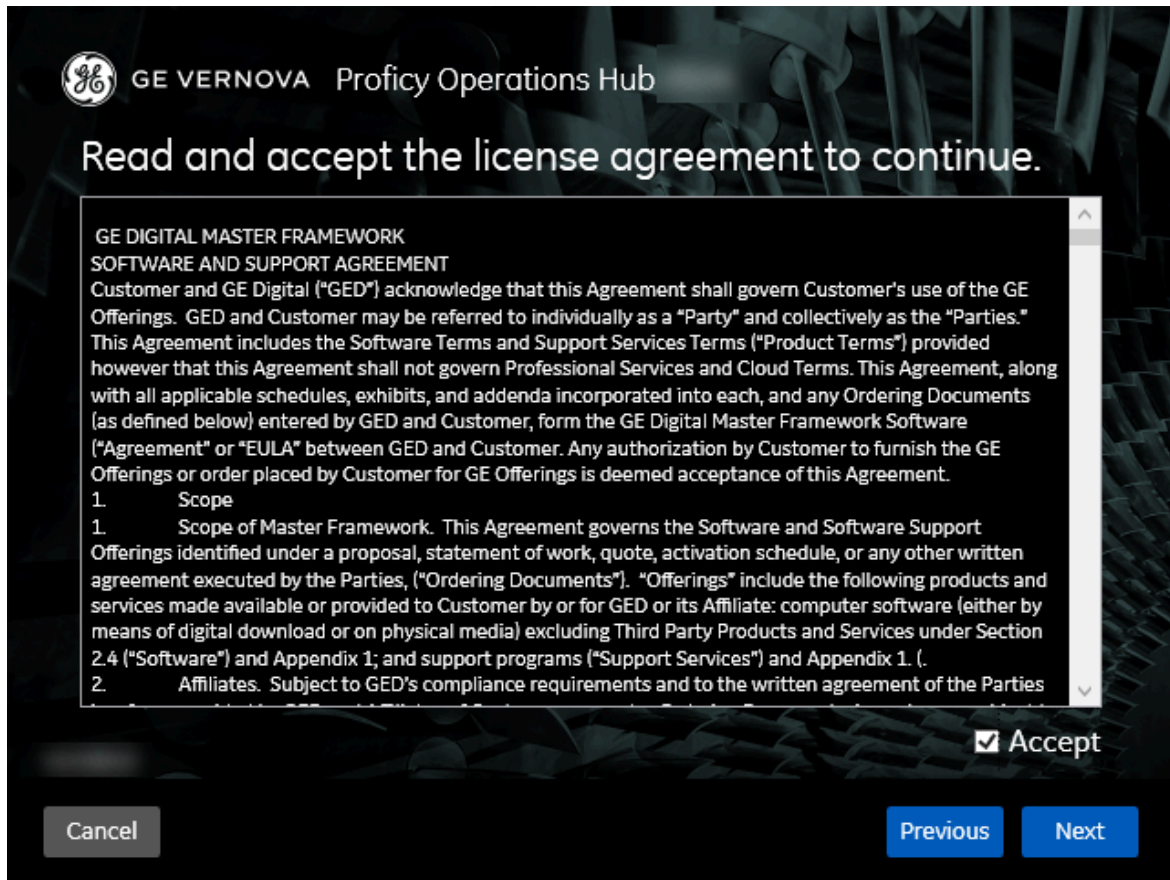


1. On the welcome screen, select **Next**.



The license agreement screen appears.

2. Select the **Accept** check box and select **Next**.



The TCP port check screen appears.

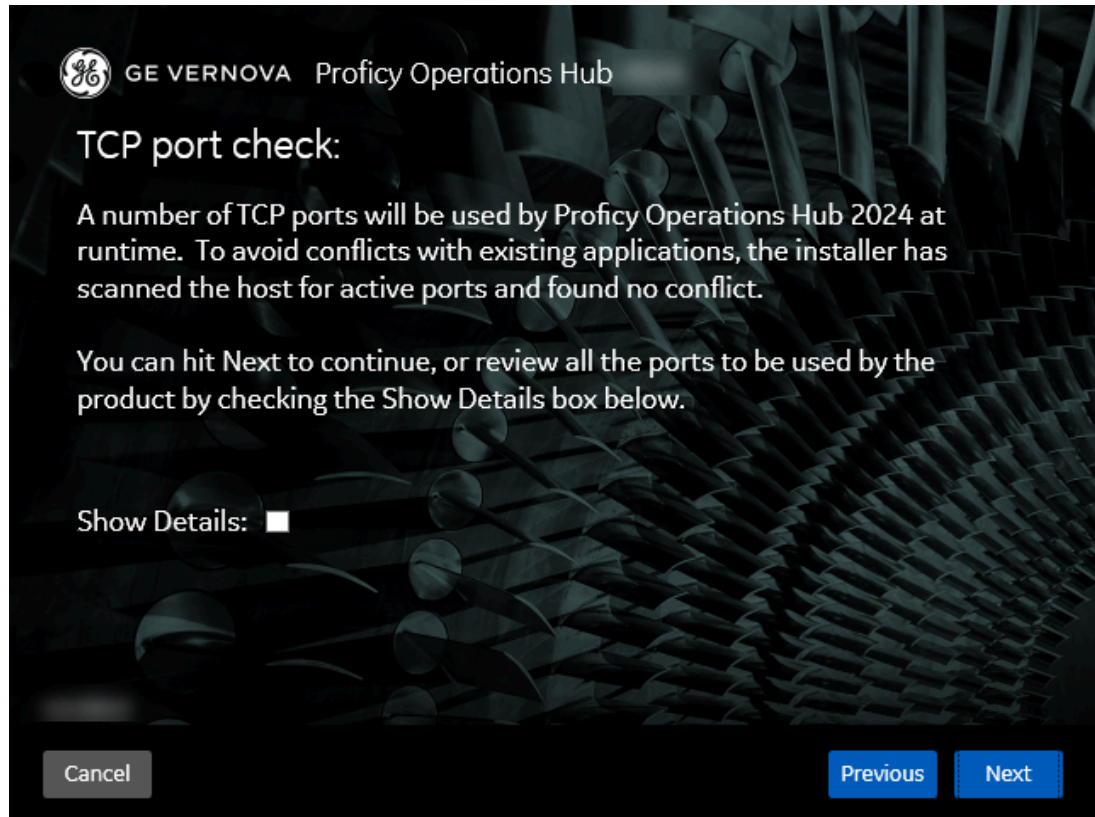
3. You need to verify whether the ports for Operations Hub are valid. If not, then update the ports as necessary.



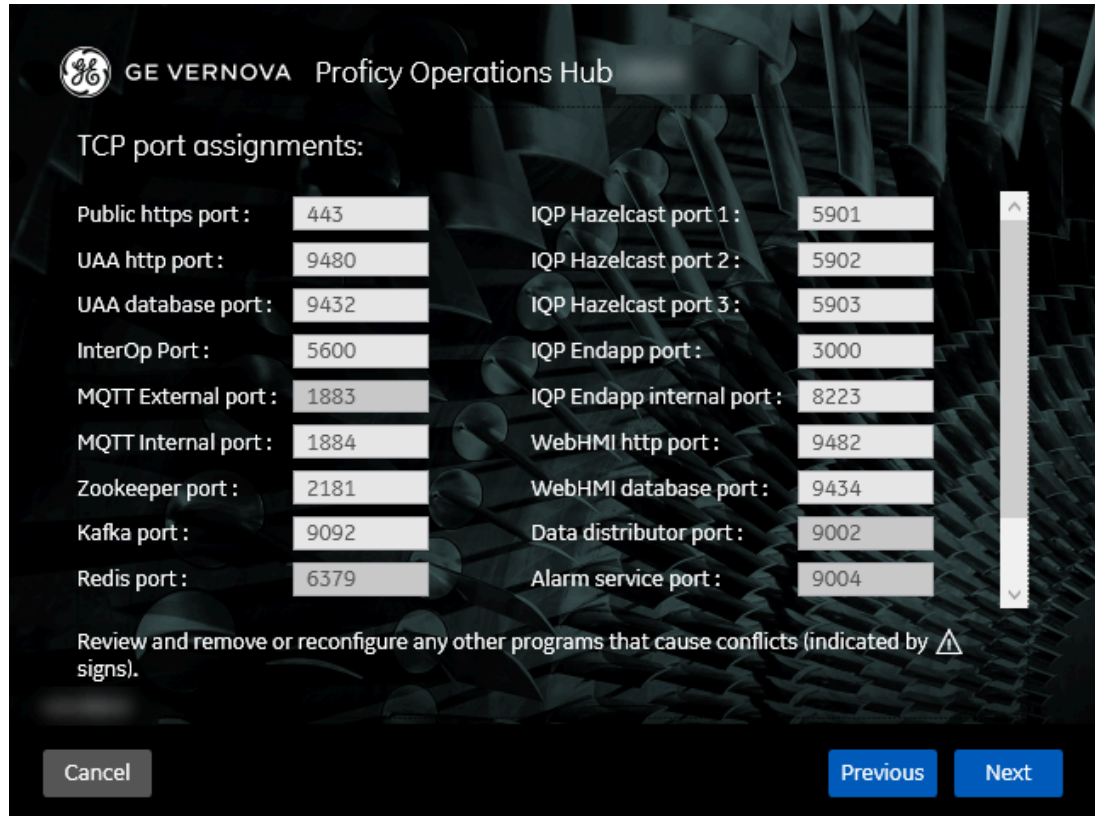
**Note:**

Use care when changing port numbers to avoid conflict with an existing application. Generally, a port number higher than 1023 should be assigned, since ports 0 to 1023 are well known ports typically already assigned on Windows systems for different purposes.

- a. Select the **Show Details** check box.



- b. Review the list of ports used by various components in Operations Hub. If necessary, modify the port numbers.



c. Select **Next**.

The *Host Names* screen appears.

4. Update the field values as described in the following table and select **Next**.

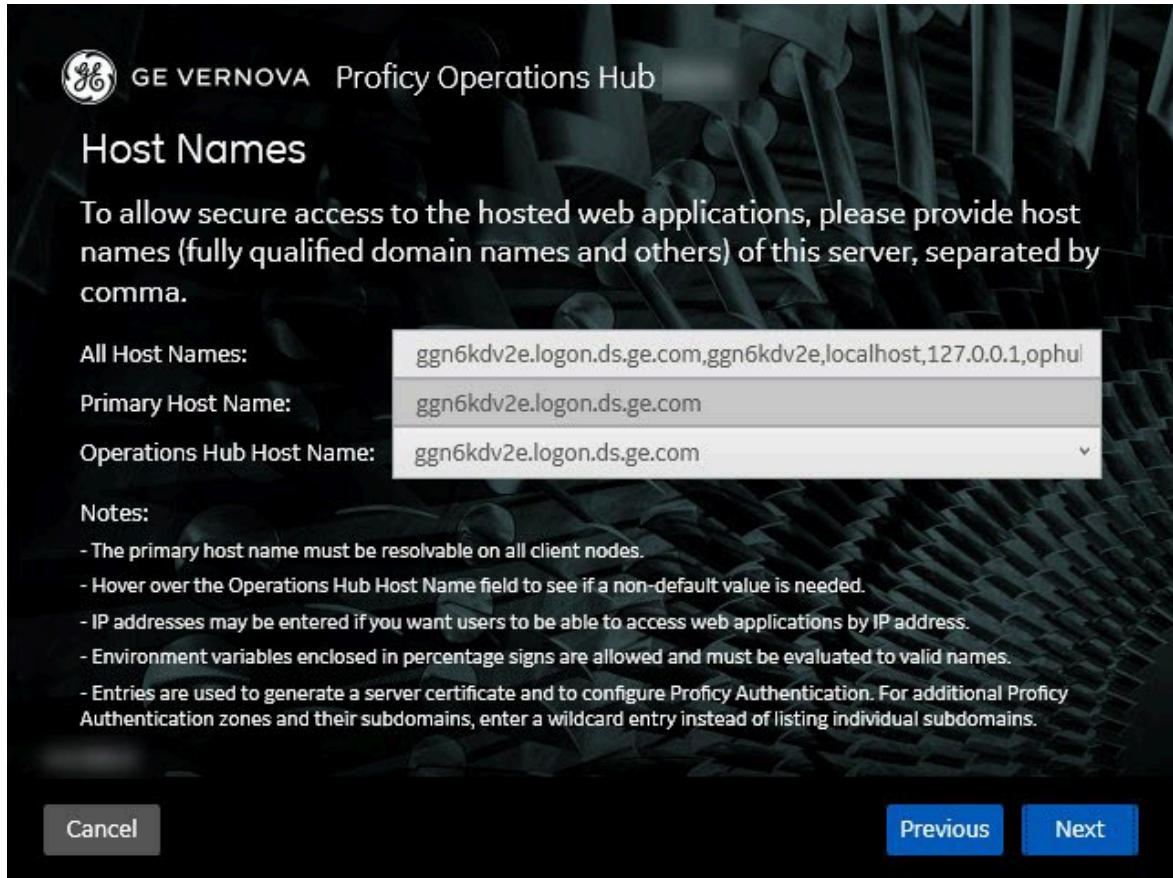
Points to consider:

- If Proficy Authentication is already installed, the **All Host Names** field will be read-only.
- The first entry in the **All Host Names** field is automatically the primary host name for Proficy Authentication.
- Use the drop-down list to select a different primary host name for Operations Hub.

<b>All Host Names</b>	<p>Machine details to access Operations Hub following the install.</p> <p>Choose from:</p> <ul style="list-style-type: none"> <li>◦ Fully qualified domain name (FQDN)</li> <li>◦ host name</li> <li>◦ IP address</li> </ul>
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	<div></div> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>◦ If you want to provide more than one of the aforementioned values, use a comma to separate them.</li> <li>◦ If you want to add the Fully Qualified Domain Name (FQDN) after completion of the install, the safest way to apply the FQDN is to uninstall without purge, and then reinstall with the FQDN in the Host Names screen.</li> </ul>
<b>Primary Host Name</b>	This field remains in a disabled state. It is updated with the first value from <b>All Host Names</b> .
<b>Operations Hub Host Name</b>	<p>If Proficiency Authentication and Operations Hub are installed on the same server, you have the option to configure different domain names.</p> <p>Select a host name from the <b>Operations Hub Host Name</b> drop-down field, ensuring it is different from the host name used when Proficiency Authentication was installed.</p>





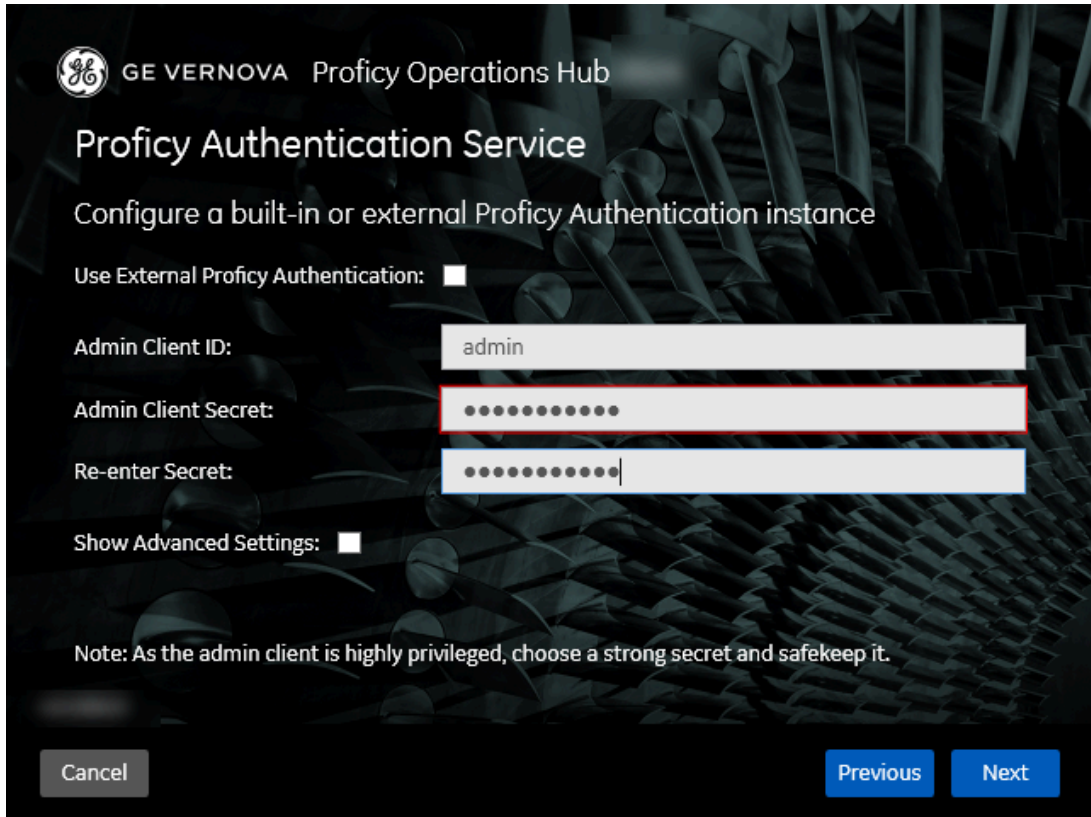
The *Proficy Authentication Service* screen appears.

5. You have the option to use either an integrated (OR) an external Proficy Authentication (UAA) service.

a. To use the UAA service integrated with Operations Hub, update the following field values as described:

<b>Admin Client ID</b>	The client Id to log in to the Proficy Authentication application.
<b>Admin Client Secret</b>	The client secret to log in to the Proficy Authentication application. <ul style="list-style-type: none"> <li>▪ Client secret should be at least 8 characters, containing at least:                     <ul style="list-style-type: none"> <li>▪ one upper case</li> <li>▪ one lower case</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>▪ one numeric</li> <li>▪ one special character</li> <li>▪ Client secret cannot contain the ampersand (&amp;) or percent (%) special characters.</li> </ul>
<b>Re-enter Secret</b>	Verifies and confirms the client secret.



- b. To use an external UAA service, select the **Use External Proficy Authentication** check box. Update the following field values as described:

<b>Proficy Authentication Base URL</b>	URL of Proficy Authentication (UAA) service.
<b>Admin Client ID</b>	ID of the administrator account of the Proficy Authentication client.
<b>Admin Client Secret</b>	Client secret of the administrator account.
<b>Proficy Authentication certificate file</b>	The path to the certificate file used by the Proficy Authentication service.

GE VERNOVA Proficy Operations Hub

## Proficy Authentication Service

Configure a built-in or external Proficy Authentication instance

Use External Proficy Authentication:

Proficy Authentication Base URL:

Admin Client ID:

Admin Client Secret:

Proficy Authentication certificate file:

Notes: Administrator of the Proficy Authentication service should provide you the information above. If you specify an issuer certificate above, view and confirm. Use the Test button to validate the inputs before proceeding.

- c. **Optional:** Select the **Show Advanced Settings** check box and update the following field value:

<p><b>Proficy Authentication Login Session Timeout</b></p>	<p>Enter the idle time for a login session in minutes. After expiry of the idle time, you must log in to the application again to resume working.</p>
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GE VERNOVA Proficy Operations Hub

## Proficy Authentication Service

Configure a built-in or external Proficy Authentication instance

Use External Proficy Authentication:

Admin Client ID:

Admin Client Secret:

Re-enter Secret:

Show Advanced Settings:

Note: As the admin client is highly privileged, choose a strong secret and safekeep it.

Cancel Previous Next

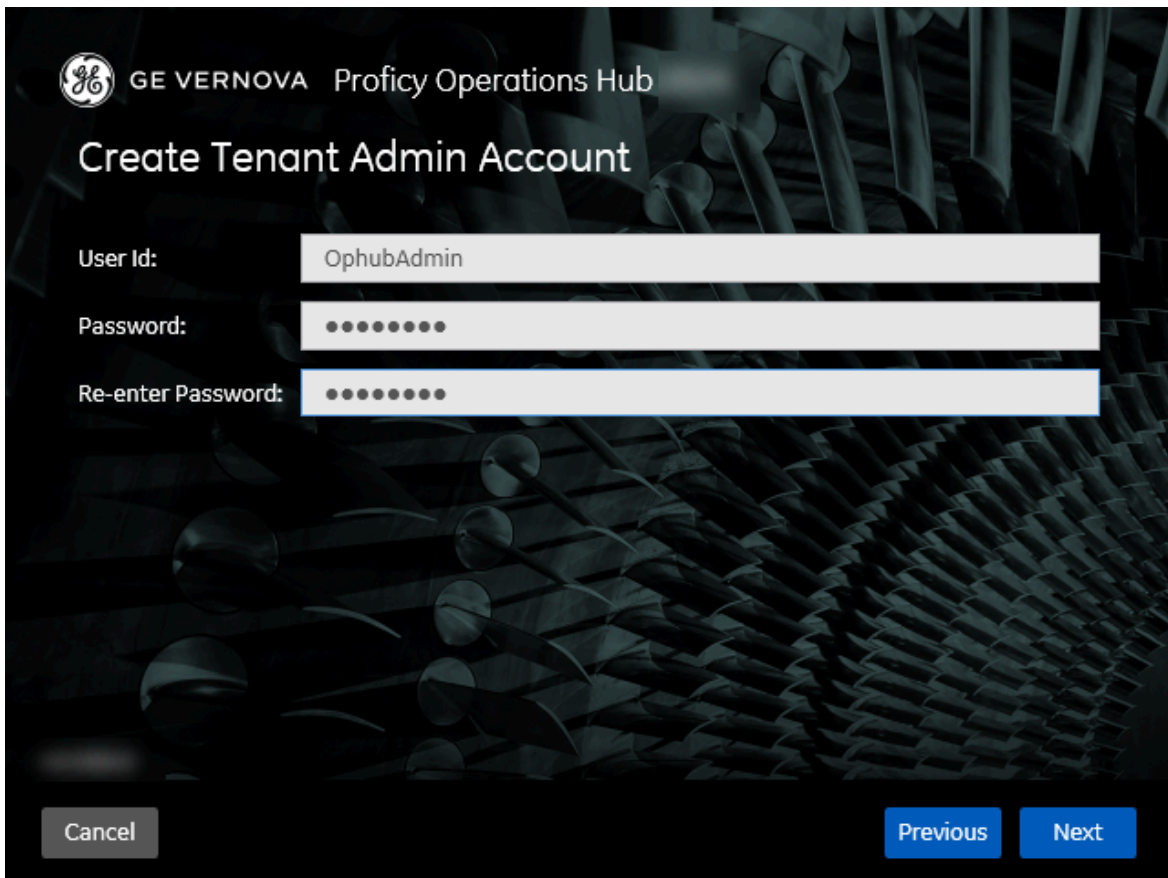
d. Select **Next**.

The *Create Tenant Admin Account* screen appears.

6. Update the following tenant admin account field values as described and select **Next**.

<p><b>User Id</b></p>	<p>User ID of the administrator account for Operations Hub. When you provide the tenant user ID, the following conditions apply:</p> <ul style="list-style-type: none"> <li>◦ If you are installing Operations Hub for the first time, do not provide StudioAdmin as the tenant user ID because it is used by Operations Hub.</li> <li>◦ If you want to use a shared Proficy Authentication to work with Operations Hub, do not provide the user ID of an existing user of the Proficy Authentication instance. If you do so, the installation fails.</li> <li>◦ If you are reinstalling Operations Hub, do not provide the tenant user ID that you previously provided. This is because even if you purged the data while uninstalling Operations</li> </ul>
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	Hub, the user account, along with the groups and privileges assigned to the user, still exists in the Proficy Authentication instance.
<b>Password</b>	Password for the administrator account.
<b>Re-enter Password</b>	To confirm, re-enter the password for the administrator account.



The *Select Drive for Programs and Data* screen appears. This screen appears only when the host machine has multiple fixed hard drives (step 8).

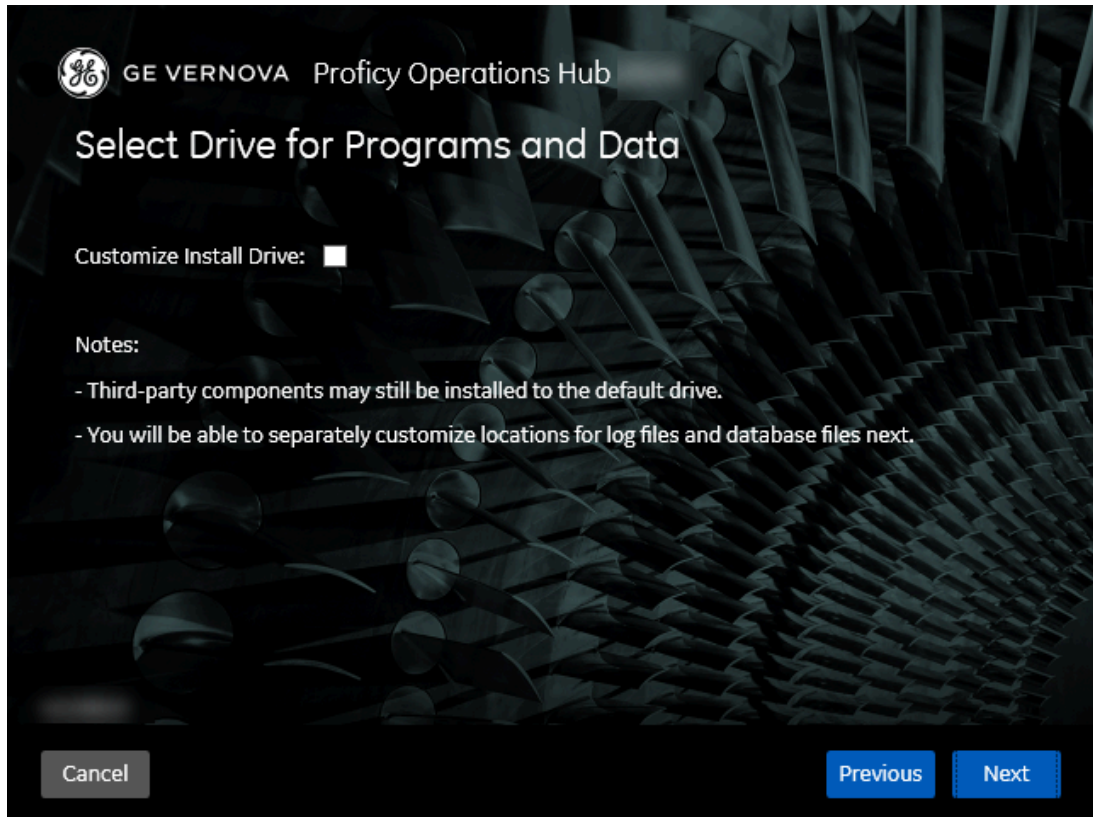
If the host machine has only one drive, then the *Customize Log Files and Postgres Data Locations* screen appears (step 9).

7. Here, you have the option to specify a different drive for installing Operations Hub.

a. Select the **Customize Install Drive** check box and update the following field value:

<b>Install to This Drive</b>	Select a drive from the dropdown list of available fixed hard drives.
------------------------------	---

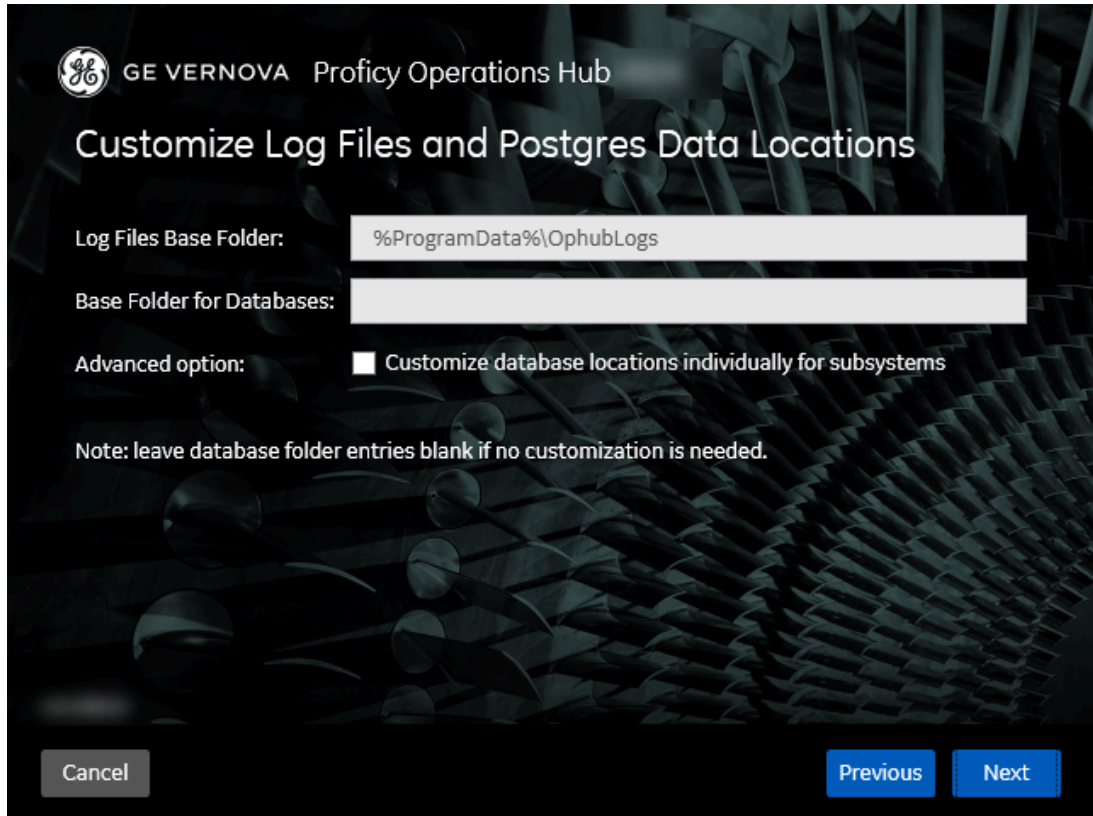
b. Select **Next**.



8. Enter the following details, and then select **Next**.

a. Specify location path:

<b>Log Files Base Folder</b>	The path to the log files generated by Operations Hub. By default, the value in this field is <code>%ProgramData%\OphubLogs</code> .
<b>Base Folder for Databases</b>	The path to the base folder for the Proficy Authentication, Operations Hub, and WebHMI databases. If you want to use the default folder, leave this field blank. Otherwise, enter the path to the folder that you want to use.



- b. To use different folders for each database, select the **Customize database locations individually for subsystems** check box. Update the following fields:

<b>Proficy Authentication Database Folder</b>	Enter the database folder that you want to use for Proficy Authentication. If you want to use the default folder, leave this field blank.
<b>IQP Database Folder</b>	Enter the database folder that you want to use for Operations Hub. If you want to use the default folder, leave this field blank.
<b>WebHMI Database Folder</b>	Enter the database folder that you want to use for WebHMI. If you want to use the default folder, leave this field blank.

The screenshot shows a configuration window for GE Vernova Proficy Operations Hub. The title is "Customize Log Files and Postgres Data Locations". The window contains several input fields and a checkbox:

- Log Files Base Folder:** Input field containing "%ProgramData%\OphubLogs".
- Base Folder for Databases:** Empty input field.
- Advanced option:** A checkbox labeled "Customize database locations individually for subsystems" is checked.
- Proficy Authentication Database Folder:** Empty input field.
- IQP Database Folder:** Empty input field.
- WebHMI Database Folder:** Empty input field.

At the bottom, there is a note: "Note: leave database folder entries blank if no customization is needed." Navigation buttons include "Cancel", "Previous", and "Next".

c. Select **Next**.

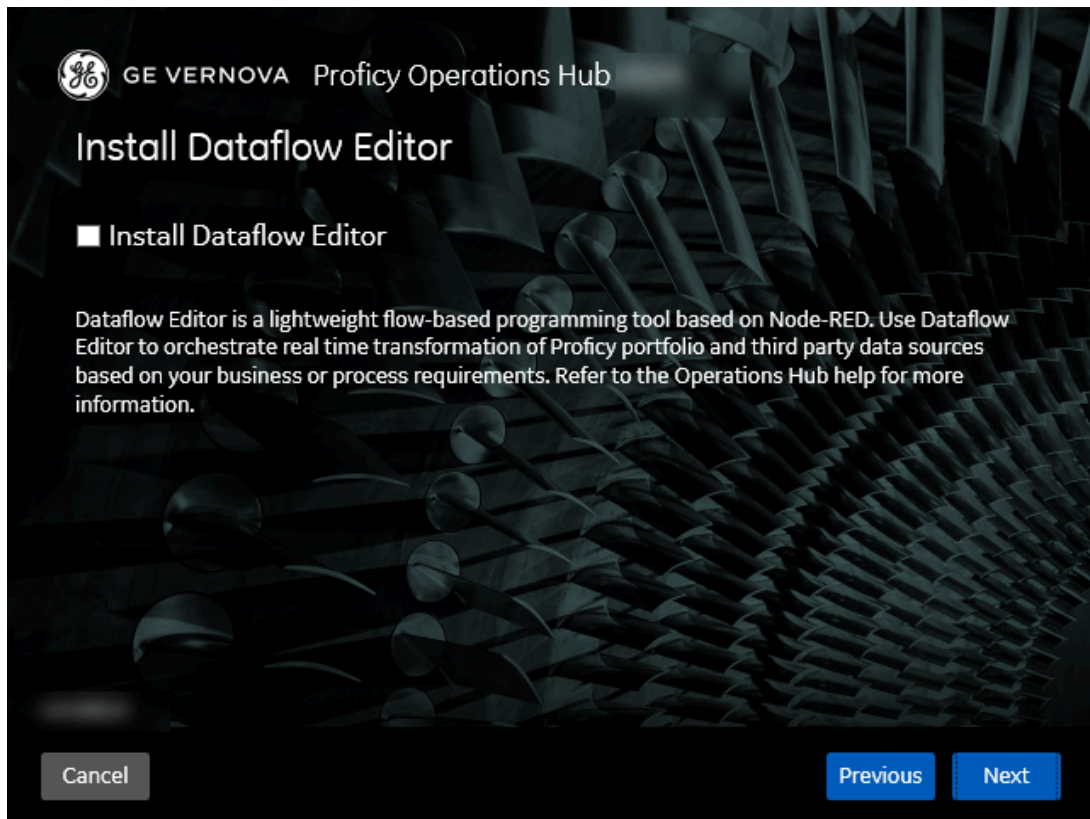
The *Install Dataflow Editor* screen appears (step 10).

If you want to skip installing Dataflow Editor, then select **Next**.

9. Here, you have the option to enable the installation of the Dataflow Editor tool along with Operations Hub.



a. Select the **Install Dataflow Editor** check box.



b. Update the following field values as described:

<b>HTTP Node Password</b>	Password to secure the Dataflow Editor http node.
<b>Re-enter HTTP Node Password</b>	Verifies and confirms the password.

c. If you want to register Dataflow Editor with Configuration Hub, then select the **Register with Configuration Hub** check box.

- Before registering, [make sure that security authentication source is configured for Configuration Hub.](#)
- Leave the check box blank if you choose to register later. For steps, refer to [Manually Register Dataflow Editor with Configuration Hub \(on page 150\).](#)

GE VERNOVA Proficy Operations Hub

## Install Dataflow Editor

Install Dataflow Editor

HTTP Node Password:

Re-enter HTTP Node Password:

Register with Configuration Hub

Note:

- HTTP Node password set here will be used in basic authentication to secure routes exposed by HTTP In nodes.

Cancel Previous Next


d. Select **Next**.

If you choose to register with Configuration Hub, the *Configuration Hub Integration* screen appears (step 11).

If not, then *You are ready to install* screen appears (step 12).

10. Update the following field values as described and select **Next**.

<b>Base URL</b>	Base URL of Configuration Hub container service, such as <code>https://chhost:5000/container-svc/</code> .
<b>Client Id</b>	Identifier of a client that has permission (authority) to register with Configuration Hub.
<b>Client Secret</b>	Client secret that can authenticate the client.

 GE VERNOVA Proficy Operations Hub

## Configuration Hub Integration

Register Designer at Install-Time:

Base URL:

Client ID:

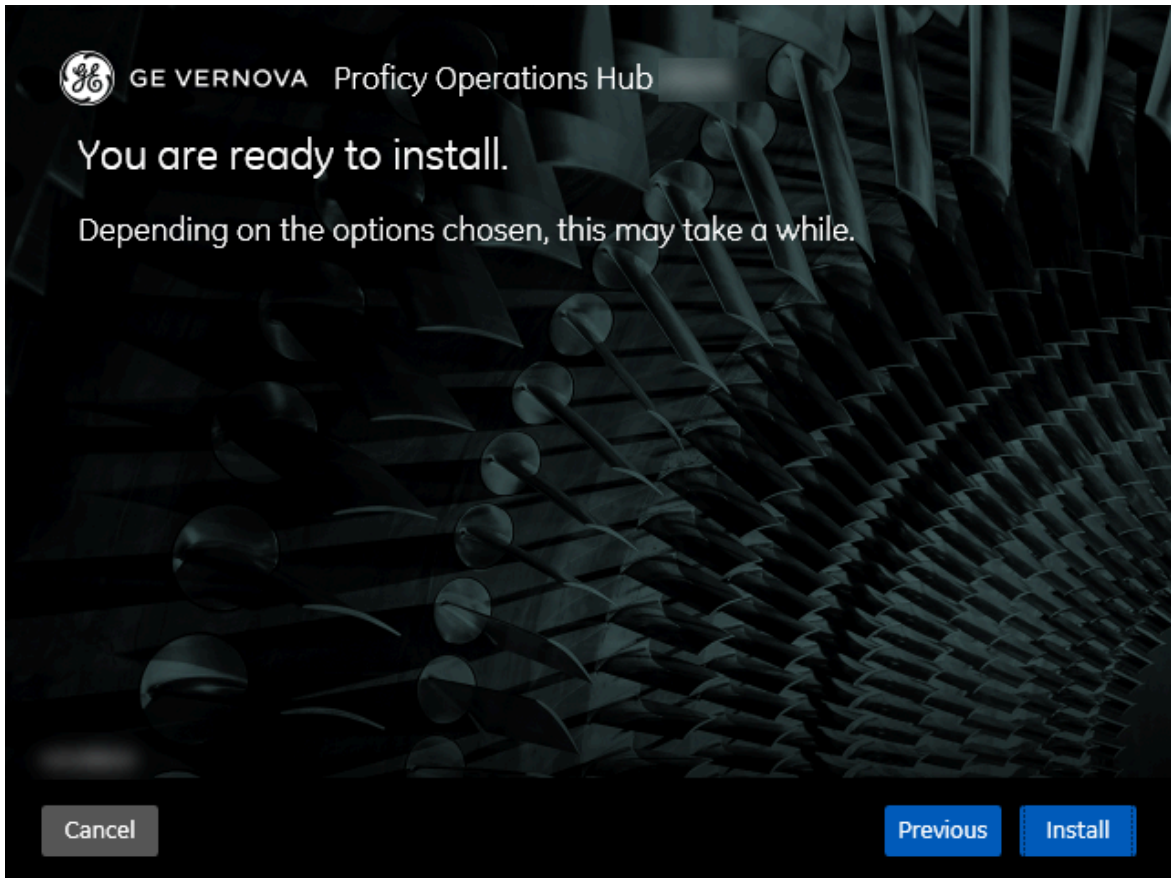
Client Secret:

Notes:

- A tool is provided to register with Configuration Hub after install, and therefore you may choose to defer registration.
- Configuration Hub Information is only needed if you choose to register either of or both Designer and Dataflow Editor at install time.



11. Select **Install** to start the installation.



## Upgrade Overview

This topic provides an overview of upgrading Operations Hub.

To access Operations Hub new features and improvements, make sure to [upgrade to the latest version of the application \(on page 74\)](#).

You have the option to upgrade Operations Hub with or without purging the database (DB).

### With DB Purge

This approach provides the option to purge the Operations Hub database during uninstallation:

1. Uninstall the current version of Operations Hub on your machine.
2. Proceed to install the new version of Operations Hub.

This fresh installation will incorporate the latest enhancements and bug fixes.

## Without DB Purge

Install or upgrade the new version of Operations Hub without uninstalling the previous version. This approach does not involve database purging.

If upgrading Operations Hub without purging the database, ensure that you follow these guidelines to prevent login issues:

- Provide the same user name and password that you gave during the initial installation. Consistency in user credentials is crucial for a seamless transition.
- If you provide a different set of credentials other than the tenant admin credentials used in the initial install, the user ID will not match with the existing Proficy Authentication (UAA) records. As a result, users will not be able to log into Operations Hub.

## Troubleshooting Upgrade Issues

**ch\_admin user does not acquire the iqp.user privilege during upgrade:** During Operations Hub upgrade from version 2022.6 to 2023 or later, the user `ch_admin` does not receive the `iqp.user` privilege by default. As a result, when the user `ch_admin` tries to create apps and initiates the runtime, an unexpected Access Denied error is encountered.

*Workaround:* As a temporary remedy, you can manually fix this issue by assigning the `iqp.user` group to the `ch_admin` user. Access the user record to modify and add the group:

- Log in to the Classic Operations Hub interface and access the user record, (OR)
- Log in to Configuration Hub and access the user record under Proficy Authentication.

The workaround would ensure that apps generated under the `ch_admin` account can be accessed without encountering any access-related issues.

## Upgrade Operations Hub

This topic describes the steps to upgrade the application.

Close any applications or components before upgrading Operations Hub.

If Proficy Authentication version is older than Operations Hub version you are upgrading to, then you will be requested to first upgrade or uninstall Proficy Authentication. The request does not appear if Proficy Authentication version is same or greater than Operations Hub upgrade version.

Do not uninstall Proficy Authentication if other Proficy products are using the application. Choose to upgrade to the latest version.

1. Download the Operations Hub ISO install media from the Salesforce and mount the file.
2. From the ISO folder, double-click `Setup.bat` to run the file.  
The welcome screen appears.
3. You must first upgrade the common components (Configuration Hub and Proficy Authentication) before upgrading Operations Hub.  
For installation steps, refer to [Install Common Components \(on page 42\)](#).
4. Upgrade Operations Hub.  
For installation steps, refer to [Install Operations Hub \(on page 49\)](#).

## Install Operations Hub in Unattended Mode

This topic describes how to perform a silent install for Operations Hub.

1. Open an elevated command prompt in Windows.

**Command Prompt > Run as administrator**

2. Run the following command:

```
<Operations Hub installation folder>\OpHub-Windows-Installer>ophub_bundle.exe <switch>
```

where `<switch>` is one of the following values:

- `-q, -quiet, -s, -silent`: Use one of these values to initiate the automated installation.
- `-passive`: Use this value if you want progress bar to appear during the installation.

For example: `ophub_bundle.exe /quiet UAA_ADMIN_CLIENT_SECRET=adminclientsec`

```
OPHUB_TENANT_PASSWORD=adminuserpassword
```

Operations Hub is installed.

To install to a different drive from the command line, refer to [Non-System Drive Install \(on page 75\)](#).

## Non-System Drive Install

This topic describes how to install to a drive other than C: drive using command line.

Open Windows PowerShell or the Command Prompt with Administrative privileges to install from command line.

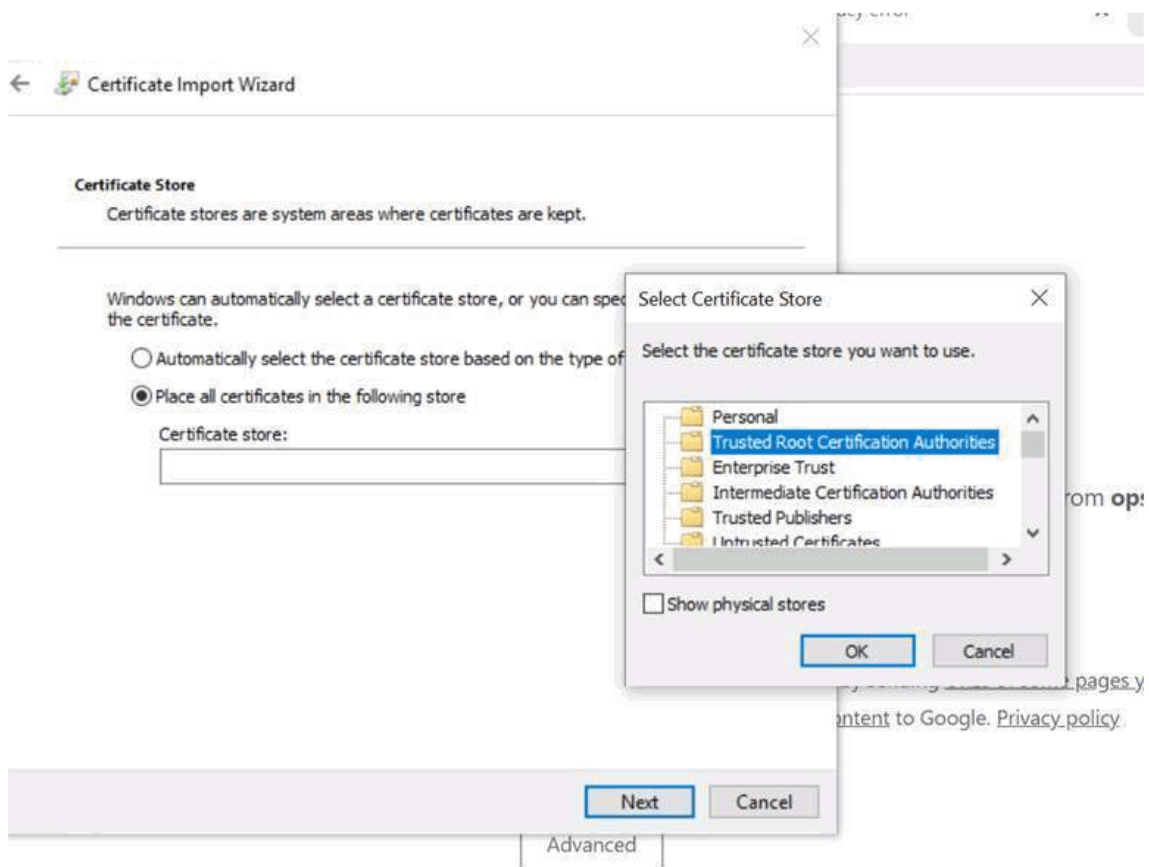
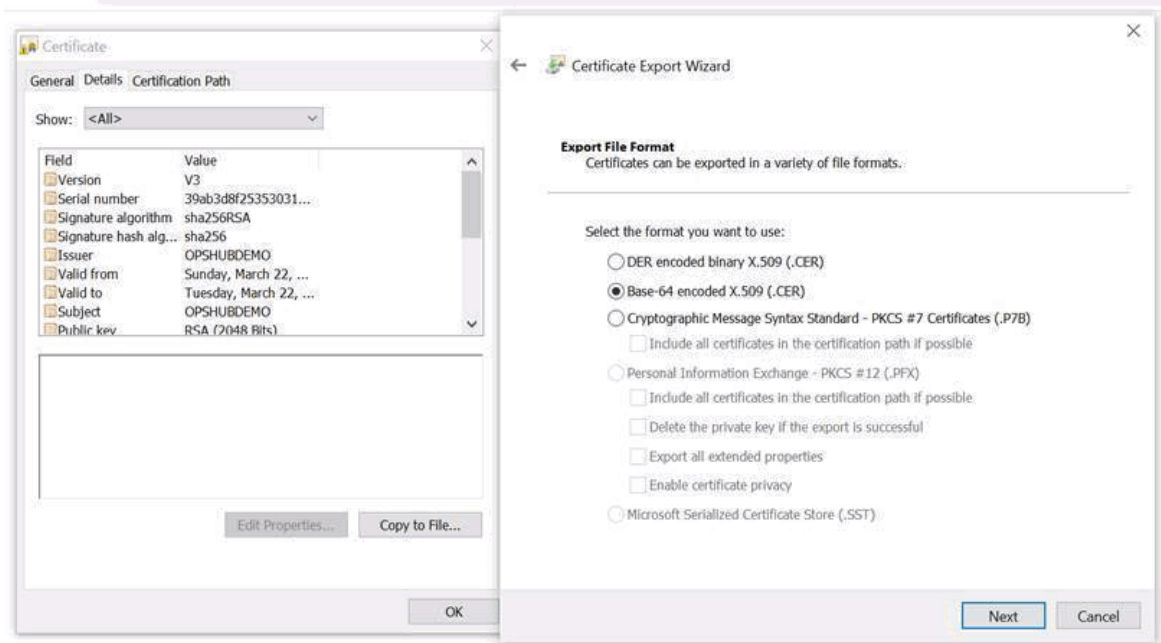
1. Right-click Windows PowerShell or Command Prompt and select **Run as administrator**.
2. Type `ophub_bundle.exe CUSTOM_INSTALL_DRIVE=E:`
3. Press Enter on your keyboard.

The application program files (which usually go to `C:\Program Files\GE`) and runtime data directories (usually under `C:\ProgramData\GE\`) are relocated to E: drive.

## Install the Certificate on your Clients

This topic describes how to install the Certificate Authority (CA) certificate on each client that you will use to access Operations Hub.

1. On the client machine, open a browser such as Google Chrome and access the Operations Hub server using the url: `https://opshubservername/iqp`.  
The browser should display a "Not secure" icon.
2. Right-click the Not Secure icon, which should lead you to a Certificate dialog box.
3. Find the issuer in the **Certificate Path** tab.
4. On the issuer, select **View Certificate**.
5. In the **Certificate** dialog box, on the issuer certificate, select the **Details** tab and then **Copy To File**.
6. Right-click that exported certificate file, and choose to import it into the Trusted Root Certificate Authorities store.



## Backup and Restore

This topic describes how to perform backups and restore the Operations Hub database.

You must have Administrator access.

You can backup and restore Operations Hub versions starting from 1.7 to the current release.



### Note:

During the execution of backup and restore scripts, all services are stopped. Services start automatically once the backup/restore is complete.

1. [Download](#) the PowerShell scripts for backup, restore, and scheduler.
2. Unzip the downloaded file to access the scripts and jar files.
3. [Perform an Operations Hub backup \(on page 78\)](#).
4. [Restore from an Operations Hub backup \(on page 78\)](#).
5. [Schedule a backup of Operations Hub \(on page 79\)](#).

## Back Up the Operations Hub Database

Refer [Backup and Restore \(on page 78\)](#).

1. Launch Windows PowerShell, and navigate to the location of the backup script file.
2. Execute `BackUp_OperationsHub.ps1` to perform a backup of the UAA, IQP, and WebHMI database. The Operations Hub and Proficy Authentication backup zip files are saved to `C:\ProgramData`. The zip file name also includes the respective backup's datetime in the `YYYYMMDD-HHMMSS` format.

## Restore the Operations Hub Database

It is recommended to take a backup of your current database before continuing with the restore operation. In case you cancel the restore operation, you can recover your current data from the backup.



### Note:

The restore operation deletes everything from the current system database.

Refer [Backup and Restore \(on page 78\)](#).

1. Log in to the machine where Operations Hub is installed.
2. Copy the `db-intializer.jar` of the version you want to restore to this location: `Program Files\GE\Operations Hub\iqp-tomcat\webapps\site\WEB-INF`

**Note:**

You can skip this step if you are restoring versions 2.1 SIM 2 or later. The jar file is already available at the location.

3. Launch Windows PowerShell, and navigate to the location of the restore script file.
4. Enter the absolute path to the Operations Hub and Proficy Authentication backup zip files, and execute `Restore_OperationsHub.ps1` to restore the database.

For example:

```
PS C:\Users\Administrator\Desktop> .\Restore_OperationsHub.ps1
C:\ProgramData\OPERATIONS_HUB_BKP_20211013-120559.zip C:\ProgramData\PROFICY_AUTH_2024_BKP_20211013-120559.zip
```

The database is restored.

## Schedule Operations Hub Database Backup

Refer [Backup and Restore \(on page 78\)](#).

1. Launch Windows PowerShell, and navigate to the location of the backup scheduler script file.
2. Execute `BackupScheduler_OperationsHub.ps1` to schedule a backup.
  - a. To create a scheduler, enter `Create`.
  - b. Enter a name for your backup.
  - c. Enter a description of your backup.
  - d. Enter `Daily` to take a backup every day, or `Weekly` to backup every week.
  - e. Enter time in the suggested format to take a daily/weekly backup at the given time.
  - f. Enter the location of your backup script.

For example:

```
PS C:\Users\Administrator\Documents\db-backup-restore\Backup_OperationsHub.ps1
```

A daily/weekly backup is scheduled.

- a. To delete a scheduler, enter `Delete`.
- b. Enter the name of the backup for which you want to delete the schedule.
 

The daily/weekly schedule for the respective backup is deleted.

The backups are saved to `C:\ProgramData`.

### Troubleshooting:

- When you run a `.ps1` PowerShell script you might get the following message `.ps1 is not digitally signed. The script will not execute on the system.`

To fix it you have to run the following command to run `Set-ExecutionPolicy` and change the Execution Policy setting.

```
Set-ExecutionPolicy -Scope Process -ExecutionPolicy Bypass
```

This command sets the execution policy to bypass for only the current PowerShell session after the window is closed. The next PowerShell session will open running with the default execution policy. "Bypass" means nothing is blocked. No warnings, prompts, or messages are displayed.

- For LDAP user connectivity, make sure the Active Directory server is accessible to both the servers:
  - the server from where we take the data backup
  - the server to which we restore the data

If the data restored server cannot access LDAP server, the `Invalid Credentials` error message appears.

## Post-Installation Tasks

### Setting Up Operations Hub

#### Log in to Operations Hub (Classic)

Use your credentials to login and access the Operations Hub homepage.

Only a single user from a UAA instance can be logged into a browser instance at a time, even across multiple tabs.

If you want to log in as a different user, you must first log out of all the active product sessions. For Operations Hub, this includes the Operations Hub Designer, the Site Admin console, and applications created using Operations Hub.

1. In a web browser, enter the `server name`. Alternatively, you can use the shortcut provided on the desktop after installation.
2. Log in with the credentials that you specified during installation.

The Operations Hub home page appears.



Apps

ALL APPS RECENTLY CREATED

+ Add new app Import

Quick Filter

Name	Description	Last updated	
Asset Management	Manage Devices	3 months ago by Docs Team	🔒 ↗ ⚙️
Asset Testing	Test Devices	3 months ago by Docs Team	🔒 ↗ ⚙️
Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	🔒 ↗ ⚙️
Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	🔒 ↗ ⚙️
Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	🔒 ↗ ⚙️
Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	🔒 ↗ ⚙️
Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	🔒 ↗ ⚙️
ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	🔒 ↗ ⚙️
ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	🔒 ↗ ⚙️
Store Temp App	temp	2 months ago by Docs Team	🔒 ↗ ⚙️

Depending on the Operations Hub solution you purchased, perform one of the following steps:

- If you have installed Operations Hub by downloading it from Salesforce, [run the `siteadmin\_addon` installer package \(on page 81\)](#) to access the Site Admin console, which is used to [configure an MQTT server \(on page 83\)](#) or an email server.
- If you have installed the Operations Hub add-on for Historian, access the Historian analysis application. This is the only application you can access. You cannot modify or delete this application.

On iOS devices (iPhone/iPad), enable the self-signed certificate to secure websockets.

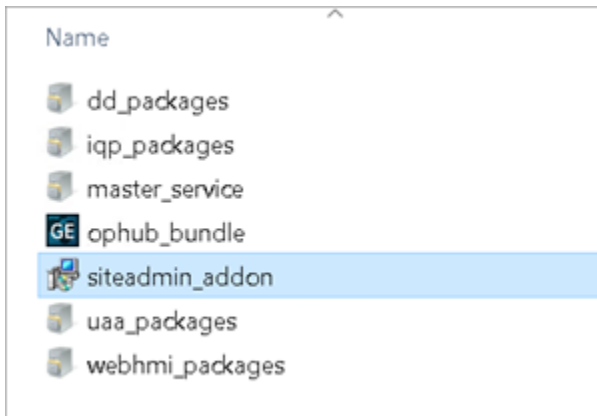
1. Go to **Settings > General > About > Certificate Trust Settings**.
2. Under **Enable Full Trust for Root Certificates**, enable your root certificate.

## Install Site Administration Addon

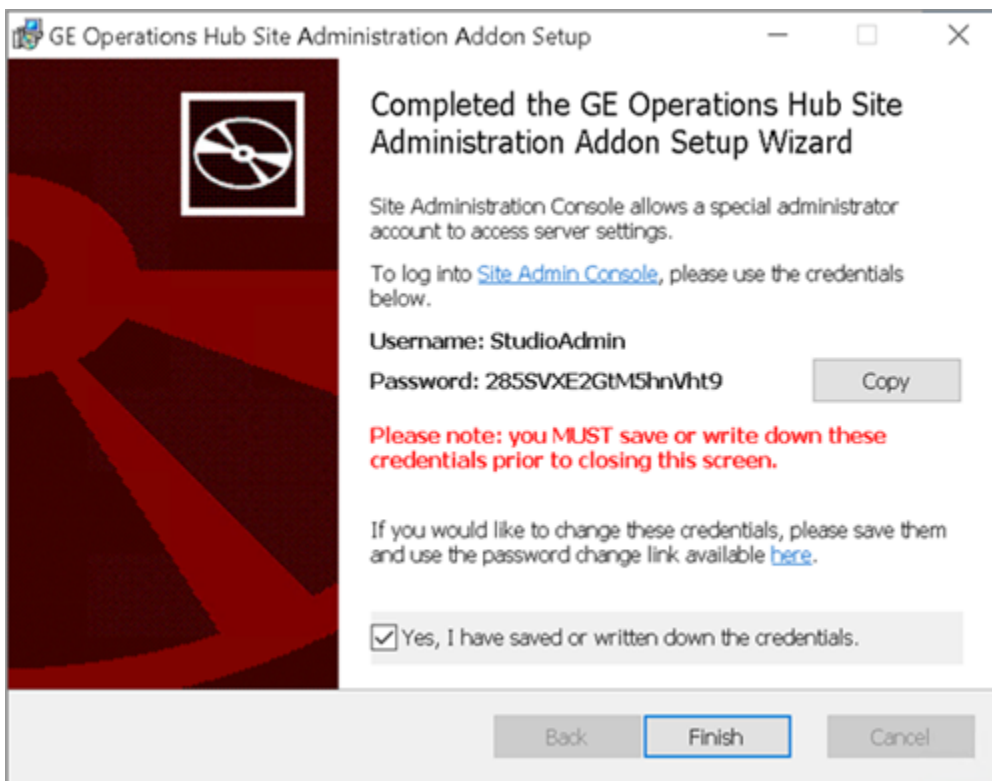
You must install the addon to access the Site Administration Console.

Log out and close all the browser windows before you run the installer.

1. Run the **siteadmin\_addon** Windows installer package from the Operations Hub installation DVD.



2. Accept the license agreement and install the package.
3. Make a note of the Site Admin user account credentials before you finish the installation.



- In case you closed the setup wizard without making a note of the credentials (password), then reinstall the add-on and note them down.
- If you changed the password of the Site Admin user account, remember to enter the new password on the login page. Some web browsers may populate cached credentials that are outdated.
- The Site Admin Console is used to configure MQTT settings or an email server. Do not use the console to change the password.
- If you have configured Historian UAA as the external UAA to be used with Operations Hub, you can change the password only after performing the following steps:
  - a. Access the `uaa.yml` file. By default, this file is located in the following folder: `c:\Program Files\GE Digital\UAA`
  - b. Add the following line at the end of the `uaa.yml` file: `issuer: uri: https://historian:8443/uaa`. Do not enter a leading space before the line.
  - c. Restart the Historian Embedded Tomcat Container service.

[Configure MQTT Broker Settings \(on page 83\)](#).

## Set up an Email Server

If using a Self-Signed certificate to set up an email server, follow these steps:

1. Copy the `certificate.pem` to a folder on the Operations Hub host machine.
2. Access `c:\ProgramData\GE\Operations Hub\iqp-config\IQP\app\setting.conf`.
3. Update `setting.conf` with the following code: `iqp_mail_cert_file=c:\\cert\\certificate.pem`


## Configure MQTT Broker Settings

If you want to use an MQTT broker to connect to devices, you must configure the settings.

[Install Site Administration Addon \(on page 81\)](#).

1. In the **Site Administration Console** page, select **Server settings**, and then select **Mqtt settings**.
2. In the **Select tenant to configure** drop-down list box, select the tenant, and then select **Continue**.  
The **Account Settings** workspace appears.
3. Enter values as specified in the following table, and then select **Update**.

Field Name	Description
Cloud url	Enter the IP address or the URL of the MQTT broker that you want to use.

Field Name	Description
Pull interval	Enter the time interval, in milliseconds, at which the Operations Hub MQTT client will connect to send or receive data. By default, it is set to 500 milliseconds.
Use password	Specify if the MQTT broker requires a user name and password to connect. By default, the value in this field is <i>False</i> .
Password	<p>If you selected <i>True</i> in the <b>Use Password</b> field, enter the password in this field. The default password for the installed MQTT broker is <code>mqttpassword</code>.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> It is highly recommended to create a new password if using MQTT in a production environment. The Mosquitto password file is located here: <code>C:\Program Files\GE\Operations Hub\mosquitto</code>.</p> <p>To create a new password file, run the following command:</p> <pre style="background-color: #F0F0F0; padding: 5px;">mosquitto_passwd -c passwordfile mqttuser</pre> <p>Visit <a href="https://mosquitto.org/man/mosquitto_passwd-1.html">https://mosquitto.org/man/mosquitto_passwd-1.html</a> for command related information.</p> <p>Visit <a href="https://mosquitto.org/man/mosquitto-conf-5.html">https://mosquitto.org/man/mosquitto-conf-5.html</a> for information on Mosquitto configuration.</p> </div>
User	If you have selected true in the Use password field, enter the user name in this field. The default user for the installed MQTT broker is <code>mqttuser</code> .
Qos	Specify the quality of service (QoS) of the MQTT broker by entering one of the following values: <ul style="list-style-type: none"> <li>◦ 0: Indicates that the message is delivered at most once or it is not delivered at all.</li> <li>◦ 1: Indicates that the message is always delivered at least once.</li> <li>◦ 2: Indicates that the message is delivered once.</li> </ul>
Port	The port number of the MQTT broker. By default, the value in this field is 1883, which is the standard MQTT port number.

The MQTT broker settings are configured.

## Display Asset Locations on a Map

Enable Google Maps for your applications to display asset locations.

While designing a page, you can use the Google Maps widget to display the locations of assets on a map. To do so, you require the API key generated by Google. This topic describes how to access the key and use it in the application that you want to create.

1. Access <https://cloud.google.com/maps-platform/>, and follow the on-screen instructions to generate the API key.

The API key is generated.



### Note:

Ensure that the following APIs are enabled for the key:

- The Geocoding API
- The Maps JavaScript API

2. Modify the `userconfig.json` file located here:

```
C:\Program Files\GE\Operations Hub\iqp-endapp\public\scripts\data
```

3. Update the file using the API key and version information provided by Google:

Search for `"googleMapsVersion"` and enter the version number for it.

Search for `[GOOGLEAPIKEY]` and replace (including the brackets) with your API key.

4. Save and close the file.

5. Restart the Operations Hub IQP Tomcat Web Server service.

The Google Map widget is now available for use in the application. Asset locations are now displayed on a map.

## Configure Session Timeouts

With Operations Hub, you can configure how soon a login session expires when a session is idle.

Before doing so, consider which application sessions you need to configure. The Designer, the End-app, and Proficy Authentication (formerly UAA) each can have its session timeout configured independently.

### Operations Hub Session Timeouts

Access the `web.xml` file from these locations, and update the configuration as follows, for End-app and Designer session timeouts respectively:

- C:\Program Files\GE\Operations Hub\iqp-tomcat\webapps\app\WEB-INF
- C:\Program Files\GE\Operations Hub\iqp-tomcat\webapps\site\WEB-INF

```
<session-config>
  <session-timeout>30</session-timeout>
</session-config>
```

A session is tracked by a cookie, wherein the cookie age must be longer than the session timeout. Therefore, if the timeout is increased, make sure the cookie's max-age (configured in the same `web.xml`) is not shorter than the session timeout as shown here:

```
<session-config>
  <session-timeout>2</session-timeout>
  <cookie-config> <max-age>120</max-age> </cookie-config>
</session-config>
```

`session-timeout` and `cookie-config/max-age` are in different units of measurement (see note below).

Additionally, if you set either of the session timeouts greater than one hour in `web.xml`, you also need to add a system environment variable `SESSION_DESTROY_TIMEOUT` with value `session_timeout_in_millisec + 10 minutes in millisec`. For example, if you set a session timeout to two hours, then set it to `130 * 60 * 1000 = 7800000`.



#### Note:

1. Restart IQP tomcat service whenever you reconfigure any of the settings/parameters mentioned above.
2. `session-timeout` is measured in minutes, whereas `cookie-config/max-age` is measured in seconds.
3. Any manual configuration changes, including changes for timeouts, are overwritten on upgrade.

## Proficy Authentication Session Timeout

Proficy Authentication session timeout decides how long your Proficy Authentication login session remains valid. It in turn determines whether you need to enter the credentials again when logging into an application that depends on Proficy Authentication for login.

Example: If the session timeout for Operations Hub Designer is set to 30 minutes, and Proficy Authentication is set to one hour, then you are not required to enter the credentials to re-login if the Designer session times out within one hour. You need to enter credentials only when the Designer session lasts longer than an hour, or you explicitly log out of a session.

You can configure session timeout during Proficy Authentication installation. To configure after installation, access the `web.xml` file from `C:\ProgramFiles\GE\Proficy Authentication\uaa-tomcat\webapps\uaa\WEB-INF` OR `C:\ProgramFiles\GE\Operations Hub\uaa-tomcat\webapps\uaa\WEB-INF`, and update the configuration as follows:

```
<session-config>
  <session-timeout>30</session-timeout>
</session-config>
```

The cookie's max-age may also need to be adjusted, similar to Operations Hub session timeouts.

## Setting Up Operations Hub for Kiosk Mode

### Overview

This topic provides an overview of Operations Hub kiosk mode setup.

With 2023 release, Operations Hub extends support for interactive user login when the application is run on non-interactive devices. For example, a TV dashboard or a digital signage system. Operations Hub allows these two options for interactive login:

- Pre-authentication
- Kiosk Mode

#### Pre-authentication

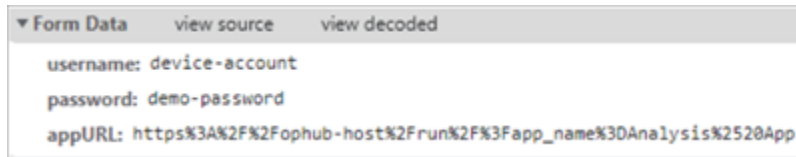
Pre-authenticated application loading is in the form of a REST endpoint, when responding to a request with proper credentials, which will lead the client (browser) to the application without further need for interactive login. This option is suitable for digital signage with a content management system that needs to programmatically start an Operations Hub application.

Pre-authentication is carried out when a client sends a `POST` request (form submission) to the endpoint `https://ophub-host/app/autologin` with the following fields in the request body:

- **username:** User name used for pre-authentication.
- **password:** Password for the user account.
- **appURL:** URL of the Operations Hub application to be loaded after authentication.

Data in the request body should be URL-encoded, and the content type of the request should be set to `application/x-www-form-urlencoded`. For more information on form submission, refer to [https://developer.mozilla.org/en-US/docs/Learn/Forms/Sending\\_and\\_retrieving\\_form\\_data#the\\_post\\_method](https://developer.mozilla.org/en-US/docs/Learn/Forms/Sending_and_retrieving_form_data#the_post_method)

Example (shown as parsed in Chrome Developer Tools):



Following the request, the response will be a redirect that leads to the application.

## Kiosk Mode

The kiosk mode option builds on pre-authentication, and allows the user to persist user credentials on a client device, which is to be used to start pre-authenticated application loading automatically.

For Kiosk mode, a client device must be first configured, which results in user credentials persisted on device. Note that credentials are only persisted and used on the configured client device. If setting up multiple client devices, each device should be configured. See [Configure Kiosk Mode \(on page 88\)](#).

## Configure Kiosk Mode

This topic provides steps to configure Operations Hub for kiosk mode.

You are an administrator.

1. Open the following URL on the device browser:

`https://ophub-host/app/autologin`

And the following form will be displayed:

The **Set up this client device for Kiosk mode** form appears.

2. Enter the details as described below:

Field	Description
Username	User name used for pre-authenticated application loading.
Password	Password for the user account.
Application URL	URL of the Operations Hub end-application.
Test Credentials	Select this button to test the pre-authentication in a new browser tab based on the credentials and application URL entered in



Field	Description
	the form. This test does not use persisted data (any data already saved to the device).

**Set up this client device for Kiosk mode**

Username:

Password:

Application URL:

Use this hyperlink on this device to start the application with persisted credentials.

3. Select **Save** to save the entered login credentials and application URL to the client device. To remove the saved data (persisted credentials) on the device, select **Clear**. This is useful when you want to clear sensitive data to re-purpose or decommission the client device.

**Note:**

Clearing the browser cache also clears the kiosk pre-authorization credentials. If kiosk mode is required and you cleared the browser cache, then re-run the setup for kiosk mode.

The URL that appears at the bottom of the configuration form is the actual URL to start the Kiosk mode. You can copy the link to use at runtime. You may use this for testing, and note that the persisted data will be tested, unlike the **Test Credentials** button.

4. Once the device is properly configured, access the following URL using the browser on the client device:

```
https://ophub-host/app/autologin?kiosk
```

This is the same URL that appears at the bottom of the configuration form.

The persisted credentials are read from the device to start pre-authenticated application loading.

## Mapping Proficy Authentication Groups

Mapping to Proficy Authentication groups helps with user management, access control, and security within Operations Hub.

User accounts created in Proficy Authentication represent people who need to access Operations Hub. Each user is associated with an identity provider (UAA, LDAP, SAML) and a set of groups that determine their permissions and access levels within Operations Hub. The authentication credentials for users associated with LDAP/SAML are verified by the identity provider before they can access Operations Hub. These are the different types of users in Operations Hub:

Type of User	Description
Site administrator	This user creates tenants and tenant administrators using the Site Admin Console application. This user is created automatically when installing Operations Hub. You cannot access, modify, or delete this user from the Designer.
Tenant administrator	This user manages the user accounts of developers and application users. The first tenant administrator is created automatically when installing Operations Hub. You cannot delete this user from the Designer.
Developer	This user creates applications using Operations Hub.
Application user	This user accesses applications created using Operations Hub.

Groups in Proficy Authentication are created for specific type of users, likely to perform the same type of activities. You can create groups based on user roles, responsibilities, or permissions, and then assign users to these groups. This allows you to manage user permissions and access levels at the group level instead of managing individual users.

For more information, refer to these topics in [Proficy Authentication documentation](#).

- *Create Groups*: Provides information on how to create groups in Proficy Authentication.
- *Map Groups*: Provides information on how to map groups (existing UAA, LDAP, SAML) in Proficy Authentication.

## Certificate Management

### About the Certificate Management Tool

The Certificate Management tool allows you to manage external certificates and renew expired certificates.

The tool is installed automatically when you install Operations Hub. Using the Certificate Management tool, you can manage the following types of certificates:

- Server certificates, which include local certificates and imported certificates.
- Issuer certificates, which include certificates that are trusted by Operations Hub. This is required to connect to an external UAA instance. If you want to connect to LDAP, use the LDAP service to generate the certificate. Typically, you will only require the root CA certificate.


Using the Certificate Management tool, you can perform the following tasks:

- [Access a certificate \(on page 91\)](#).
- [Renew a local certificate \(on page 93\)](#).
- [Import a server certificate or an issuer certificate \(on page 91\)](#).
- [Remove a server certificate or an issuer certificate \(on page 93\)](#).
- [View log messages \(on page 93\)](#) that are generated while managing the certificates.

## Access a Certificate

Using the Certificate Management tool, you can access server certificates and issuer certificates.



1. Double-click  on your desktop.

The icon appears on your desktop after you install Proficy Operations Hub.

The **GE Operations Hub Certificate Management Tool** page appears, displaying the **Server Certificate** section.

2. Depending on the type of certificate that you want to access, perform one of the following tasks:
  - If you want to access a server certificate, select **View** in the **Local Certificate** or the **Imported Certificate** subsection.
  - If you want to access an issuer certificate, select **External Trust**, and then select **View**.


The certificate appears.

## Import a Certificate

Using the Certificate Management tool, you can import the following types of certificates:

- **Server certificates:** You can import a certificate (chain) file of the PEM, PFX, or P12 format. To import a certificate of the PFX or a P12 format, you must enter a password.
- **Issuer certificates:** You can import a certificate file of the PEM format that contains only one certificate for the root CA. If you are currently using a certificate for the external UAA instance, it is replaced by the imported certificate.



1. Double-click  on your desktop.

The icon appears on your desktop after you install Proficy Operations Hub.

The **GE Operations Hub Certificate Management Tool** page appears, displaying the **Server Certificate** section.

2. If you want to import a server certificate, perform the following steps:
  - a. In the **Imported Certificate** subsection, next to the **Certificate File** box, select **Select**.
  - b. Navigate to and select the certificate file, and then select **Open**.
  - c. Next to the **Key File** box, select **Select**.
  - d. Navigate to and select the key file, and then select **Open**.
  - e. If you have selected a PFX or a P12 file, enter the password in the **Password** box.
  - f. Select **Import**.  
A message appears, asking you to confirm that you want to import a certificate.
  - g. Select **Yes**.

The certificate is imported.


3. If you want to import an issuer certificate, perform the following steps:
  - a. In the **External Trust** subsection, next to the **Certificate File** box, select **Select**.
  - b. Navigate to and select the certificate file, and then select **Open**.
  - c. Select **Import**.  
A message appears, asking you to confirm that you want to import a certificate.
  - d. Select **Yes**.

The certificate is imported and replaces the currently used certificate for the external UAA, if any.

## Renew a Certificate

Using the Certificate Management tool, you can renew local certificates that have expired.



1. Double-click  on your desktop.

The icon appears on your desktop after you install Proficy Operations Hub.

The **GE Operations Hub Certificate Management Tool** page appears, displaying the **Server Certificate** section.


2. Select the local certificate that you want to renew, and then select **Renew**.

A message appears, specifying that the certificate has been renewed.

## Remove a Certificate

Using the Certificate Management tool, you can remove a server certificate or an issuer certificate. When you do so, the local certificate is used by Operations Hub.



1. Double-click  on your desktop.

The icon appears on your desktop after you install Proficy Operations Hub.

The **GE Operations Hub Certificate Management Tool** page appears, displaying the **Server Certificate** section.

2. Depending on the type of the certificate that you want to remove, perform one of the following tasks:

- If you want to remove a server certificate, in the **Imported Certificate** subsection, select **Remove**.
- If you want to remove an issuer certificate, select **External Trust**, and then select **Remove**.

A message appears, asking you to confirm that you want to remove the certificate.

3. Select **Yes**.

The certificate is removed, and the local certificate is used by Operations Hub.

## View Log Messages

Using the Certificate Management tool, you can view the log messages that are generated while managing certificates.



1. Double-click **Certificate Management Tool** on your desktop.

The icon appears on your desktop after you install Proficy Operations Hub.

The **GE Operations Hub Certificate Management Tool** page appears, displaying the **Server Certificate** section.

2. Select **Messages**.

The **Messages** section appears, displaying the log messages.

## Send Certificate Expiry Notification

Sends email notification on certification expiry.

[Install Site Administration Addon \(on page 81\)](#).

Email notifications must be sent to the recipients when their Operations Hub certificate expires, or is about to expire. Use the default [entity \(on page 294\)](#), [event \(on page 363\)](#), and [template \(on page 373\)](#) to complete this task. These are available on [installing Operations Hub \(on page 34\)](#).

- `SendEmailEntity`
- `CertificateExpiryEvent`
- `CertificateEmailTemplate`

1. Log in to Site Administration Console and set up an email server.

Here is an example of gmail setup:

If using a Self-Signed certificate, you need to perform [additional steps \(on page 83\)](#) to update the `setting.conf` file.

2. Log in to Operations Hub as an administrator.
3. From the main navigation menu, select **Events**.
4. Open `CertificateExpiryEvent`.
5. On the **ACTIONS** tab, enter the email address of the recipients.

**Note:**

Do not modify the default populated details for `CertificateExpiryEvent` or `CertificateEmailTemplate`.

The screenshot shows the configuration interface for the `CertificateExpiryEvent`. The **ACTIONS** tab is active. Under the **Actions** section, the **Send an E-mail** action is selected. The recipient's address is set to `iqpuser@mail.mydomain.com`. The email template is `CertificateEmailTemplate`. The scheduler is set to **Take action on every trigger**. At the bottom, there are buttons for **Cancel**, **Save**, and **Save And Exit**.

6. Select **Save And Exit**.

When certification expiry is detected in the next 45 days, daily emails are sent to the recipients asking them to renew their certificates. The email also contains the details of the certificates about to expire (or already expired, if not renewed within 45 days).

## Integrating with Historian

### Integrating Operations Hub and Historian

A trend chart allows you to trend data from Historian.

You can choose to trend data from an asset model or directly from Historian. To do so, you must integrate Historian and Operations Hub.

## Access the Trend Chart with Asset Model

1. Create a data source to connect to the Historian server.  
For instructions, refer to the Data Sources section of the User Guide.
2. Set up the Historian server.  
For instructions, refer to the Administration section of the User Guide.
3. Import the model to Operations Hub.  
For instructions, refer to the Administration section of the User Guide.
4. For the model that you have imported, enable the trendable properties by performing the following properties:
  - a. In the **Admin** workspace, select **Visualizations > Designer**.
  - b. For each data variable that is trendable, select the check box in the Trendable check box.
5. Access the Historian Analysis application.  
For instructions, refer to the Applications section of the User Guide.

When you navigate to the model, the trend chart plots data based on the selected context.

## Access the Trend Chart without Asset Model

You can access the trend chart without the asset model (that is, by browsing through the Historian data source directly for use in the trend chart).

1. Create a data source to connect to the Historian server.  
For instructions, refer to the Data Sources section of the User Guide.
2. Set up the Historian server.  
For instructions, refer to the Administration section of the User Guide.
3. Access the Historian Analysis application.  
For instructions, refer to the Applications section of the User Guide.
4. Access the trend chart configuration to select the tags that you want to plot on the trend chart.  
For instructions, refer to the Widgets section of the User Guide.

Data for the selected tags is plotted on the trend chart.

## Uninstalling Operations Hub

### Uninstall Operations Hub

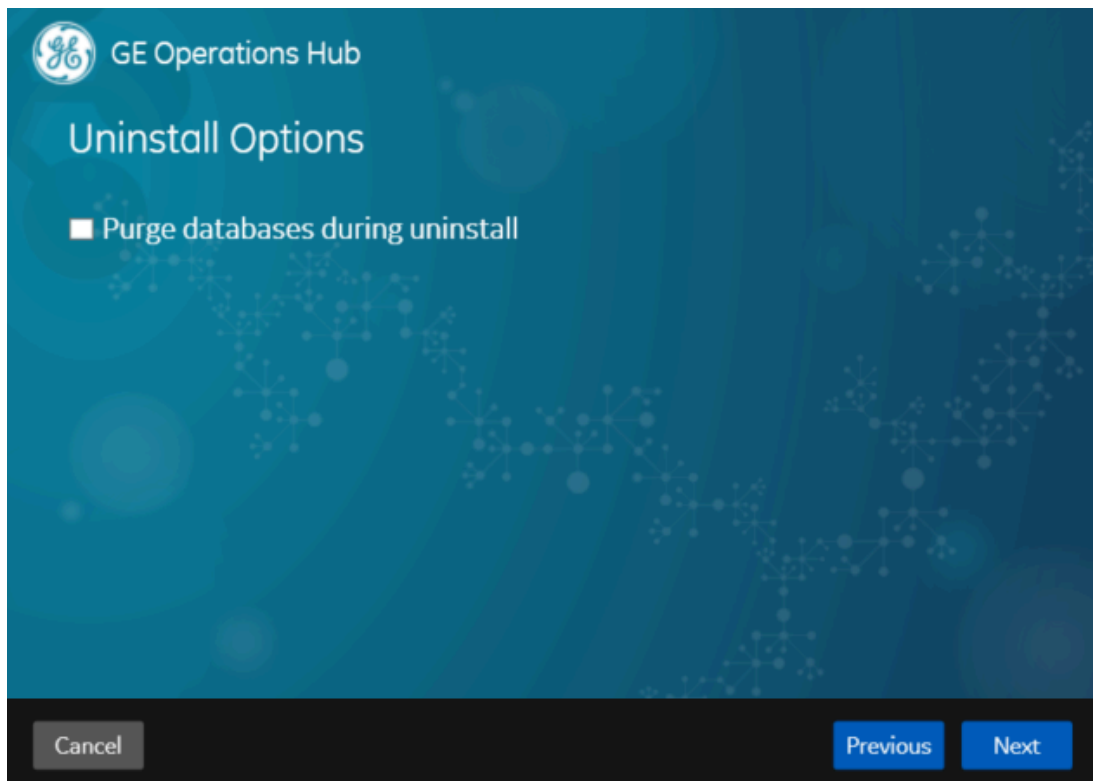
This topic describes the uninstalling of Operations Hub.



To completely remove the Proficy product installation, you need to uninstall the following applications as per the instructions that follow:

- Configuration Hub
- Operations Hub
- Proficy Authentication

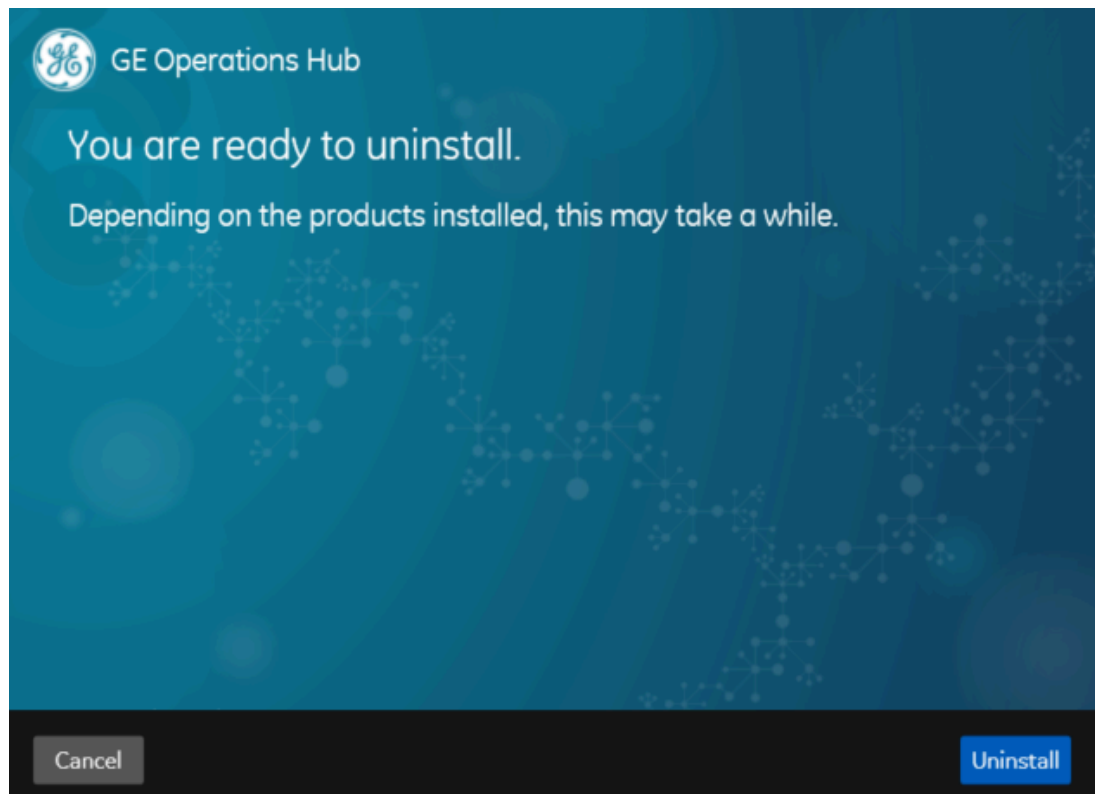
1. If you want to uninstall Operations Hub automatically, open Command Prompt, and enter the following command: `<Installation folder path of Operations Hub>\OpHub-Windows_Installer>ophub_bundle -uninstall`
2. If you want to uninstall Operations Hub manually, perform the following steps:
  - a. On the machine on which you want to uninstall Operations Hub, select **Control Panel > Uninstall a Program**.  
A list of programs that you can uninstall appears.
  - b. Right-click **Operations Hub**, and then select **Uninstall**.  
The **Uninstall Options** screen appears.



- c. In addition to uninstalling Operations Hub, if you want to delete all the related data and applications, select the **Purge databases during uninstall** check box.

d. Select **Next**.

The **You are ready to uninstall** screen appears.



e. Select **Uninstall**.

Operations Hub is uninstalled from the Windows machine.

## Getting Started with Proficy Historian

### Get Started with Proficy Historian and Operations Hub

This topic guides you through how to get started integrating Proficy Historian and Operations Hub.

#### **Before You Begin**

Before beginning, make a note of the following:

- Ensure the Historian Web Clients are installed on the Historian machine; this is very important if you will be using the Historian REST API in Operations Hub.
- Ensure that you can access Historian Web Trending Client from a remote machine or from the Operations Hub machine.
- Ensure that certificates are trusted for both Operations Hub and Historian (not strictly necessary if you use option to ignore TLS/SSL, but a good idea).

## Steps

The following sections walk you through:

1. Configuring a Historian data source (System API or REST API) in Operations Hub. See [Configure Historian Data Sources for Operations Hub \(on page 99\)](#).
2. Creating a Model. See [Create a Model for Operations Hub to use with Historian \(on page 101\)](#).
3. Using the Trend widget to trend model-based Historian data or trend data directly from a Historian. See [Use the Trend Widget for Historian Data Source \(on page 103\)](#).
4. Creating a Historian REST query. See [Create Historian REST Query for Operations Hub \(on page 106\)](#).
5. Using the Query in the page designer. See [Use the Historian Query in the Operations Hub Page Designer \(on page 107\)](#).

## Configure Historian Data Sources for Operations Hub

### Overview

Look at the following examples for configuring a data source for Historian 7.x and Historian 8.x.

- **Historian 7.x** requires entry of port used – in this instance, port 8443.
- The Auth Client ID is the admin (case sensitive) for Historian 7.x.
- **Historian 8.x** does not require any port to be specified.
- The Auth Client ID for Historian 8.x must be in the form of MachineName.admin, where MachineName is case sensitive.
- For both **Historian 7.x and 8.x**, ensure Data source URL and Client ID are in the right format.



**Note:**

- The **System API** connection is necessary for Trending Historian data in the Trend widget.
- The **REST API** connection is necessary for creating REST queries against the Historian REST API. These queries can then be bound to widgets like gauges, grids, etc to visualize this data
- When configuring a REST data source, be sure to provide all necessary parts to the Base URL, including any required ports. (Example: `https://<HistorianServerName>:8443`)

Refer to [Add Historian or Custom REST Data Source \(Classic\)](#) (on page 424).

### Configuring Historian 7.x in Operations Hub

Name:

Product: Proficy Historian

Description:

---

**Enable System Connection** - This connection is used for trending.

Hostname:

Authentication Required

Username:

Password:

Test

**Enable REST Connection** - This connection is used for queries.

Base URL:

REST Authentication Required

Ignore TLS/SSL

Certificate Required

Cancel
Save

## Configuring Historian 8.x in Operations Hub

< HistorianServer

Name:

Product: Proficy Historian

Description:

---

**Enable System Connection** - This connection is used for trending. ⓘ

Hostname:

Authentication Required

Username:

Password:  👁

⚙️ Test

---

**Enable REST Connection** - This connection is used for queries. ⓘ

Base URL:

REST Authentication Required

Ignore TLS/SSL

Certificate Required

Certificate: Choose Certificate WebHMITacoRoot.cer

Auth URL:

Auth Client Id:

Auth Client Secret:  👁

⚙️ Test

Auth Type: OAuth

Auth Grant Type: client\_credentials

Use Datasource Certificate

Auth Certificate: Choose Certificate WebHMITacoRoot.cer

Cancel
Save
Save As New
Save And Exit



### Note:

The Auth Client ID field is case sensitive. For example, if the Historian server name is hist8Server, the user must use hist8Server.admin and not HIST8Server.admin or Hist8Server.admin, otherwise REST authentication will fail. If your rest connection fails, make sure you can login to the Historian Web trend client (<https://webhmitaco/historian-visualization/hwa>) Once successful, use the same user name and password for the client id in the REST configuration in Operations Hub.

Create a Model for Operations Hub to use with Historian

## Create an Object Type

The screenshot shows the 'Object Types' configuration page. On the left sidebar, 'Object Types' is selected. The main content area shows the configuration for 'DisplacementPump'. The 'Name' is 'DisplacementPump'. Below this, there are two tabs: 'Data Variables' and 'Contained Types'. The 'Data Variables' tab is active, showing a table with columns: Variable, Data Type, and Description. The table lists several variables with checkboxes in the first column.

<input type="checkbox"/>	Variable	Data Type	Description
<input type="checkbox"/>	Mounting	STRING	
<input type="checkbox"/>	RunningStatus	BOOLEAN	
<input type="checkbox"/>	Head	STRING	
<input type="checkbox"/>	OperatingMode	BOOLEAN	
<input type="checkbox"/>	Manufacturer	STRING	
<input type="checkbox"/>	HP	STRING	
<input type="checkbox"/>	ControlMode	BOOLEAN	
<input type="checkbox"/>	Pressure	NUMBER	

## Create an Object based on the New Type

The screenshot shows the 'Objects' configuration page. On the left sidebar, 'Objects' is selected. The main content area shows the configuration for 'DisplacementPump1A'. The 'Name' is 'DisplacementPump1A' and the 'Object Type' is 'DisplacementPump'. Below this, there are two tabs: 'Data Variables' and 'Contained Objects'. The 'Data Variables' tab is active, showing a table with columns: Variable, Data Type, RealTime Data Al, Real Time Data Sc, Historical Data Al, and Historical Data Sc. The table lists several variables with dropdown menus in the last two columns.

Variable	Data Type	RealTime Data Al	Real Time Data Sc	Historical Data Al	Historical Data Sc
Mounting	STRING		...	Histori	FIX.FWT_FWI ...
RunningStati	BOOLEAN		...	Histori	FIX.FWT_FWI ...
Head	STRING		...	Histori	FIX.FWT_FWI ...
OperatingMc	BOOLEAN		...	Histori	FIX.FWT_FWI ...
Manufacture	STRING		...	Histori	FIX.FWT_FWI ...
HP	STRING		...	Histori	FIX.FWT_FWI ...
ControlMode	BOOLEAN		...	Histori	FIX.FWT_FWI ...
Pressure	NUMBER		...	Histori	FIX.FWT_FWI ...

Tie the properties of the Data variables to the Historian data source.

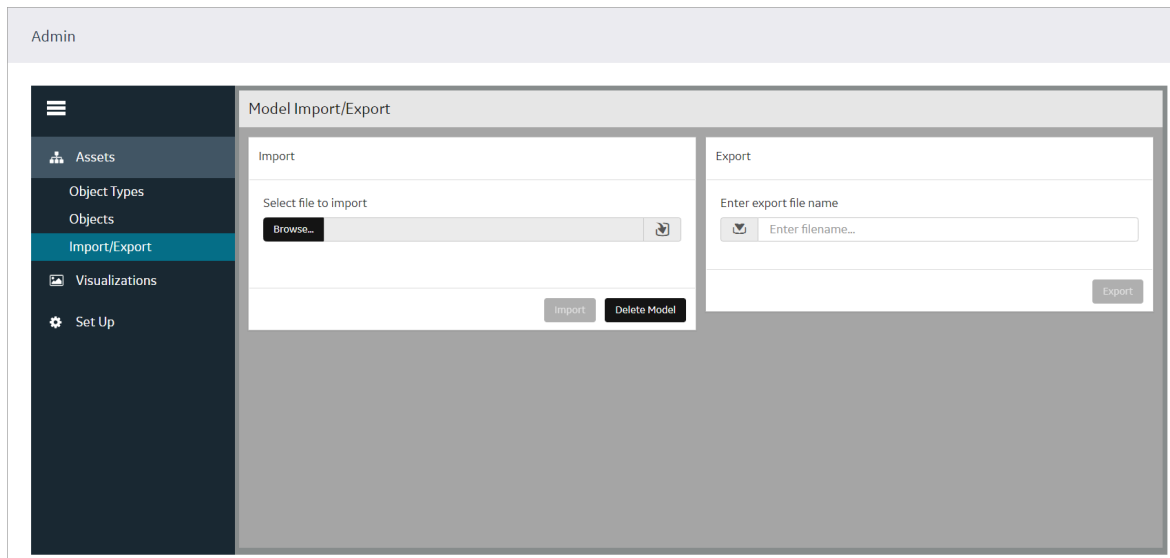
Refer to [Set Up the Model Structure \(Classic\) \(on page 407\)](#) and [Define Objects \(Classic\) \(on page 408\)](#).

## Use the Trend Widget for Historian Data Source

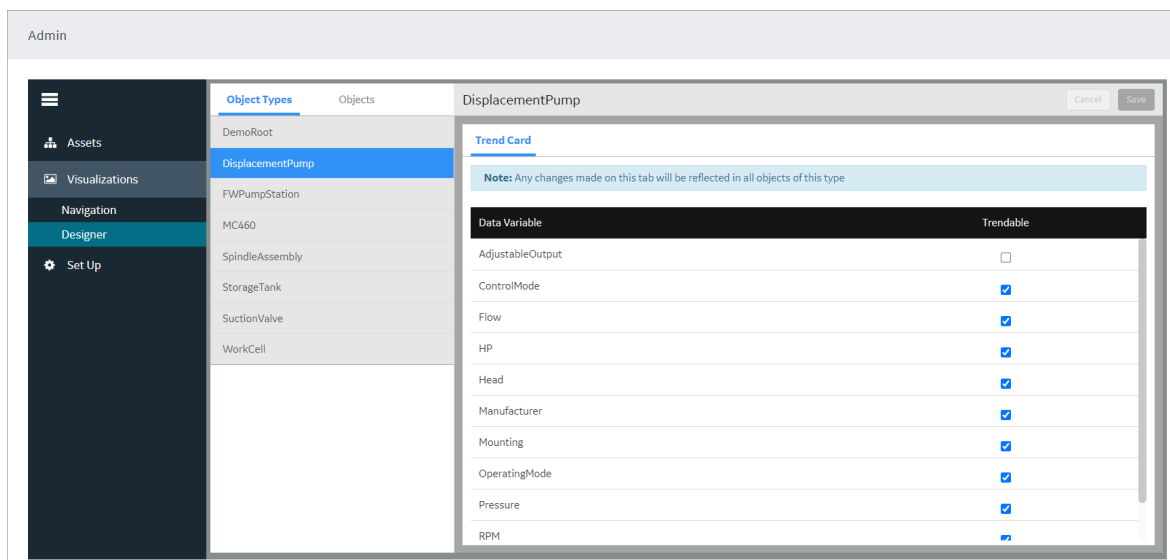
When using Operations Hub with Historian use the following guidelines to successfully get data flowing in the Trend widget.


## Use the Trend Widget with an Asset Model

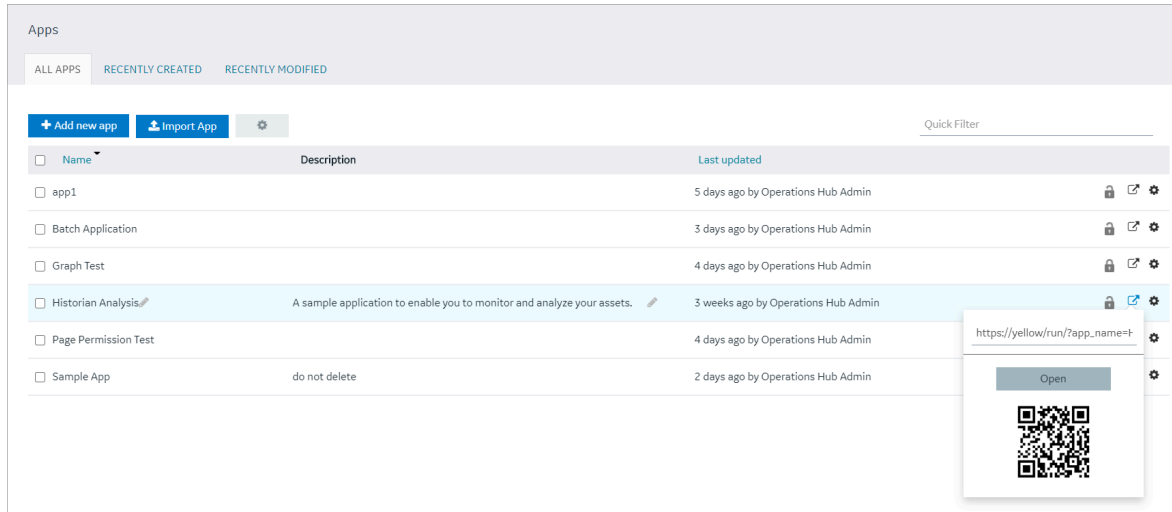
1. Create a Historian data source (on page 424).
2. Import the model from the **Admin > Import/Export** option.



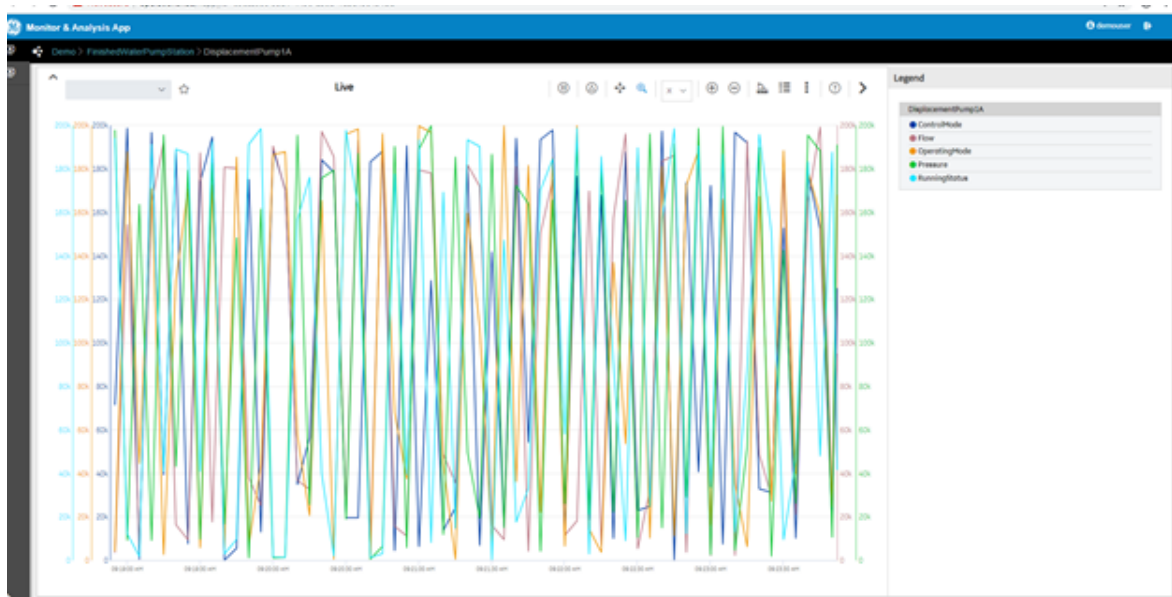
3. After the model is successfully imported, go the **Visualizations > Designer** section and enable the Trendable properties and save.



4. Switch to the **Apps** section.
5. Choose the **Historian Analysis** app.
6. Select the  button to open the app.





7. At run time, navigate through the model and the Trend chart will display data based on the context selected.



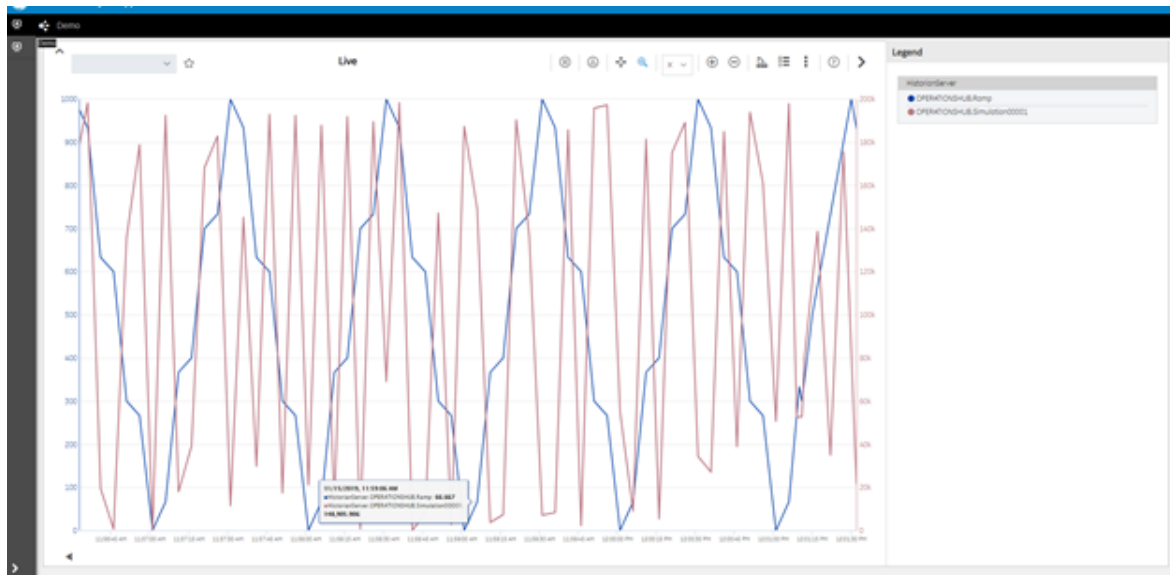
### Use the Trend Widget without an Asset Model (Browsing Data Source Directly for Trend Widget)

1. Create a data source to historian via the **Data Sources** section.
2. Make sure the test passes.



3. In the **Admin**, make sure the Historian server is also setup via the Setup area.
4. Switch to the **Apps** section.
5. Choose the **Historian Analysis App**
6. Select the  button to open the app.
7. At run time, open the Trend chart configuration via the  button, then select **Add Tags for Trend** to browse Historian and add tags to the chart for trending.

The image shows two overlapping panels from the Operations Hub interface. The 'Add Sources' panel on the left is titled 'Proficy Historian' and 'HistorianServer'. It features a search bar and a list of tags with checkboxes. Three tags are selected: 'FIX.FWT\_FWP\_DISCHARGE\_PRESSURE.F\_CV', 'FIX.FWT\_FWP\_DPUMP\_1A\_ADJ\_OUTPUT.A\_CV', and 'FIX.FWT\_FWP\_DPUMP\_1A\_CONTROLMODE.F\_CV'. A 'CLOSE' button is at the bottom right. The 'Trend Configuration' panel on the right is titled 'Trend Configuration'. It has a 'Mode' section with 'Live' selected and 'Historical' as an option. The 'Duration' section has '5M' selected, with other options being 1M, 30M, 1H, 2H, 4H, 8H, and 24H. A 'Custom' option is also present with a time input field set to '0 : 0 : 5 : 0'. There is a 'Notes' section with a toggle switch and a 'Specification Limits' section with a right-pointing arrow. The 'Sources' section contains a red-bordered button labeled '+ Add Tags for Trend' and a list of the three selected tags, each with a right-pointing arrow and a close 'x' icon.



Create Historian REST Query for Operations Hub

1. Make sure the data source for Historian REST API is configured as described in the [Configure Historian Data Sources for Operations Hub \(on page 99\)](#) section.

**Enable REST Connection** - This connection to a specific Proficy Historian REST API is used for REST queries utilized in page building.

Base URL: <input type="text" value="https://webhmitaco"/>	Auth Type: <input type="text" value="OAuth"/>
<input checked="" type="checkbox"/> REST Authentication Required	Auth Grant Type: <input type="text" value="client_credentials"/>
<input type="checkbox"/> Ignore TLS/SSL	<input checked="" type="checkbox"/> Use Datasource Certificate
<input checked="" type="checkbox"/> Certificate Required	Auth Certificate: <input type="text" value="Choose Certificate"/> WebHMITacoRoot.cer
Certificate: <input type="text" value="Choose Certificate"/> WebHMITacoRoot.cer	
Auth URL: <input type="text" value="https://webhmitaco/uaa/oauth/token"/>	
Auth Client Id: <input type="text" value="WebHMITaco.admin"/>	
Auth Client Secret: <input type="text" value="....."/>	

2. Create a query for Current value.

Refer to [Create REST Query \(Classic\) \(on page 336\)](#).

< GetCurrentValue

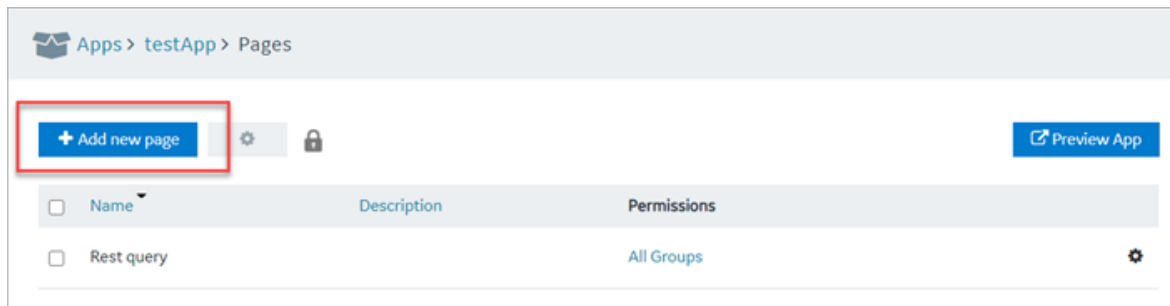
Name: <input type="text" value="GetCurrentValue"/>	Data Source: <input type="text" value="HistorianServer"/>
Description: <input type="text"/>	Available API: <input type="text" value="Current Value"/>
Type: <input type="text" value="REST"/>	Base URL: <input type="text" value="https://webhmitaco"/>
Entity: <input type="text" value="historian_data"/>	Query URL: <input type="text" value="/historian-rest-api/v1/datapoints/currentvalue"/>
Raw JSON: <input type="checkbox"/>	
Method: <input checked="" type="radio"/> Get	
<input type="radio"/> Post	
<input type="radio"/> Put	
<input type="radio"/> Delete	

**Path Parameters**

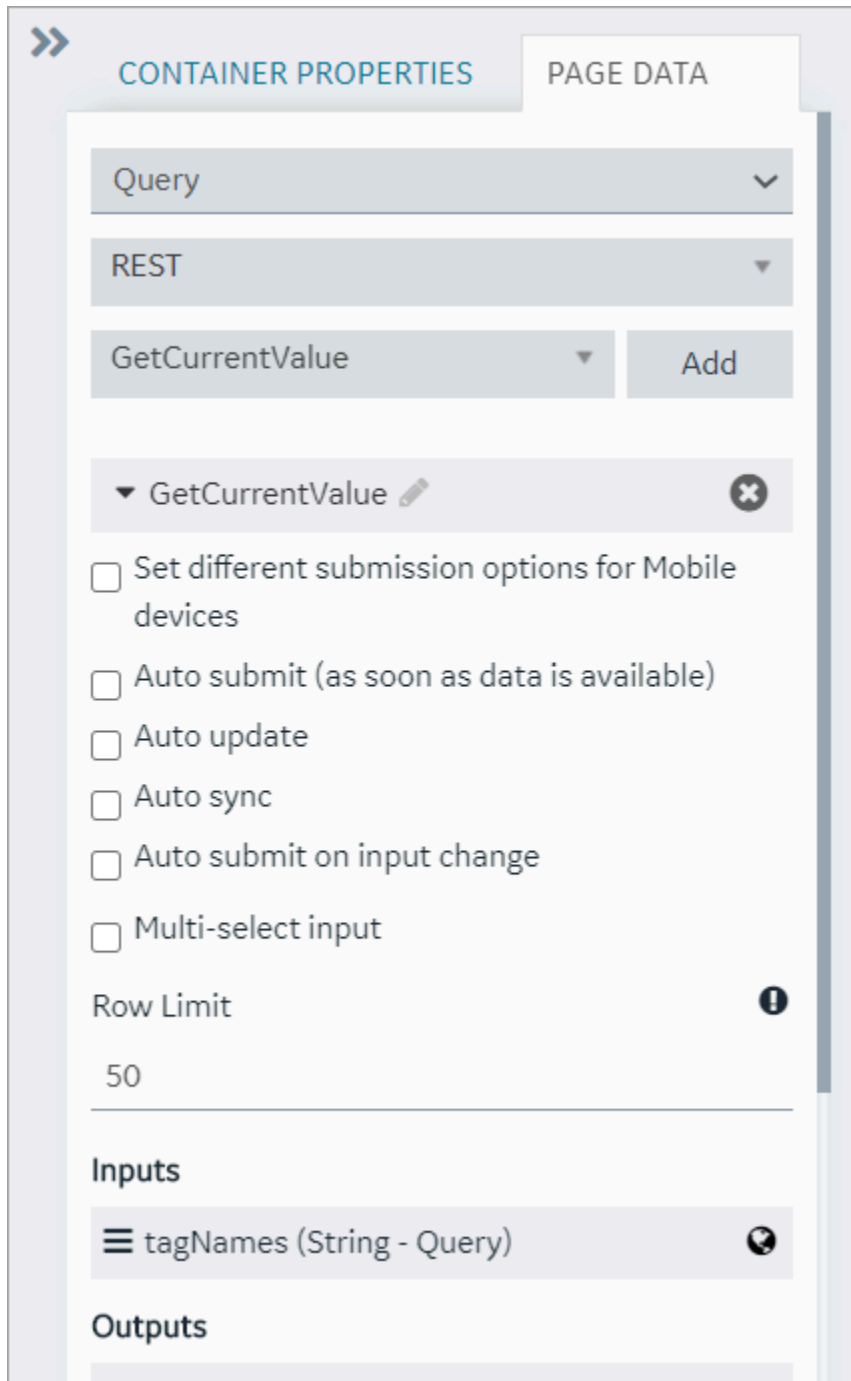
**Query Parameters**

Use the Historian Query in the Operations Hub Page Designer

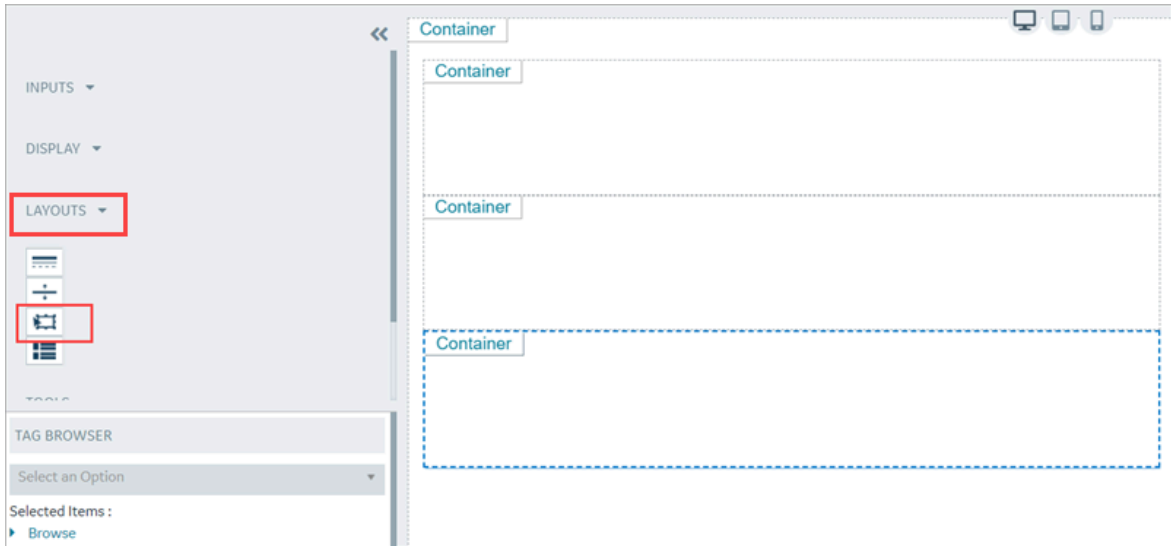
1. Go to **Apps > Pages** and then **Add a New Page** from within the App.



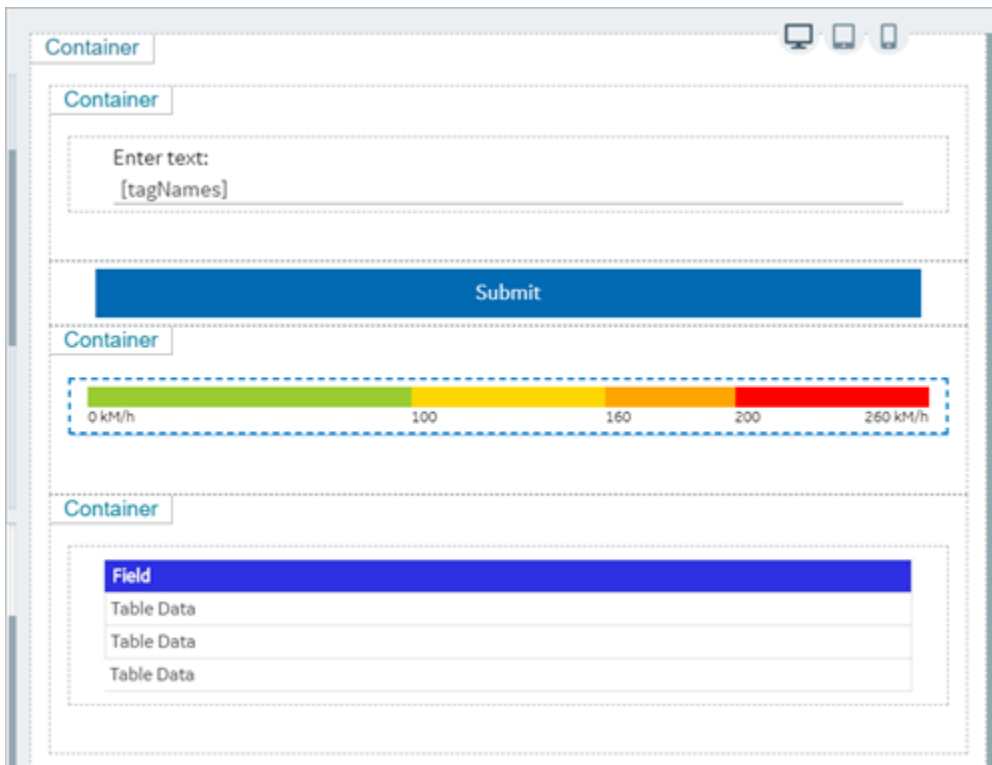
2. Within Page > Page Data, select Query > REST, next to **Get Current Value**, click Add to add the "Current Value Query" to Page.



3. Add widgets to the Page, by first adding three containers to the page. From Layouts, select and drag Containers.



4. Add an Input > Input widget and a button into the first container, Display > Gauge into the second container, and Display > Table into the third container.



5. Now we need to bind the query parameters to each of the widgets: For the Input widget set the target data to the "GetCurrentValue" > TagNames. For the Source you can put in a manual entry of a known Historian tag name.

» INPUT PROPERTIES PAGE DATA

Settings Visual Responsive

▼ DATA

Required ?

Target Data

**GetCurrentValue**

tagNames ▼

Source:

Data

Manual

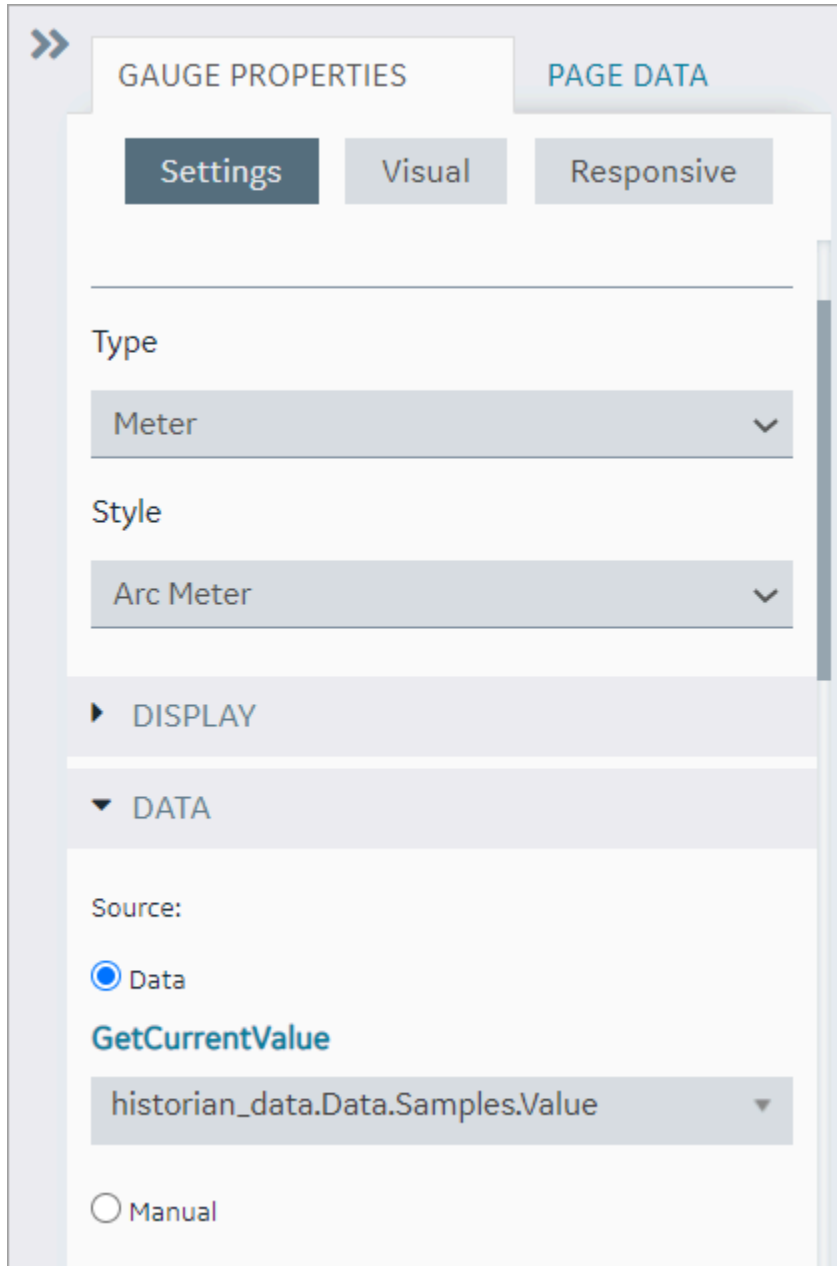
WebHMITaco.Simulation00001

Formula

Submit on change ?

Validation

6. For the Gauge widget, set the style to "Arc Meter" and set the Data > Source > Get Current Value > historian\_data.Data.Samples.Value.




7. Set the color and start position numbers based on the data source High and Low as shown in the following figure.



GAUGE PROPERTIES PAGE DATA

Settings Visual Responsive

- ▶ GENERAL
- ▶ DISPLAY
- ▶ DATA
- ▼ BEHAVIOR

Start position 

100

---

Color

gold

---

Start position 

160

---

Color

orange

---

Start position 

200

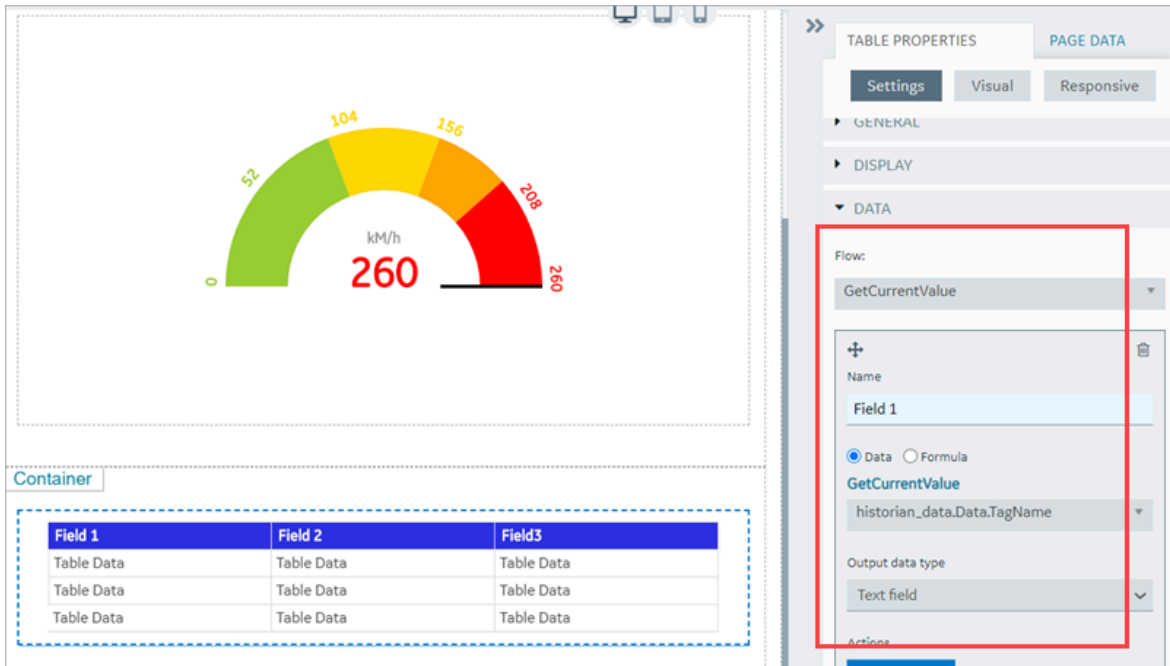
---

Color

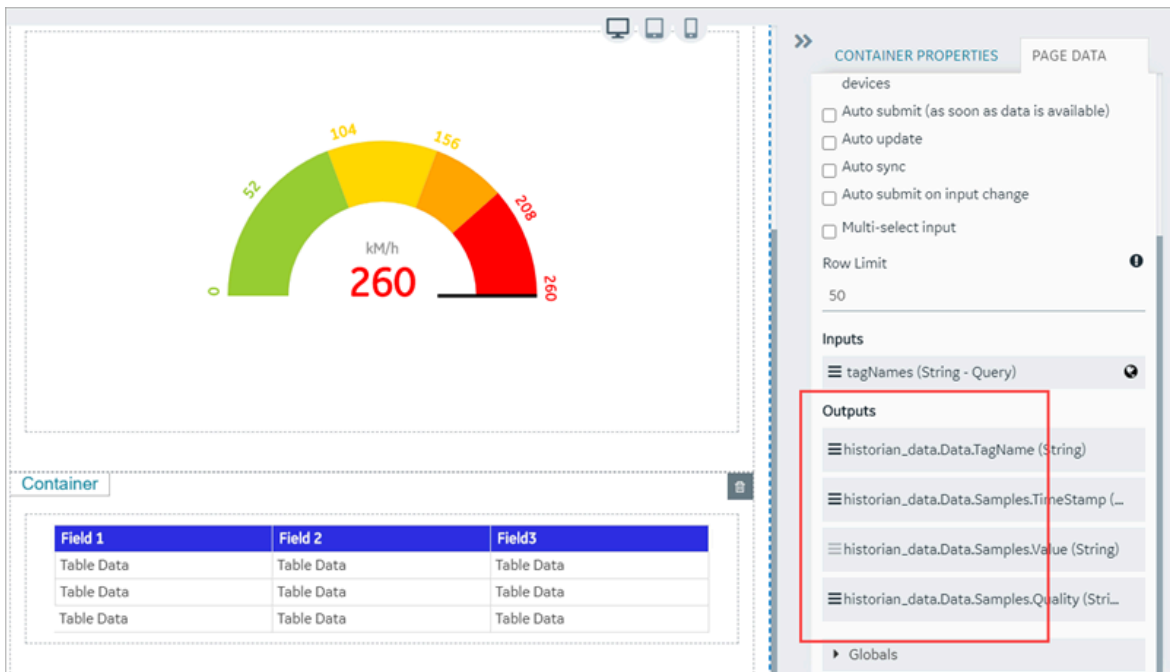
red

---

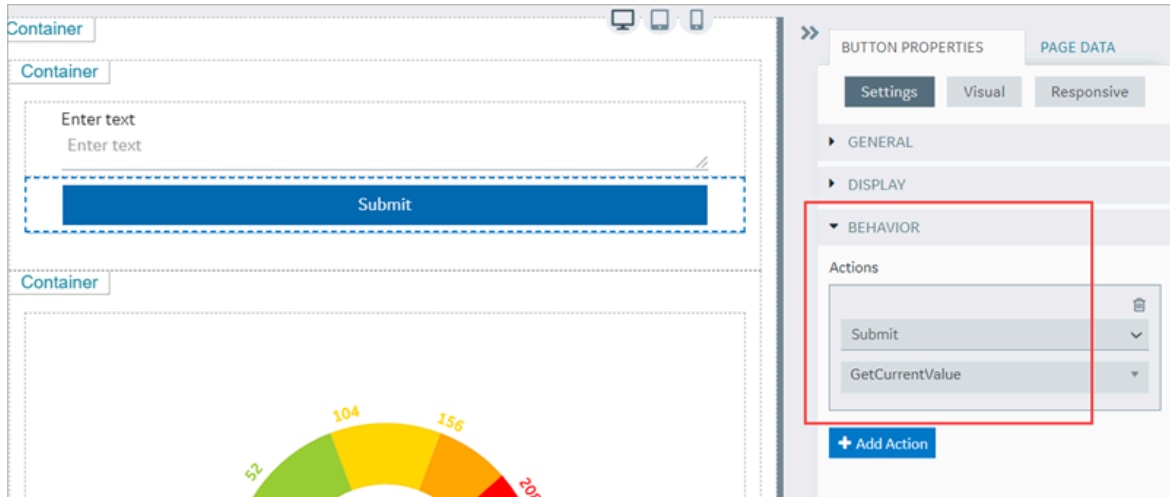
8. For the Table widget, set the Flow->Get Current Value. Now add fields, and set the value for each of the fields.



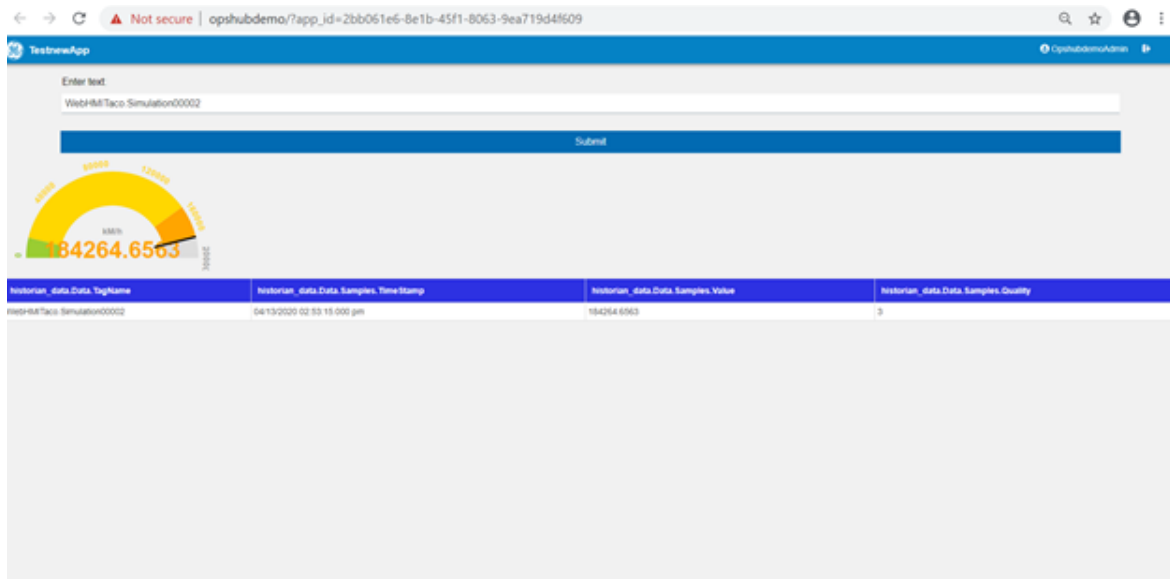
9. Alternatively, you can drag and drop the output parameters from the query onto the grid.



10. Bind the **Submit Action** on button to the query as shown in the following figure:



11. Save the App.
12. Open the App.
13. In the End app, click the **Submit** Button.



14. To update the gauge and the table with the current value of the specified Historian tag, enter a different Historian tag name and click on the **Submit** button.

## Getting Started with the Relational Database Connector

### Get Started with Relational Database Connector

This topic guides you through how to get started integrating the Relational Database Connector and Operations Hub.

## Before You Begin

Before beginning with your relational database connector, be aware of the following:

- This release of Operations Hub supports fetching data via stored procedures from Microsoft SQL Server only.
- Be sure to confirm that you can to successfully connect to the SQL Database:
  - Test that you can connect to SQL Server with another client (for example: SSMS, UDL files), using the SQL account you want to use in Operations Hub.
  - Confirm that the TCP/IP Protocol is enabled on the SQL Server. You will not be able to connect from Operations Hub until you enable TCP/IP using the SQL Server Configuration Manager.
- Ensure that you have a working SQL Database, and that the selected database has stored procedures.

## Steps

The following sections walk you through:

1. Create a data source of type Relational Database. Refer to the [Add Relational Database Data Source \(Classic\) \(on page 422\)](#) section.
2. Provide the details to the external database. Refer to the [Create a Query to a Relational Database \(on page 116\)](#) section.
3. Create a Query of type Relational Database, and specify the expected inputs and outputs of a Stored Procedure. Refer to the [Create a Query to a Relational Database \(on page 116\)](#) section.
4. Map the query in the page designer to use the query to fetch the data from the external database. Refer to the [Use the Relational Database Query in the Designer \(on page 120\)](#) section.
5. View the page in the end app. For an example, see [Example of Adding Relational Database Queries to a Page \(on page 124\)](#).

## Create a Query to a Relational Database

This topic describes how to create a SQL query.

In order to proceed you must have a working SQL database, and the selected database must have stored procedures. You must also have created a data source for the relational database in Operations Hub. See [Create a SQL Data Source \(Classic\) \(on page 443\)](#).

1. In the main navigation menu, select **QUERIES**.

The **QUERIES** workspace appears.

Queries							
Quick Filter						<a href="#">+ Add new query</a>	
<input type="checkbox"/> Name	Type	Description	Origin	Permissions	Last updated		
<input type="checkbox"/> TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin		
<input type="checkbox"/> EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin		
<input type="checkbox"/> GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin		
<input type="checkbox"/> Current Value	Extension		System	All Groups	6 days ago		
<input type="checkbox"/> Historical By Count	Extension		System	All Groups	6 days ago		
<input type="checkbox"/> Historical By Interval	Extension		System	All Groups	6 days ago		

2. Select **Add new query**.

The **Create Query** window appears.

3. In the **Name** field, enter a name, and then select **Create**. The name must contain at least one uppercase or lowercase letter.

The available options for creating the query appear.

4. In the **Description** field, enter a description for the query.
5. In the **Type** field, select **Relational Database**.
6. In the **Data Source** field, select the name of the data source from the list.
7. In the **Query Type** field, observe that the field defaults to 'Stored Procedure' when you select 'Relational Database' as the Type.
8. In the **Schema** field, select the database schema that you want to use. All the database schemas will be loaded for the selected data source. The default selection is *dbo*.
9. In the **Stored Procedure** field, select the Stored Procedure that you want to use from the selected schema.

After you select all the required fields, the list of input parameters will be loaded if there are any, for the selected stored procedure.

The value for the input parameters can be configured either while creating the query or while consuming the query in the page builder page.

10. To assign the value for an input parameter while creating the query, select the type drop-down in the input parameter list. It has two options:

- Fixed Value: If this option is selected, the value given will be taken as the input to the Stored Procedure. The input parameter will not be shown in the page builder page.
  - Input Field: If this option is selected, the value given will be taken as the default input to the Stored Procedure. The input parameter will be shown in the page builder page and if there is any input provided to while execution, the default value will be overridden.
11. After the default values for input parameters are provided, click the **Execute** button under the Test category. You will then be presented with the various fields in Result Sets and Output Parameters sent out of the Stored Procedure.



**Note:**

Currently we do not support dynamic responses from the Stored Procedures. Meaning, the fields that we see while building the query after clicking the Execute button, should match the fields returned by the stored procedure while using the application.

12. Add the required fields.

The following figure displays an example:

**Designer**

APPS  
 ENTITIES  
**QUERIES**  
 DATASOURCES  
 PLUGINS  
 EVENTS  
 EMAILS  
 PARAMETERS  
 ADMIN  
 MANAGE  
 COLLAPSE
 

 < New Query

Name:

Description:

Type:

Data Source:

Query Type:

Schema:

Stored Procedure:

### Input Parameters

Key	Datatype	Type	Default or Test Value
BirdName	VARCHAR	<input type="text" value="Input Field"/>	<input type="text"/>
BirdNameOutput	VARCHAR	<input type="text" value="Input Field"/>	<input type="text"/>
ReptileName	VARCHAR	<input type="text" value="Input Field"/>	<input type="text"/>
ReptileNameOutput	VARCHAR	<input type="text" value="Input Field"/>	<input type="text"/>

### Output Parameters

Key	Datatype
BirdNameOutput	VARCHAR
ReptileNameOutput	VARCHAR

### Test

Resultset1

BirdName(VARCHAR)	ScientificName(VARCHAR)	TypeOfBird(VARCHAR)
-------------------	-------------------------	---------------------

Resultset2

ReptileName(VARCHAR)	ScientificName(VARCHAR)	TypeOfReptile(VARCHAR)
----------------------	-------------------------	------------------------

OutputParameter

BirdNameOutput(VARCHAR)	ReptileNameOutput(VARCHAR)
-------------------------	----------------------------

### Output Data

### Output Data

Resultset1 -> BirdName	Resultset1 -> ScientificName
Resultset1 -> TypeOfBird	Resultset2 -> ReptileName
Resultset2 -> ScientificName	Resultset2 -> TypeOfReptile
OutputParams -> BirdNameOutput	OutputParams -> ReptileNameOutput

13. Select **Save** or **Save And Exit**.

The query is created.

## Use the Relational Database Query in the Designer

This topic describes how to apply SQL queries to a page.

1. In the main navigation menu, select **APPS**.

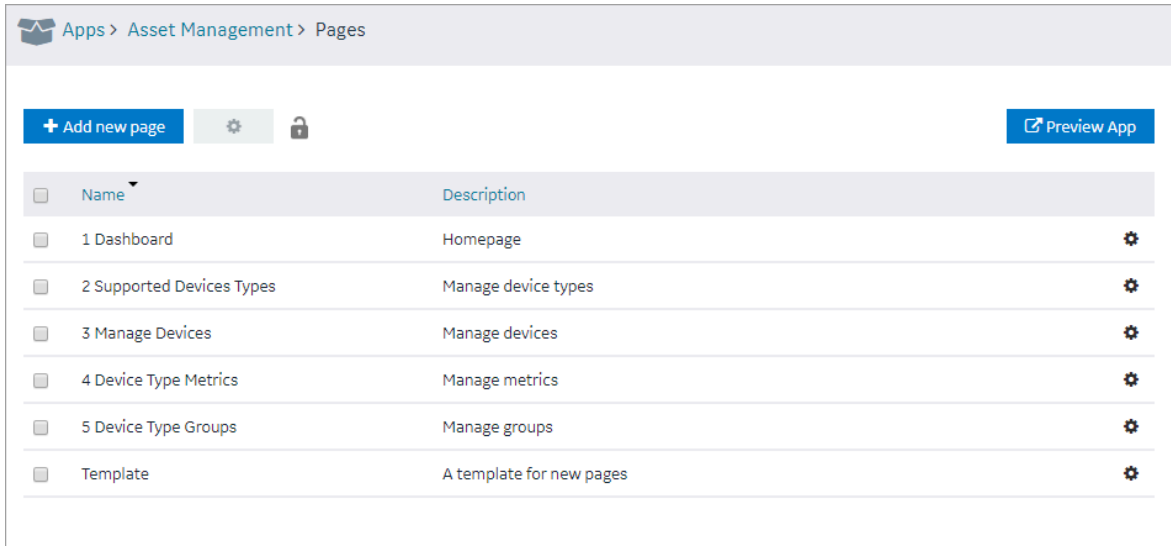
The **APPS** workspace appears, displaying a list of applications created in Operations Hub.

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/>	ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/>	ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/>	Store Temp App	temp	2 months ago by Docs Team	

2. In the **Name** column, select the application in which you want to create a page.

The **PAGES** workspace appears.





3. Select **Add new page**.

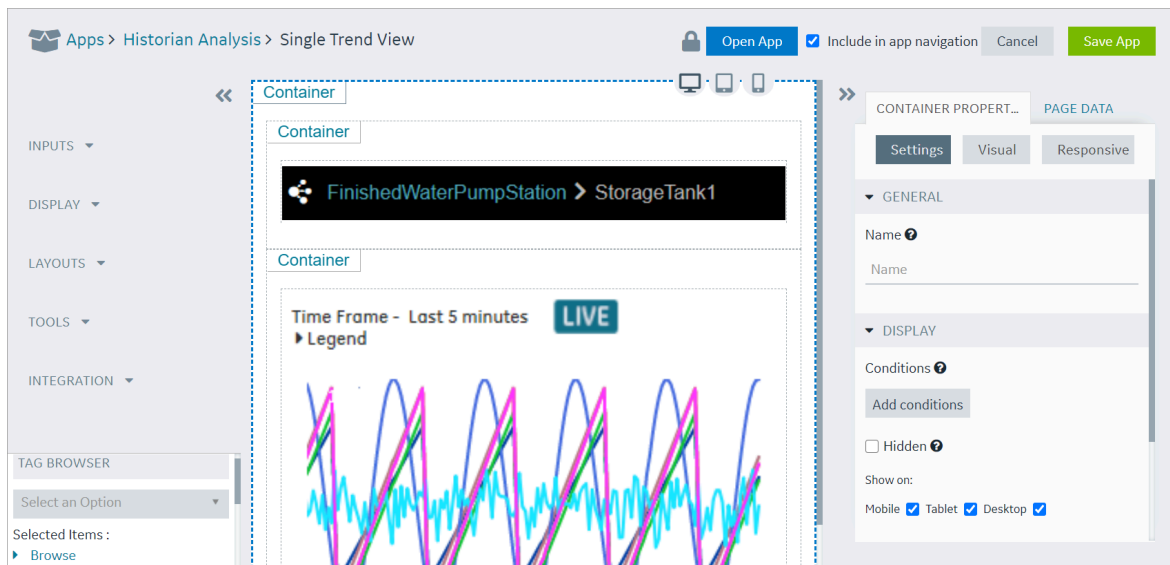
The **Create Page** screen appears.

4. Enter or select values as described in the following table.

Field	Description
Page name	Enter a name for the page. The name must contain at least one uppercase or lowercase letter.
Page description	Enter a description for the page.
Include in app navigation	Select this check box if you want this page to be included in the application navigation. By default, this check box is selected.

## 5. Select **Create**.

The page is created, and the page designer appears.



## 6. Select **Page Data**.

7. To add a Relational Database Query to the page, do the following:

- a. Select the flow type as `Query`.
- b. Select the Data source type as `Relational Database`.
- c. Select the required data source.
- d. Select the required query.
- e. Select a result set.
- f. Select **Add**.

The query with sub-selected result set will be added to the page. The naming convention will be `QueryName - ResultSetName`. Inputs and Outputs are assigned to components exactly like that of REST and Entity pages.

- **Applies to Operations Hub 2022 and earlier versions:**

- For SQL queries with multiple result set, if a result set is added to the page, you cannot add that result set multiple times with different inputs to the same page. You need to create a separate query each time you want to add that result set to the page.
- In case a SQL query with multiple result is added to the page, the inputs and query execution options (check boxes for auto-submit, auto-update, etc.) appear only for the first added result set. Only outputs appear for result sets added subsequently.

The selected inputs and query execution options for the first result set apply to all the query result sets.

- For a query with single result set, you can add it multiple times to the page. But, if the same query output is changed to contain multiple result sets at a later time, then you must remove the second instance of the query before adding the new result set.
- **Applies to Operations Hub 2022.4.1 and later versions:** Every ResultSet in a query is an independent query (inputs and query execution options appear for every result set). This new behavior does not impact the existing apps and queries (created in earlier versions).



**Note:**

As of Operations Hub 1.7, The inbuilt pagination and infinite scrolling for Grid and Table components will not work with Relational Database Queries. The pagination must be handled using the input and output parameters of the stored procedure.

8. Select **Save App**.

An example is shown in the following figure.

The screenshot shows the GE Designer interface for a page titled "Species Management > All Species". The central workspace displays a "Container" containing a table with columns "BirdName", "ScientificName", and "TypeOfBird". Below the table are two "Enter text:" input fields and two "Text:" output fields labeled "[BirdNameOutput]" and "[ReptileNameOutput]". The right sidebar shows the "CONTAINER PROPERTIES" and "PAGE DATA" tabs. The "PAGE DATA" tab is active, showing a query configuration for "PA DB" with a result set named "Get All Species.Resultset1". The "Inputs" section lists "BirdName (String - Input\_parameter)" and "ReptileName (String - Input\_parameter)". The "Outputs" section lists "BirdName (String)" and "ScientificName (String)".

The changes made to the page are saved.



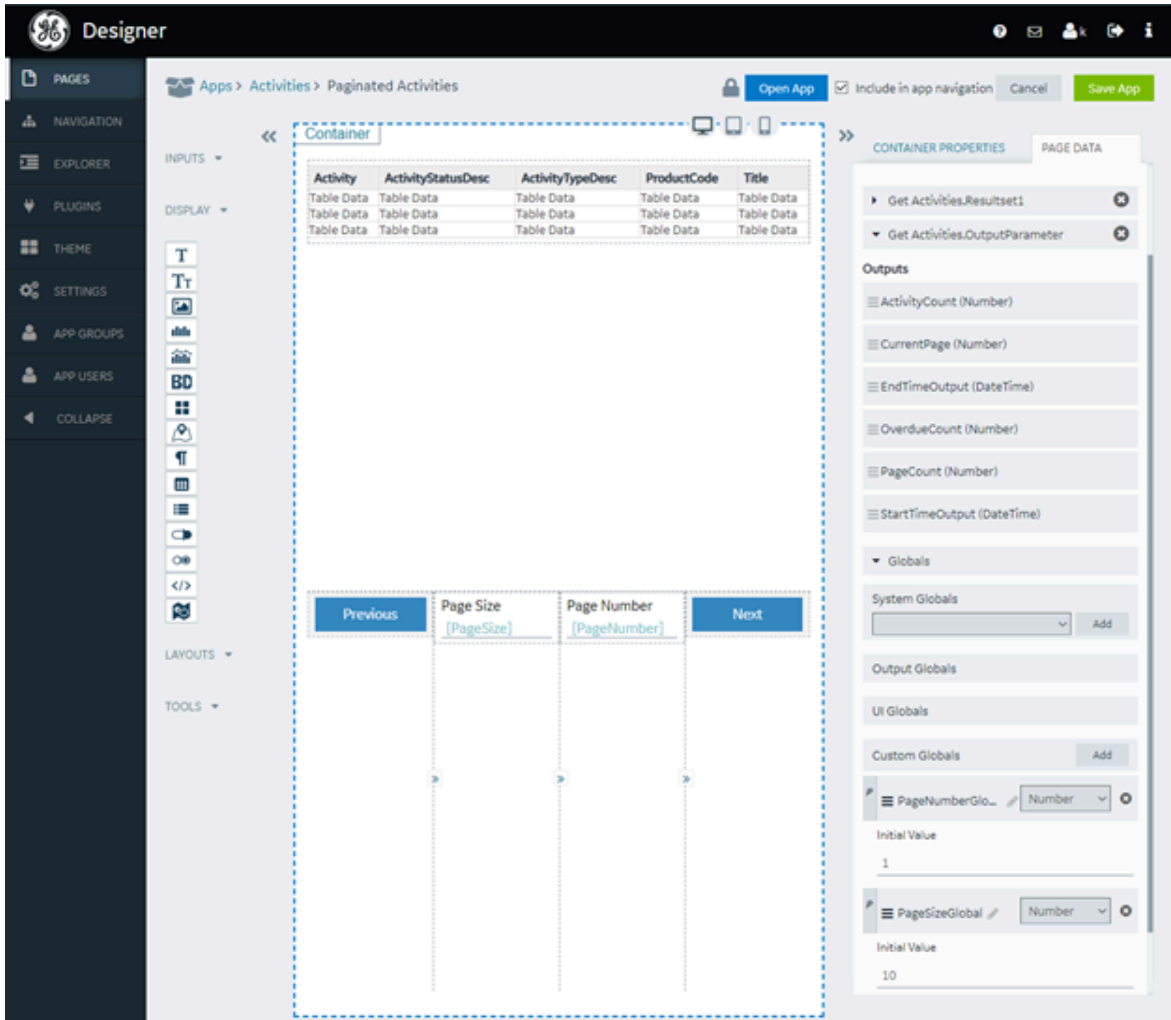
**Note:**

View the Page in the End app, by clicking **Open App** button.

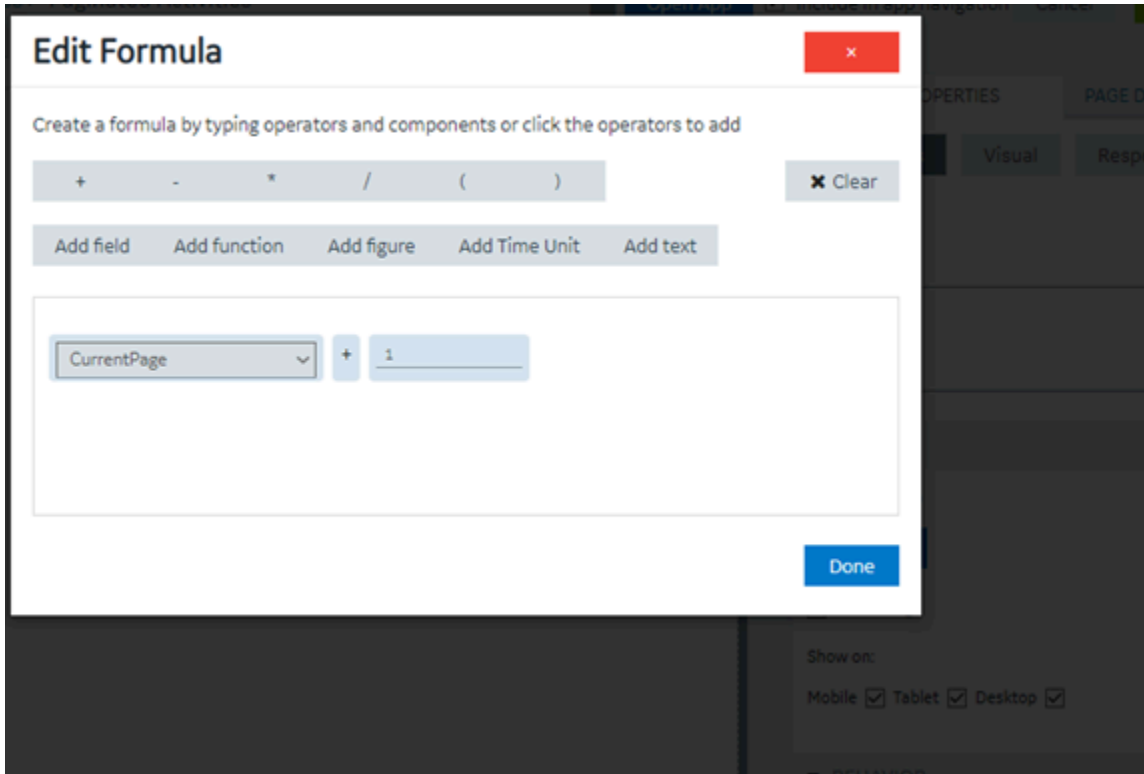
## Example of Adding Relational Database Queries to a Page

In the following example, the query has two result sets. One is the result from the stored procedure and the other is from the output parameters. It also has inputs `PageNumber` and `PageSize`.

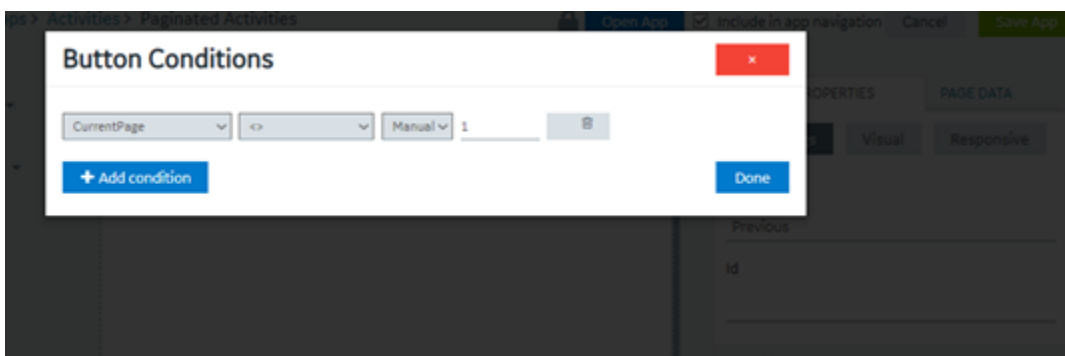
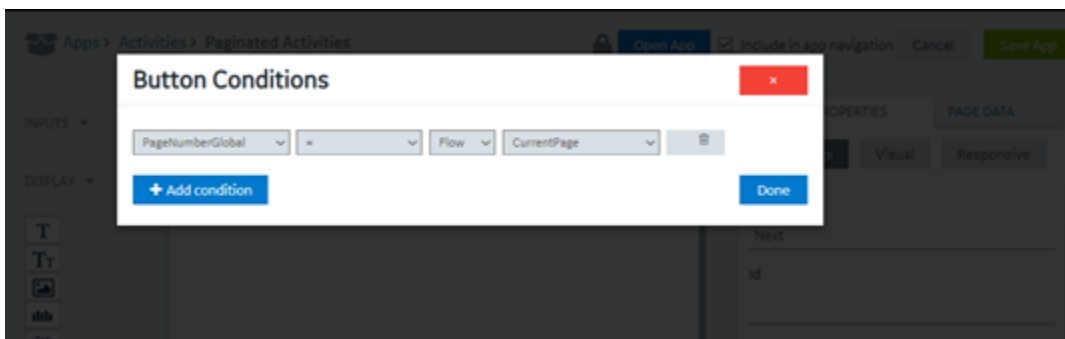
1. Design a page by adding two buttons and two input boxes, and disable the input controls.
2. Map the input parameters of the query to the input controls.
3. Create two custom globals for page number and page size and provide default values as shown in the following figure.



4. Select each button and set the action to set the global value using a formula as shown in the figure (+ for next, - for previous).

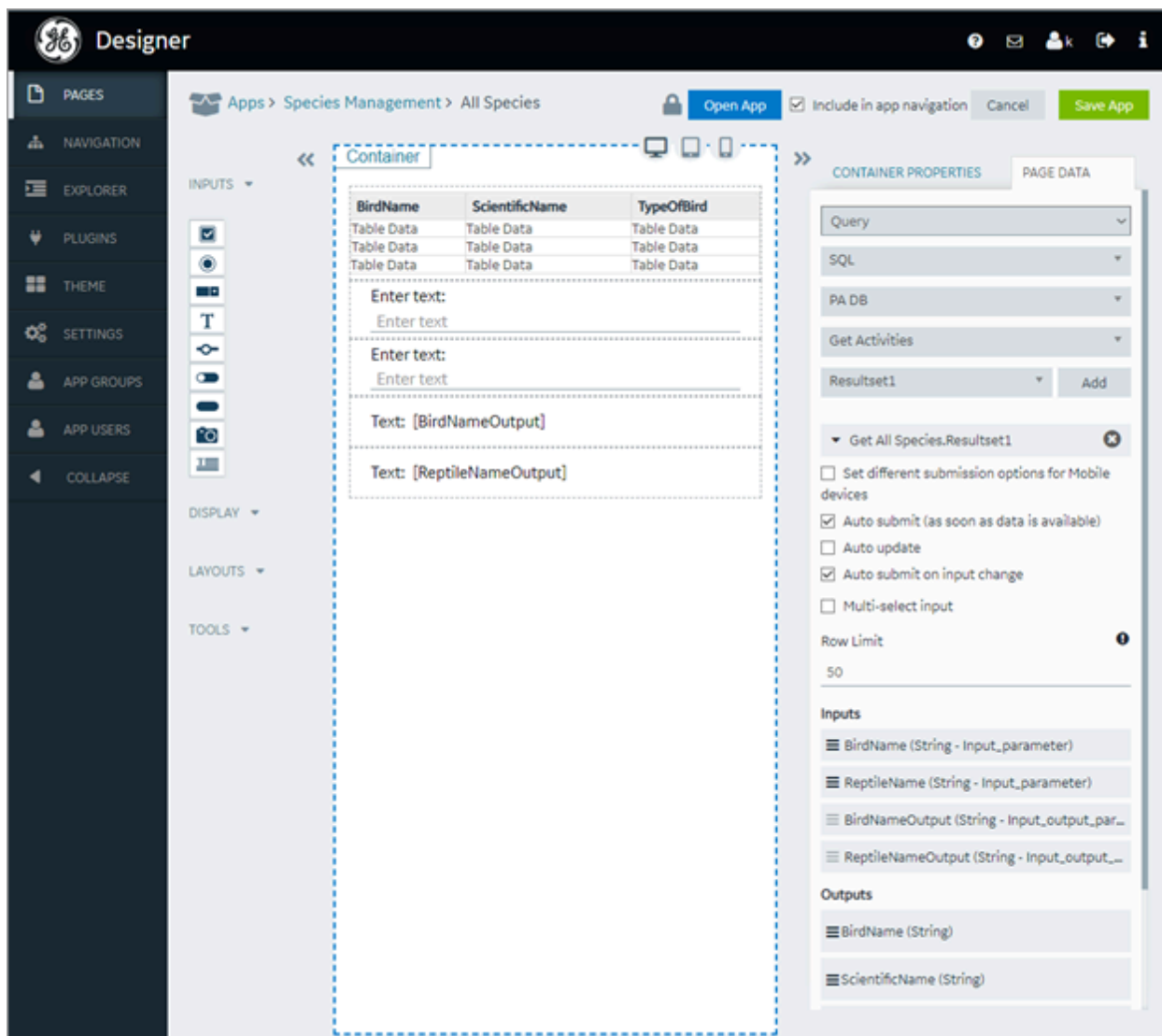


5. Select each button and set the display condition as shown in the following figures.



6. Select **Save App**.

The final page appears as shown here:



## Getting Started with OPC UA

### Get Started with OPC UA and Operations Hub

This topic guides you on how to configure an OPC UA data source, and build visualization.

#### Steps

The following sections walk you through:

1. Create a data source with [OPC UA configuration in Operations Hub \(on page 429\)](#).
2. Build an asset model for OPC UA data sources in this order:

- [Create object types \(on page 407\)](#) with Proficy iFIX, Proficy CIMPLICITY, and IGS data variables.
  - For the object types, [create object instances \(on page 408\)](#).
3. Build an asset hierarchy to specify the hierarchical relationships of assets. Operators navigate through this hierarchy to select the equipment context for a given layout at runtime. Refer to [Set Up Runtime Navigation \(Classic\) \(on page 410\)](#).
  4. [Use the Trend Widget for OPC UA Data Sources \(on page 128\)](#).
  5. To enable write operations in Proficy CIMPLICITY for Operations Hub, refer to [Configure Proficy CIMPLICITY for Writes \(on page 131\)](#).
  6. To enable write operations in Proficy iFIX for Operations Hub, refer to [Configure Proficy iFIX for Writes \(on page 133\)](#).


## Use the Trend Widget for OPC UA Data Sources

Data visualization with trend widget for OPC UA data sources.

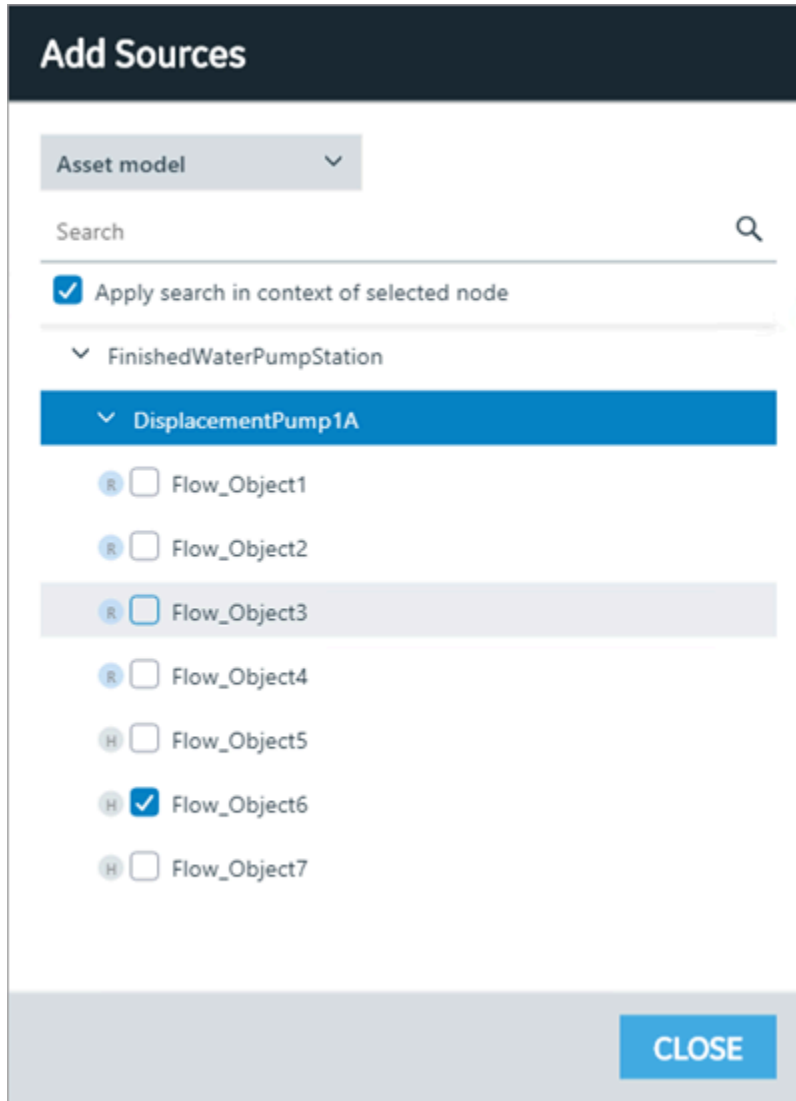
Use the following guidelines to successfully get data flowing in the Trend widget. Refer to [Customize a Trend Chart at Runtime \(on page 623\)](#).

## Use the Trend Widget with an Asset Model

- Create a data source with [OPC UA configuration in Operations Hub \(on page 429\)](#).
- Build an asset model for OPC UA data sources.

1. In the main navigation menu, select **APPS**.  
The **Apps** workspace appears, displaying a list of applications.
2. Open the application.
3. Select  .  
The **Trend Configuration** pane appears.
4. Select **Add Tags for Trend**.  
The **Add Sources** window appears.






5. Select **Asset Model** from the drop-down.  
A list of assets appear.
6. Browse and select the check box for the properties you want to add to the trend chart.  
Refer to [Browse Data Sources \(Classic\) \(on page 442\)](#).  
The live data from the data source starts displaying in a trend chart.

## Use the Trend Widget without an Asset Model

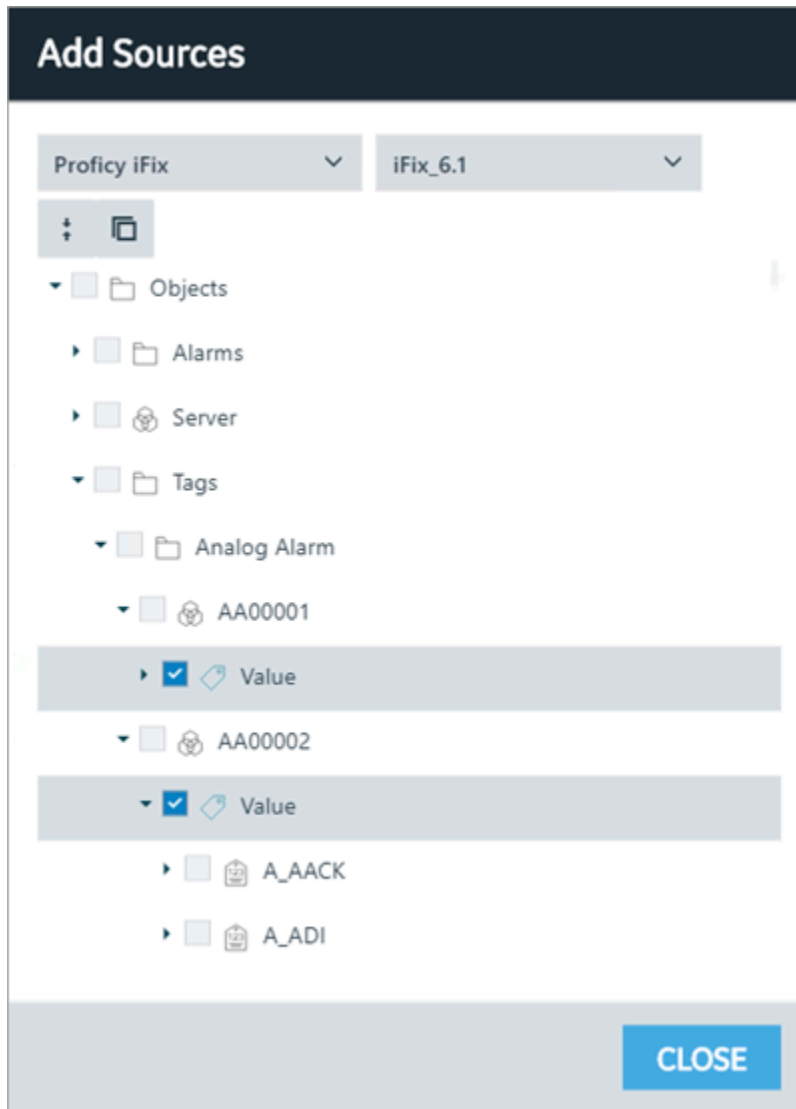
- Create a data source with [OPC UA configuration in Operations Hub \(on page 429\)](#).
1. In the main navigation menu, select **APPS**.  
The **Apps** workspace appears, displaying a list of applications.
  2. Open the application.

3. Select  .

The **Trend Configuration** pane appears.

4. Select **Add Tags for Trend**.

The **Add Sources** window appears.



5. Select iFIX, CIMPLICITY, or OPC UA from the drop-down, then select the server.

The address space for the selected data source appears in a tree structure.

6. Browse and select the check box for the tags you want to add to the trend chart.

Refer to [Browse Data Sources \(Classic\) \(on page 442\)](#).

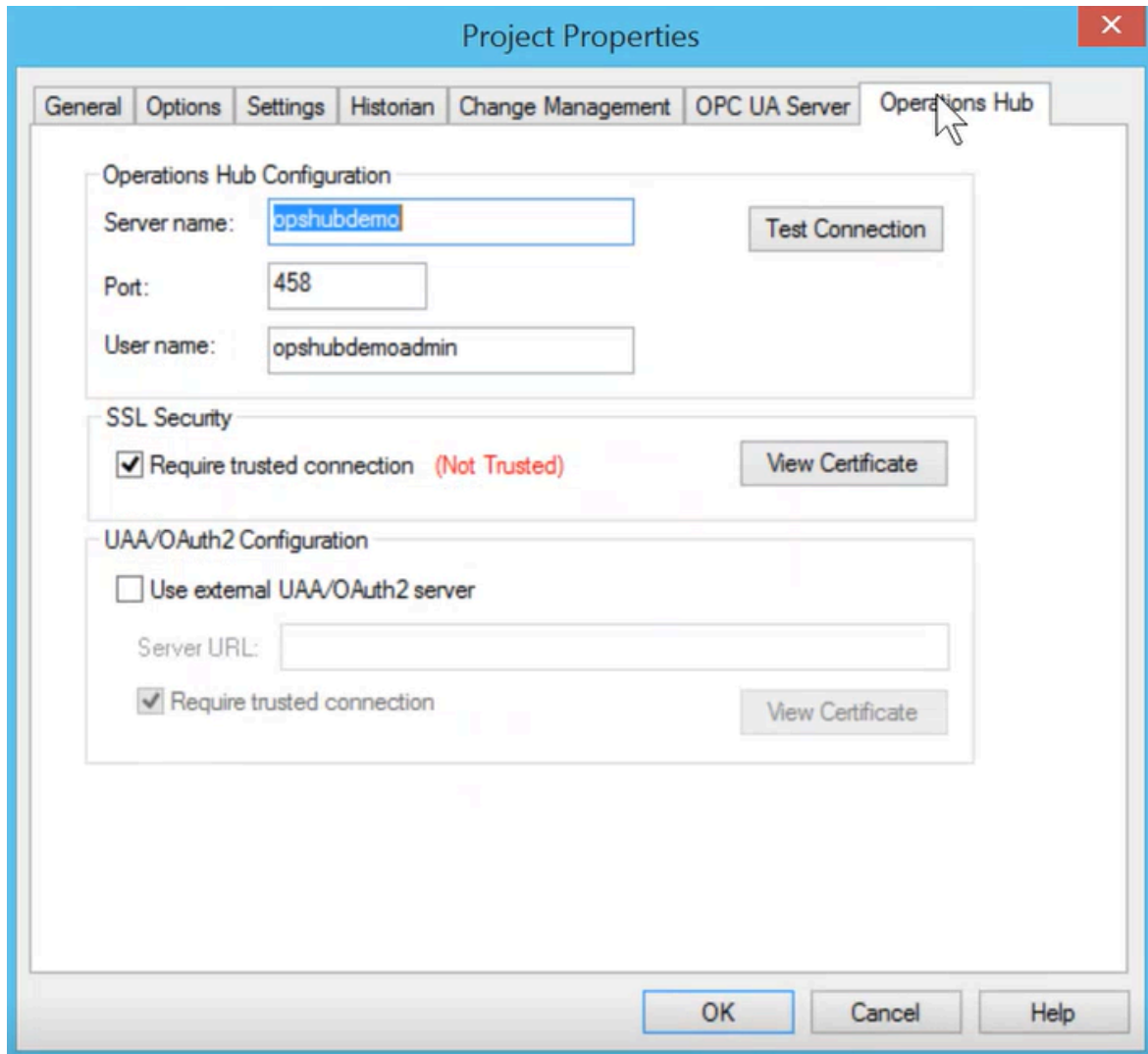
The live data from the data source starts displaying in a trend chart.

## Configure Proficy CIMPLICITY for Writes

This topic describes how to configure Proficy CIMPLICITY to enable write operations.

1. Log in to Proficy CIMPLICITY.
2. From the main menu, go to **Project > Properties**.  
The **Project Properties** window appears.
3. Select **Operations Hub** tab.
4. Provide these details to set up the connection to Operations Hub.

Field Name	Description
Server name	Operations Hub machine name
Port	Port number for the machine
User name	Enter the user name for logging in to the machine. Select <b>Test Connection</b> to verify the Operations Hub machine details for establishing a connection.
Require trusted connection	Select the check box to enable SSL security for the connection. If the security appears as (Not Trusted), you must trust it. To do so, select <b>View Certificate</b> for instructions on where to copy the issuer certificate on your CIMPLICITY machine.
OK	Save the details and close the window.



5. To verify the write operations, log in to Operations Hub.
6. Create a data source with OPC UA configuration (on page 429) in Operations Hub.
7. Set up an extension query (on page 342) for CIMPLICITY with these details:

Method	WRITE
Tag Source	OPC UA
Tag inputs and outputs	As required



**Note:**

When configuring an extension query, make sure to select the tag attribute for the tag input.

8. Create an application page and bind the extension query with widgets.
9. Log in to the end application, and perform the write operations in runtime.

## Configure Proficy iFIX for Writes

This topic describes how to configure Proficy iFIX to enable write operations.

1. Log in to Proficy iFIX.
2. Go to `C:\Program Files (x86)\GE\iFIX` and open the `secmgr.clr.dll.config` file in a notepad.
3. Save the dll file after verifying and updating these details:

Ensure that `uaa_oauthHost` points to the UAA server that provides the authentication services. If default UAA server is installed with Operations Hub, this will generally be the hostname (short or FQDN) used during Operations Hub installation.

```
<?xml version="1.0" encoding="utf-8" ?>
<configuration>
  <appSettings>
    <add key="oauthHost" value="127.0.0.1"/>
    <add key="oauthPort" value="8443"/>
    <add key="oauthEndPoint" value="oauth"/>
    <add key="strictCertificatePolicy" value="false"/>
      <add key="ifix_oauthIssuer" value="ifix_auth_service"/>
    <add key="ifix_oauthHost" value="localhost"/>
    <add key="ifix_oauthPort" value="4857"/>
    <add key="ifix_oauthEndPoint" value="ifix-auth-service/v1/oauth"/>
    <add key="ifix_strictCertificatePolicy" value="false"/>
      <add key="confighub_oauthIssuer" value="ConfigHubAuthService"/>
    <add key="confighub_oauthHost" value="localhost"/>
    <add key="confighub_oauthPort" value="5678"/>
    <add key="confighub_oauthEndPoint" value="confighub-auth/v1/oauth"/>
    <add key="confighub_strictCertificatePolicy" value="false"/>
    <add key="uaa_oauthHost" value="localhost"/>
    <add key="uaa_oauthPort" value="443"/>
    <add key="uaa_oauthEndPoint" value="uaa"/>
    <add key="uaa_strictCertificatePolicy" value="false"/>
  </appSettings>
</configuration>
```

4. To verify the write operations, log in to Operations Hub.

5. [Create a data source with OPC UA configuration \(on page 429\)](#) in Operations Hub.
6. [Set up an extension query \(on page 342\)](#) for iFIX with these details:

Method	WRITE
Tag Source	OPC UA
Tag inputs and outputs	As required



**Note:**

When configuring an extension query, make sure to select the tag attribute for the tag input.

7. Create an application page and bind the extension query with widgets.
8. Log in to the end application, and perform the write operations in runtime.

## Configure Third Party OPC UA Servers for Writes

If you are using third party OPC UA server configuration for data to update any value, you must provide user name and password credentials to perform write operations. In case of alarm card or a mimic card receiving data from a third party OPC UA server, a pop-up dialog prompts for user name and password credentials to perform write operations.

1. [Create a third party data source with OPC UA configuration \(on page 429\)](#) in Operations Hub.
2. In the data source, under **Authentication > Write**, select **User Name/Password (provided by user)**.

### Authentication

**Read**

Anonymous
  User Name/Password

User Name:

Password:

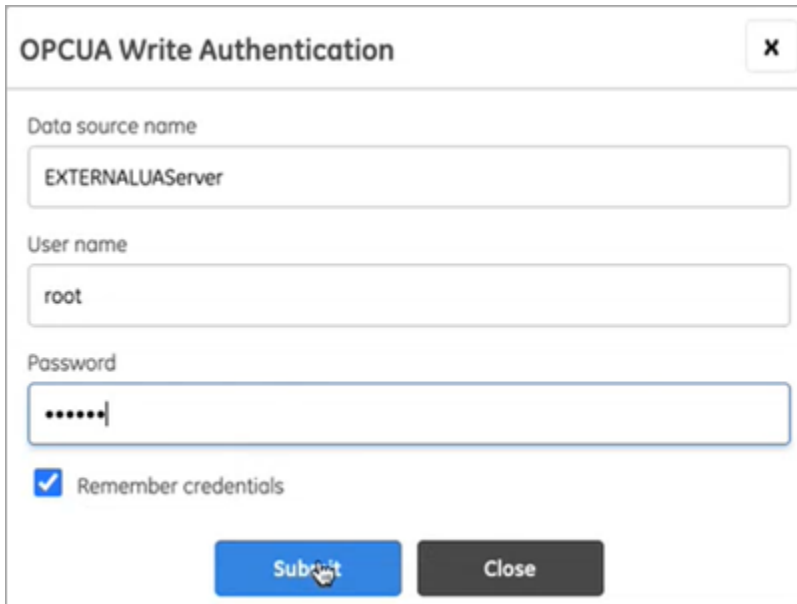
**Write**

Use Read Credentials for Write

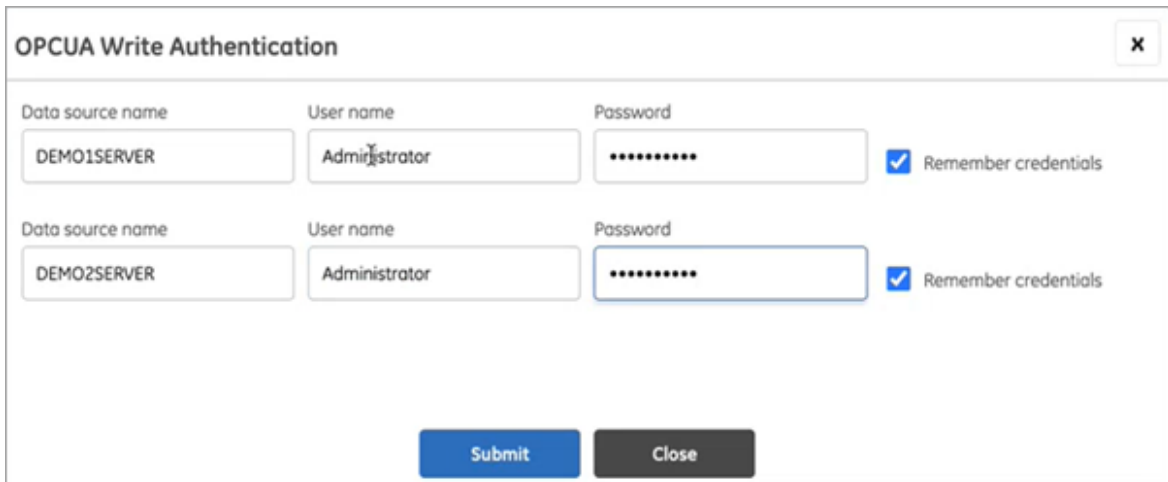
Logged On User Token
  User Name/Password (provided by user)

3. Create an application (on page 265).
4. Create application pages (on page 450) for Alarm card (on page 685) and Mimic Card (on page 697).
5. Acknowledge alarms (on page 696) at runtime to verify alarm write operations.

A pop-up dialog appears requesting for user name and password to perform write operations.




If you choose to acknowledge multiple alarms from multiple sources, then enter the credentials for all the data sources listed in the authentication popup.



6. Similarly perform set point operation on mimics at runtime to verify mimic write operations.
7. Select the **Remember Credentials** check box to save the user name and password.  
When data source credentials are saved, the authentication popup for that data source does not appear again to acknowledge additional alarms.

In case you selected this check box and entered invalid credentials, the invalid data gets saved. You must clear the saved data source credentials to be able to enter the valid user name and password.

Select  to clear all the saved data source credentials.

## Get Started with Proficy Plant Applications

This topic guides you through how to get started integrating Proficy Plant Applications and Proficy Operations Hub.

Ensure that system requirements for [Plant Applications](#) and [Operations Hub](#) are met.

### Overview

1. Install Proficy Operations Hub.
2. To install Proficy Plant Applications, choose your installation type:
  - [Standard Edition \(on page 136\)](#)
  - [Enterprise Edition \(on page 136\)](#)
3. [Work with Web Client applications \(on page 137\)](#).
4. (Optional) Refer to the [API documentation](#) to customize applications.

### Steps for Installing Standard Web Client

1. [Configuring Apache CouchDB Settings](#)
2. [Standard Edition Web Client Requirements](#)
3. [Install Plant Applications Standard Web Client](#)
4. [Run Message Bridge Configuration Utility](#)
5. [Run Operations Hub Posting Utility](#)
6. [Verify the Installation](#)

### Steps for Installing Enterprise Web Client

1. [Configuring Apache CouchDB Settings](#)
2. [Enterprise Edition Web Client Requirements](#)
3. [Review the files provided by GE](#)
4. [Pre-Installation Checklist](#)
5. [Install Enterprise Edition Web Client](#)
6. [Run Message Bridge Configuration Utility](#)



7. [Run Operations Hub Posting Utility](#)
8. [Verify the Installation](#)

## Work with Web Client Applications

**Note:**

These applications appear based on user privileges.

- [Unit Operations](#)
- [Non Conformance](#)
- [Work Order Manager](#)
- [Route Editor](#)
- [Work Queue](#)
- [Time Booking](#)
- [Property Definition](#)
- [Security](#)
- [Configuration](#)
- [Approval Cockpit](#)
- [Downtime](#)
- [OEE Dashboard](#)
- [Reports](#)
- [My Machines](#)
- [My Machines](#)
- [Analysis](#)
- [OEE Aggregation Store](#)
- [Activities](#)
- [Process Orders](#)
- [Alarm Event Notification](#)
- [Waste](#)
- [Receiving Inspection](#)
- [BOM Editor](#)
- [Genealogy](#)

## Data Binding to Widgets/Plug-ins (Classic)

This topic describes the options you can use to bind values to widgets/plugin-ins.

**Attention:**

In case you modified the data source alias (machine name), then all references to the data source (Historian or OPC UA) server are lost. You must rebuild queries for all your widgets in use.

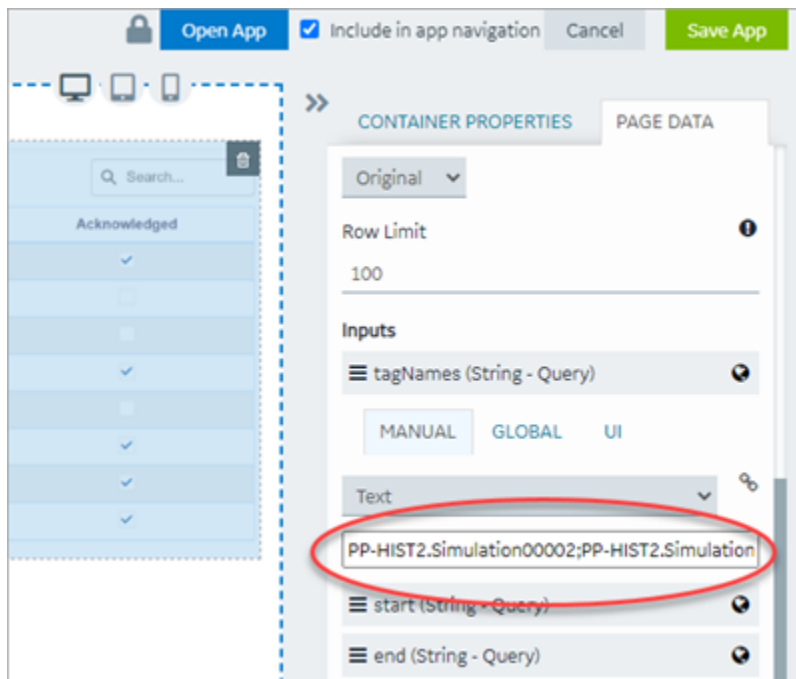
## Tag Browser

A list of out-of-the-box (OOTB) queries of 'Extension' type are available with the tag browser.

1. Select the OOTB query that you want to apply to the widget.
2. [Browse the data source and select tags \(on page 442\)](#).
3. Drag-and-drop the query on your widgets. This automatically populates the data fields for the query under **PAGE DATA**.
4. Save the page with the default data from the query, (OR) modify the data fields to your requirement.

**Note:**

The tag browser does not apply to REST or SQL queries. It works only with Extension queries. If you want to configure tags in a REST query, then enter them as Text. You can also enter multiple tags separated by a semicolon.



Refer to:

- [Create Extension Query \(Classic\) \(on page 342\)](#)
- [About Queries \(on page 314\)](#)

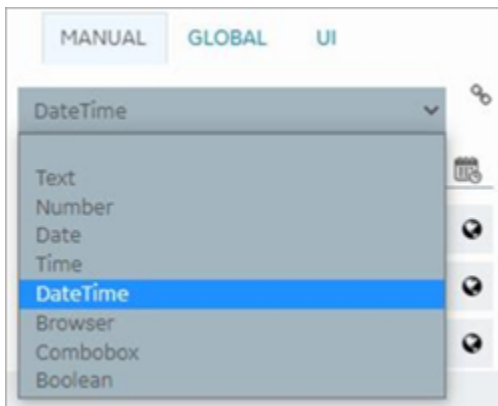
**Example:** Refer to [Sample Page with Historical Data \(on page 830\)](#).

## Inputs

Queries have input values. On drag-and-drop from tag browser, these inputs are bound to the widget, and appear under **PAGE DATA**.

Each input has these options that are populated with default values as per the query:

- Manual: Allows to use a variety of components to provide manual values for query inputs - text, number, date, time, datetime, browser, combo box, and boolean.



- Global
- UI



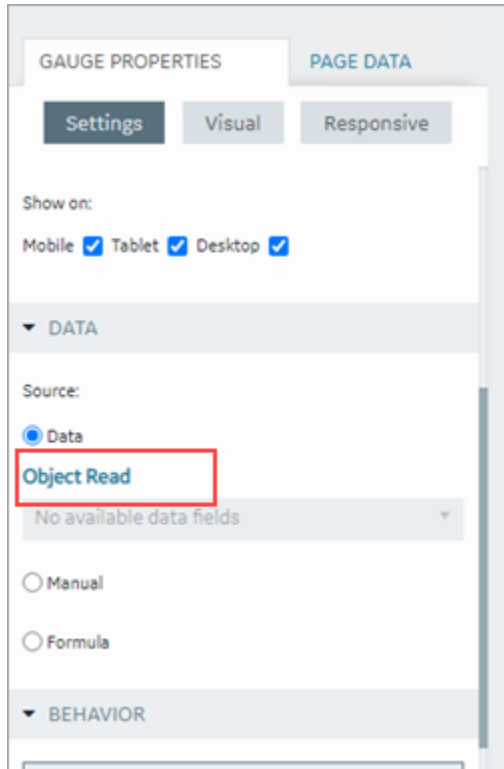
### Note:

At any point in time, ensure that only one binding exists for the query inputs. For example, there should be no manual or global binding if you have already bound the query input to UI through a widget or plugin. To remove a binding from the query input, select the unlink icon next to the binding.

## Link to Access the Query

If you changed the **Asset Context** for the page, access a direct link to the query to update or modify it.

On selecting the widget, a link to the associated query appears under the widget properties. Select the link to directly jump to the query on the **PAGE DATA** tab.

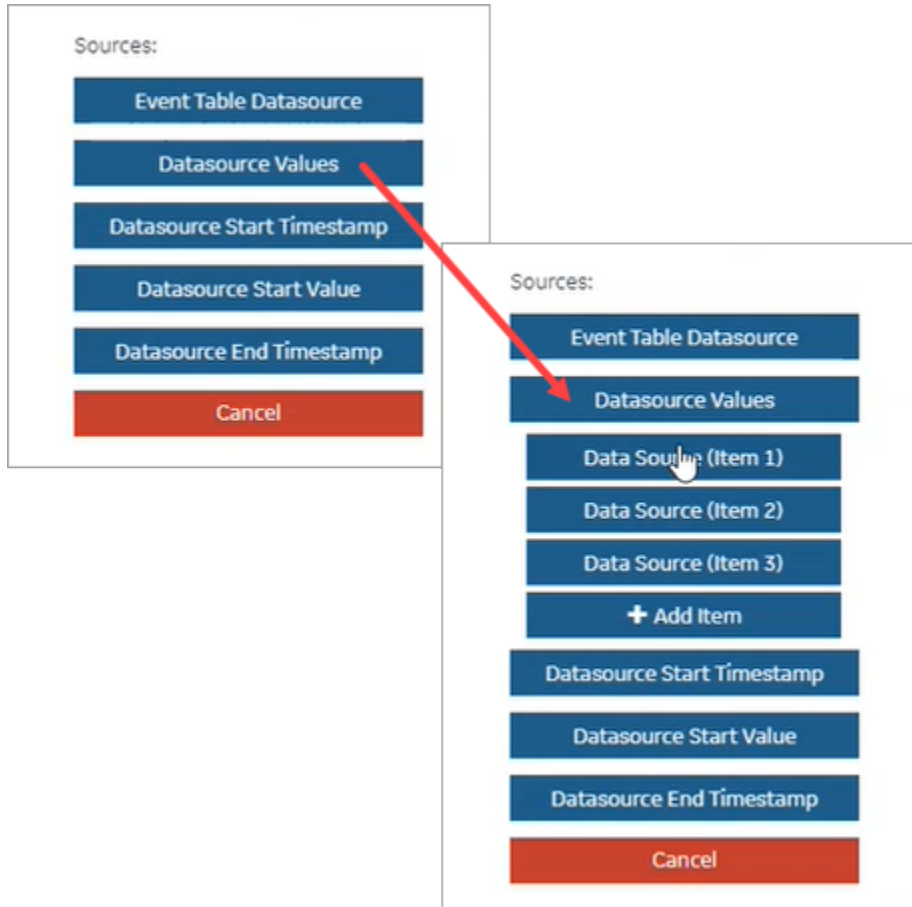


## Drag-and-Drop Data

This feature is applicable when configuring widgets/plugin-ins in Operations Hub. You have the option to drag-and-drop selected tags/properties (from the tag browser) directly on to the widgets. The data is quickly bound to the widget without the need to manually configure its value fields. After you drag and drop data on the widget, go to the widget properties tab to verify. The source value fields are auto-filled with the data that you dropped on the widget.

For widgets with multiple array fields to bind to, the drag-and-drop feature shows the available value fields. A menu appears, where you can drill down and select the specific item to bind data. Items in the menu are arranged according to their sequence order.

To bind the drag-and-drop data to a new item, select **+ Add Item**. A new item is created and data is bound to it.



## HMI

### Work with Alarms

- [Configure iFIX for Alarms \(on page 688\)](#)
- [Configure CIMPLICITY for Alarms \(on page 691\)](#)
- [Alarm Card \(on page 685\)](#)
- [Alarm Count \(on page 697\)](#)
- [Apply Filters to View Alarms \(on page 694\)](#)
- [Acknowledge Alarms \(on page 696\)](#)

---

#### Related reference

[Work with Mimics \(on page 141\)](#)

### Work with Mimics

- [Configure iFIX for Mimics \(on page 699\)](#)
- [Configure CIMPLICITY for Mimics \(on page 707\)](#)
- [Import Mimics \(Classic\) \(on page 417\)](#)
- [Assign Mimics to Assets \(Classic\) \(on page 417\)](#)
- [Override an Assigned Mimic \(Classic\) \(on page 418\)](#)
- [Set Up Mimic Target Zones \(Classic\) \(on page 419\)](#)
- [Mimic Card \(on page 697\)](#)

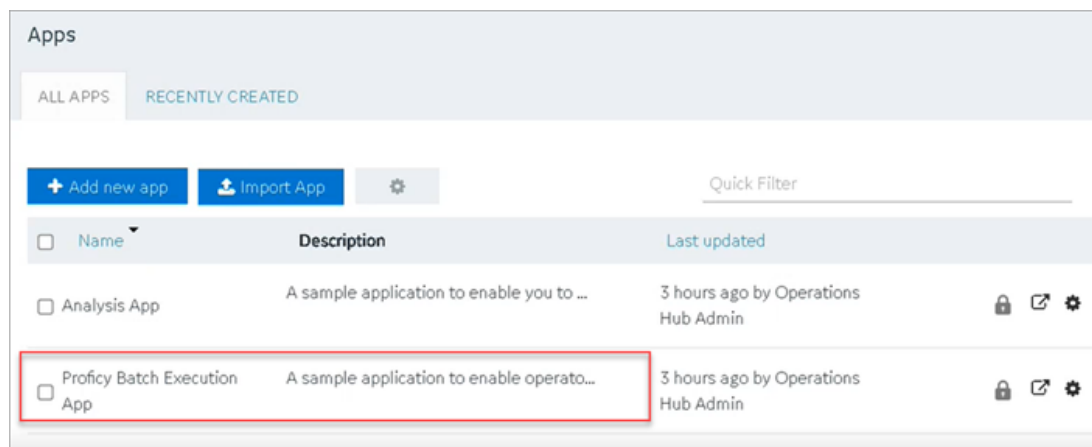
### Related reference

[Work with Alarms \(on page 141\)](#)

## Get Started with Proficy Batch

This topic describes how to get started with batch execution process.

1. [Set up Batch \(on page 143\)](#).
2. [Add a Batch Data Source \(Classic\) \(on page 436\)](#) in Operations Hub.
3. Import and start using the sample application.
  - a. Open your installation ISO, and navigate to the `Installation Content\Apps` folder.
  - b. Copy `Proficy Batch Execution App` to a temporary folder on your hard drive.
  - c. [Import \(on page 278\)](#) the sample batch application to Operations Hub.



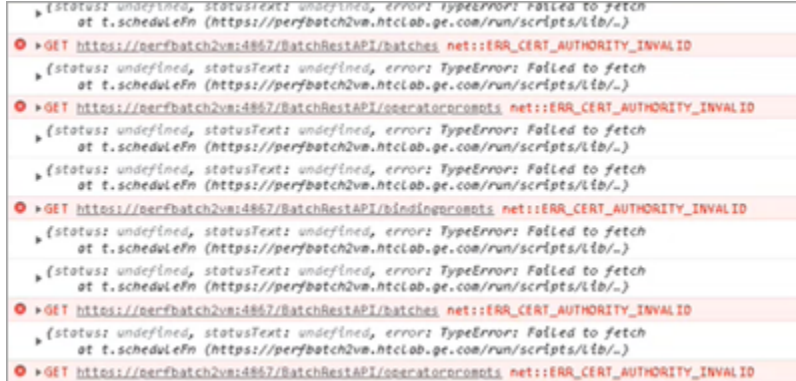
- d. After import, navigate to your Batch data source, and modify the **Endpoint URL** to reflect the host name of your Batch Server.

Alternatively, you may skip step 3 and proceed to [creating your own application \(on page 265\)](#).

4. [Configure properties for batch widgets \(on page 773\)](#).
5. Create and execute batch instances at runtime.

Perform these steps if your Batch Server uses a self-signed certificate. Ignore the following for digitally signed certificates.

- a. Open your browser console.
- b. Right-click any of the URLs and open in a new tab.



```

[status: undefined, statusText: undefined, error: TypeError: Failed to fetch
at t.scheduleFn (https://perfbatch2vm.htclab.ge.com/run/scripts/lib/..)]
> GET https://perfbatch2vm:4867/BatchRestAPI/batches net::ERR_CERT_AUTHORITY_INVALID
[status: undefined, statusText: undefined, error: TypeError: Failed to fetch
at t.scheduleFn (https://perfbatch2vm.htclab.ge.com/run/scripts/lib/..)]
> GET https://perfbatch2vm:4867/BatchRestAPI/operatorprompts net::ERR_CERT_AUTHORITY_INVALID
[status: undefined, statusText: undefined, error: TypeError: Failed to fetch
at t.scheduleFn (https://perfbatch2vm.htclab.ge.com/run/scripts/lib/..)]
[status: undefined, statusText: undefined, error: TypeError: Failed to fetch
at t.scheduleFn (https://perfbatch2vm.htclab.ge.com/run/scripts/lib/..)]
> GET https://perfbatch2vm:4867/BatchRestAPI/bindingprompts net::ERR_CERT_AUTHORITY_INVALID
[status: undefined, statusText: undefined, error: TypeError: Failed to fetch
at t.scheduleFn (https://perfbatch2vm.htclab.ge.com/run/scripts/lib/..)]
[status: undefined, statusText: undefined, error: TypeError: Failed to fetch
at t.scheduleFn (https://perfbatch2vm.htclab.ge.com/run/scripts/lib/..)]
> GET https://perfbatch2vm:4867/BatchRestAPI/batches net::ERR_CERT_AUTHORITY_INVALID
[status: undefined, statusText: undefined, error: TypeError: Failed to fetch
at t.scheduleFn (https://perfbatch2vm.htclab.ge.com/run/scripts/lib/..)]
> GET https://perfbatch2vm:4867/BatchRestAPI/operatorprompts net::ERR_CERT_AUTHORITY_INVALID

```

The **Your connection is not private** error screen appears on the new tab.

- c. To bypass the error, select **Advanced > Proceed to <BatchServerName> (unsafe)**.
  - d. Close the tab.
6. Restart the Batch Server. After restart, make sure `BatchRestService` is up and running.

## Set up Batch

This topic describes how to set up Proficy Batch REST API.

Download these files from GE Salesforce.

- Proficy Batch Execution ISO file
- Batch REST API zip file
- Latest Batch SIM file

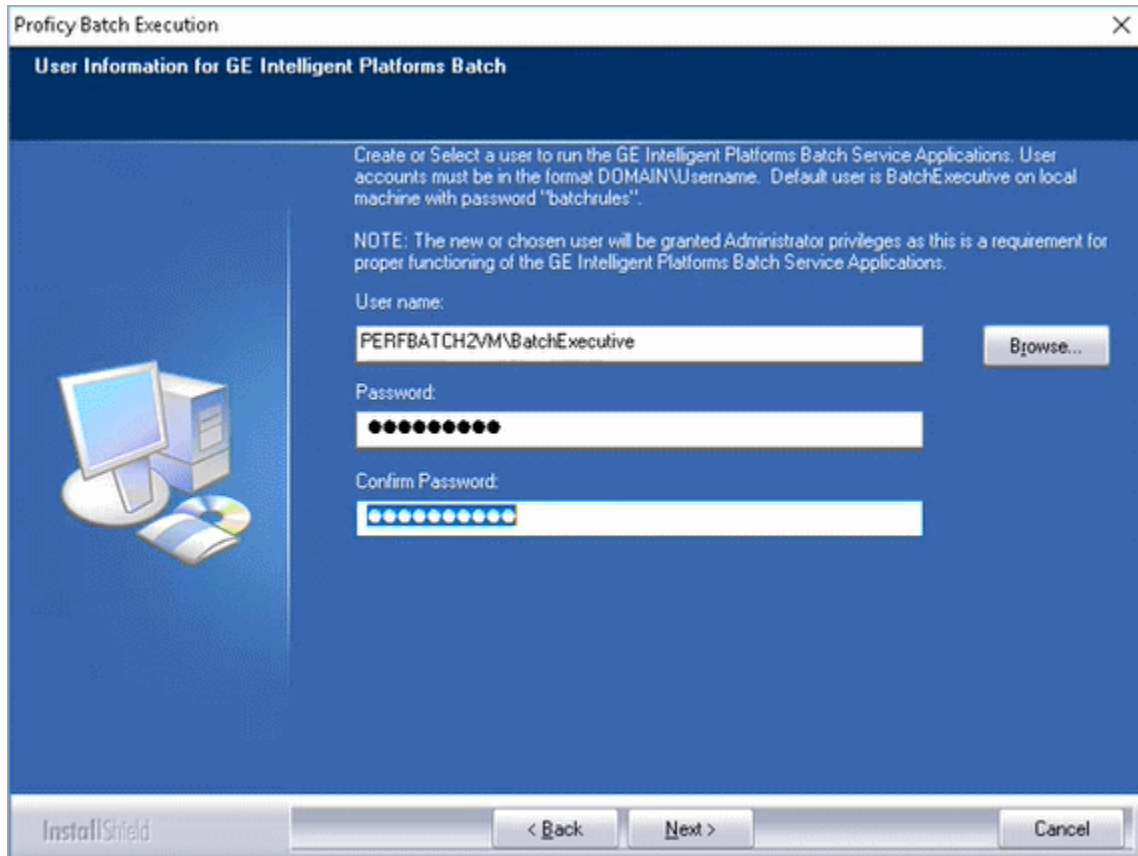


### Note:

You also require a GE Digital Batch License Key with Batch Integration Services and Electronic Signatures for the Batch computer.

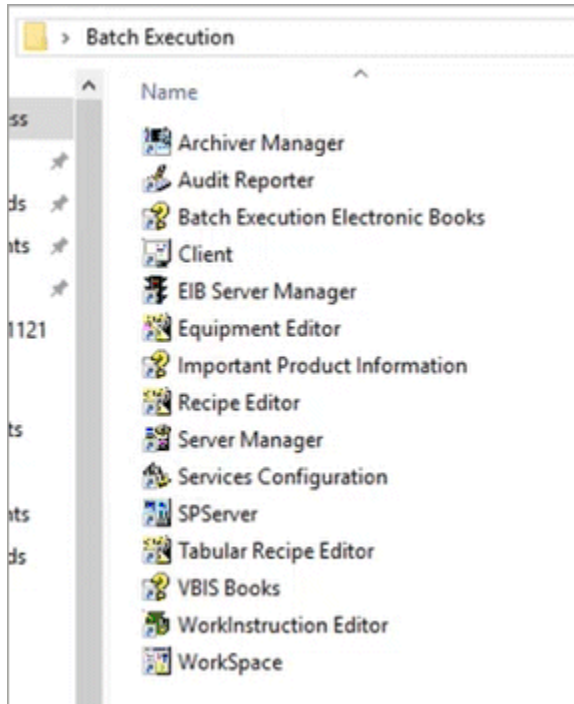
With Proficy Batch, operators can oversee batch processing using a set of [batch widgets \(on page 773\)](#). Operator views and controls are provided in the form of Batch list, Batch control, etc. to execute batches efficiently. A sequential flow chart (SFC) widget presents a graphical view of the batch flows. For more information, refer to [Proficy Batch Execution](#).

1. Log in to the machine where Operations Hub is installed.
2. Run the ISO file to install the Proficy Batch Execution application with default settings.  
To create a Windows user account for the batch executive, provide the **User name** and **Password** details.

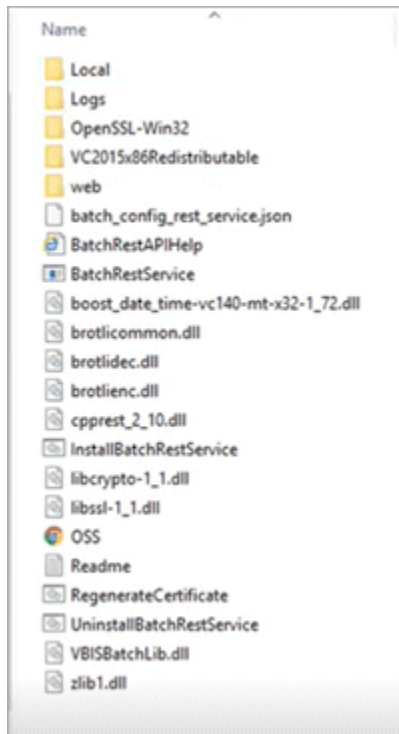


After installation, `Batch Execution` folder is created on your desktop.

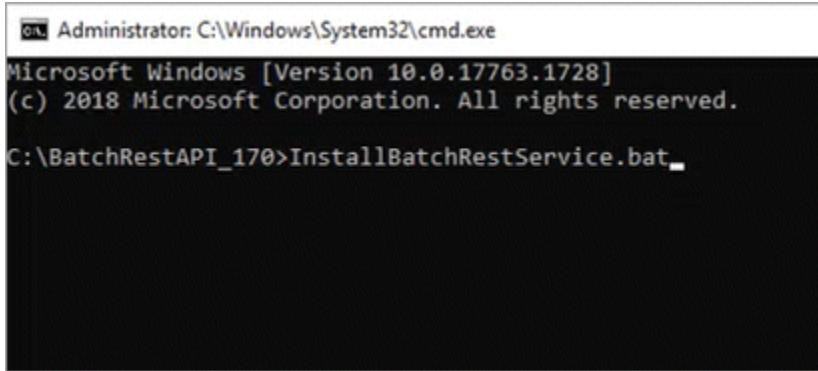




3. Install the latest Batch SIM.
4. Restart your machine.
5. Unzip the `BatchRestAPI` file and place the folder in your C drive.



6. From the command prompt, run the installation for `BatchRestAPI` service.



7. Access the Readme file in the unzipped `BatchRestAPI` folder and follow the instructions for installation.

For example,


Country Name	US
State or Province Name	Massachusetts
Locality Name	Boston
Organization Name	GE
Organization Unit Name	Digital
Common Name	Enter your server name
Email Address	ophubuser@gmail.com
Enter Export Password	Enter a password.  You must modify the <code>batch_config_rest_service.json</code> file to reflect this password.

8. From the unzipped `BatchRestAPI` folder, open `batch_config_rest_service.json` in a text editor. For example, Notepad.

Refer to the `BatchRestAPI\Readme.txt` for more details.

9. Verify and update these parameters:

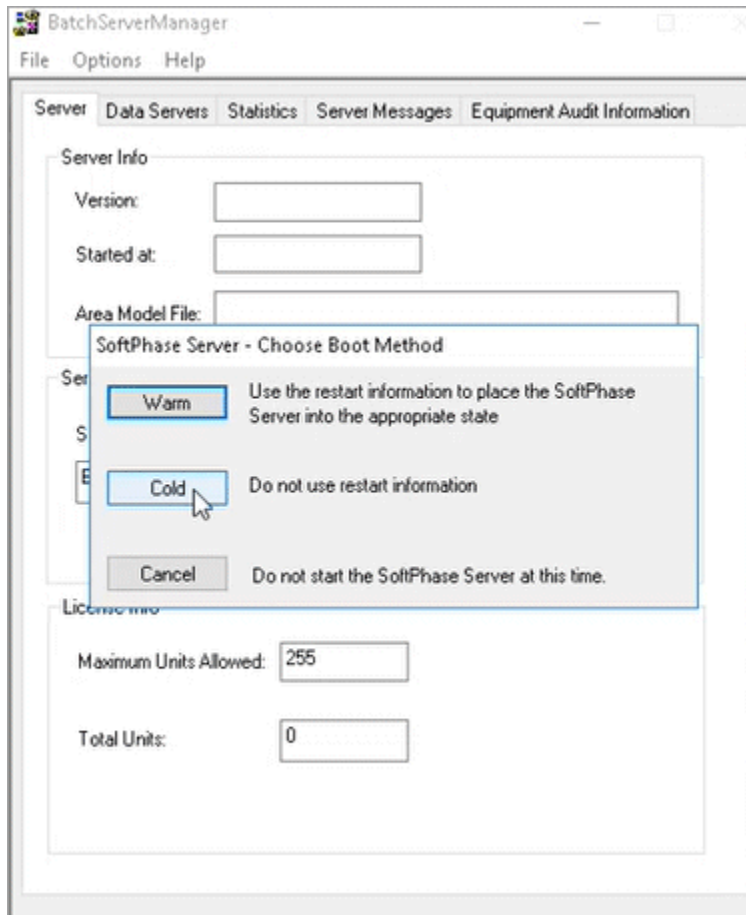
<code>serverCertificatePassword</code>	Enter the export password.
<code>basicAuthWindowsGroupValidation</code>	If <code>true</code> , then the Windows user (used for basic auth and for bearer token security) should be a member of the Windows user group indicated by the property <code>basicAuthWindowsGroup</code> .

	<p>This is initially set to <code>PROFICY_BATCH_REST_USERS</code>. You must create this Windows group on the Batch REST Service computer, and add the corresponding Windows users to this group.</p> <p>Set this to <code>false</code> if you do not want to use Windows Group validation.</p>
<p><code>basicAuthWindowsGroup</code></p>	<p><code>PROFICY_BATCH_REST_USERS</code></p>
<p><code>uaaServers</code></p>	<p>Enter the URL for Operations Hub Proficy Authentication (UAA).</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> Only one UAA server is supported.</p> </div>

```

batch_config_rest_service.json - Notepad
File Edit Format View Help
{
  "basicAuthWindowsGroupValidation": false,
  "basicAuthWindowsGroup": "PROFICY_BATCH_REST_USERS",
  "uaaServers": [
    {
      "url": "https://qabatch.htclab.ge.com/uaa",
      "skipCertificateValidation": true
    }
  ],
  "portnumber": "4868",
  "serverCertificateName": "Local\\pki\\batchrestservice.pfx",
  "serverCertificateStoreName": "batch rest serviceRoot",
  "serverCertificatePassword": " ",
  "lockout_retries": 0,
  "lockout_timeout": 15,
  "batchlist_refresh_interval": 3,
  "recipelist_refresh_interval": 60,
  "log": {
    "enable": true,
    "name": "batch_rest_service.log",
    "level": "info",
    "max-size": 5242880,
    "max-files": 3,
    "flush-seconds": 10
  }
}
    
```

10. Ensure that the Operations Hub user is also a domain user or a local Windows user on the batch computer system. Refer to [Configuring Windows User Accounts on the Batch REST Service Computer \(on page 149\)](#).
11. From the `Batch Execution` folder, launch `Server Manager`.  
The **BatchServerManager** application screen appears.
12. Select **Start Server > Cold**.



**! Important:**

- Use the Windows Services to start/restart the `BatchRestService` after you start/restart the Batch Server.
- If `BatchRestService` fails to start, stop the VBIS service and try again. If it still fails, check for error messages in the `logs\batch_rest_api.log` file. Look for a syntax error in the `batch_config_rest_service.json` file, which may be responsible for the `BatchRestService` to not start.
- Remember to restart `BatchRestService` if you make changes to the `batch_config_rest_service.json` file.
- You can also start your Batch Client if you want to compare the data screens with the batch widgets.
- After the Batch REST Service starts, it can take a minute before it is available to receive REST calls.

For additional information on the UI screens of the batch widgets, refer to [https://www.ge.com/digital/documentation/batch/Operations\\_Manual.pdf](https://www.ge.com/digital/documentation/batch/Operations_Manual.pdf).

13. From the `Batch Execution` folder:**Note:**

You can perform this step right after installing the ISO file as well.

a. Launch `Equipment Editor` and define your equipment models.

Refer to [https://www.ge.com/digital/documentation/batch/Equipment\\_Configuration\\_Manual.pdf](https://www.ge.com/digital/documentation/batch/Equipment_Configuration_Manual.pdf).

In case you modify the equipment model:

- Make sure to validate your recipes.
- If the Batch Server was running, you must restart the Batch Server and the Soft Phase Server.
- If the VBIS Service was running, you should stop it. Then start/restart the Batch REST Service (this will automatically start the VBIS Service).

b. Launch `Recipe Editor` and create your recipes.

A recipe contains a series of automated steps to execute a particular batch instance. The steps may also contain prompts that request for permission to proceed ahead, and trigger alarms that need your attention.

Refer to [https://www.ge.com/digital/documentation/batch/Recipe\\_Development\\_Manual.pdf](https://www.ge.com/digital/documentation/batch/Recipe_Development_Manual.pdf).

## Configuring Windows User Accounts on the Batch REST Service Computer

The batch widgets send a bearer token to the Batch Rest Service containing the currently logged in Ophub User account name. This account name must exist on the Batch Rest Service computer as a local Windows user, or as a domain user.

- If using local Windows user accounts, create the corresponding local Windows user accounts on the Batch REST Service computer that match the Ophub user account names.
- If you are using a domain user, the domain name can be a part of the Operations Hub user name (for example: `ophubuser@DomainName`). You can also use an Ophub account name without domain as part of the Operations Hub username. For example, `ophubadmin`.
- If you use an Operations Hub user name without domain, for example `ophubadmin`, the Batch REST Service will first look up this user to see if it is a valid local Windows user on the Batch REST Service computer. If it is not found, then it will look up this user on the Domain used by the computer. The order of the user lookup can be customized with the `UAAUserDomainLookupOption` property and is described in more detail the Batch Rest API `readme.txt`.

- As an extra security feature, if the `basicAuthWindowsGroupValidation` property is `true`, the Batch REST Service will validate that this user is a member of the `basicAuthWindowsGroup`. This group is initially set to `PROFICY_BATCH_REST_USERS`. If this is set to `true`, then be sure to add the windows user accounts to this Windows User Group.

## Use e-Signatures

To use e-Signatures for batch widgets, do the following:

1. Create Windows user groups on the Batch REST Service computer that correspond to the e-Signature Requirement `Performed By` and `Verified By` group names in the batch widgets.

For example, `Operator` and `Supervisor` group names are used in the Batch widgets sample application.

2. Create Windows users on the Batch REST Service computer and add them to the appropriate Windows user group used for e-Signature. Or if you are using Domain users, add the domain users to the appropriate Windows user groups used for e-Signature.
3. Be sure that the Windows User accounts `full name` is not blank.
4. If using Domain users, be sure to set the `GE Intelligent Platforms Security Server (iSecurity.exe)` Windows Service to run under a Domain user account, and restart this service.

## About Dataflow Editor

A lightweight flow-based programming tool.

Use Dataflow Editor to interact across the Proficy portfolio via REST or connect to third party data sources via SQL, MQTT or OPC-UA, etc. (requires additional downloads) to orchestrate real-time data transformation based on your business or process requirements. Refer to <https://nodered.org/> for additional downloads and help.

You have the option to [install Dataflow Editor when installing Operations Hub on your machine \(on page 49\)](#). Access the Dataflow Editor plug-in either from within the Configuration Hub application, or via its independent URL. To access the Dataflow Editor user interface, you should be a member of `iqp.nodered` group.

The URL to access Dataflow Editor independently is case-sensitive after the hostname:

```
https://<hostname>/Node-RED/admin
```

## Manually Register Dataflow Editor with Configuration Hub

This topic describes how to manually register and unregister Dataflow Editor with Configuration Hub.

- Ensure that security authentication source is configured for Configuration Hub.
- You should be an administrator to perform this task.

Perform these steps if you did not register Dataflow Editor with Configuration Hub during Operations Hub install.

1. On the Operations Hub machine, open Windows Command Prompt.
2. Change the directory to the path where Operations Hub is installed on your system: `\Program Files\GE\Operations Hub\node-red\`
3. Run the following command replacing placeholder with actual values:

```
node.exe ch_reg_plugin.js <OPHUB_HOST> <HTTPS_PORT> <configHubContainerServiceBaseUrl>
=<clientId>:<clientSecret> nodered
```

Placeholder	Replace With
<OPHUB_HOST>	The primary host name you selected during install.
<HTTPS_PORT>	The port assigned to https protocol for Operations Hub. Typically it is 443.
<configHubContainerServiceBaseUrl>	The base URL of the Configuration Hub Container Service.
<clientId>	Identifier of a client that has permission (authority) to register with Configuration Hub.
<clientSecret>	Client secret used to authenticate the client.

For example,

```
node.exe ch_reg_plugin.js ophubhost1.test.net 443 https://chhost:5000/container-svc/
=confighubadmin:itsSecret nodered
```

4. To unregister manually, you must run the following command before uninstalling Operations Hub:



**Note:**

If you registered manually, then you should also manually unregister. Uninstalling Operations Hub does not unregister if you did not choose to register during installation.

Replace placeholder with actual values:

```
node.exe ch_reg_plugin.js <OPHUB_HOST> <HTTPS_PORT> <configHubContainerServiceBaseUrl>
=<clientId>:<clientSecret> nodered unreg
```

## Enable Windows Auto-login in an Active Directory Environment

This topic describes how to enable Windows Auto-login in an Active Directory Environment.



### Note:

Windows Auto-login authentication is not supported on a local client browser if Proficy Authentication is installed on the same machine.

See also [Proficy Authentication Windows Auto-login](#).

#### 1. Install Proficy Authentication.

During installation (standalone or as part of Operations Hub), use a FQDN that has a proper record on the DNS server as the primary host name. A local name will not work. IP address is not recommended either.

#### 2. Log in to Proficy Authentication, and configure LDAP identity provider using the domain's LDAP server.

Test the LDAP login to make sure it works for LDAP users.

#### 3. Create a user account on the Active Directory domain.

Proficy Authentication (UAA) uses this account for validating Windows domain credential (Kerberos service tickets) presented by browser on user's behalf.

#### 4. Build the Service Principal Name (SPN).

The SPN is formed based on the host's canonical domain name, not any other aliases. It is in the form of `HTTP/fqdn@REALM`, where HTTP is literal. The `fqdn` should be replaced by the actual FQDN of the host, typically in lower case, and `REALM` be replaced by the Active Directory domain name, typically in upper case.

For example, if the Active Directory domain name is `test.net`, the host's FQDN is `uaa.test.net`, then the full SPN is `HTTP/uaa.test.net@TEST.NET`

#### 5. Create a keytab file for this account.

The keytab file contains the cryptographic keys that are private to this account. Each key is specific to an encryption algorithm, so all the algorithms allowed for the account must be accounted for in the keytab file. It is recommended to specify `All` for the `crypto` parameter `Crypto`. The following is an example of how `ktpass.exe` command is used to generate a keytab file on a domain server:



```

ktpass.exe -out xyz.keytab -mapUser xyz@TEST.NET +rndPass -mapOp set +DumpSalt -crypto All
-ptype KRB5_NT_PRINCIPAL -princ HTTP/xyzuaa.test.net@TEST.NET

```

6. Copy the generated keytab file to the machine where Proficy Authentication is installed.

For convenience, it is recommended to place the keytab file under the same directory as `uaa.yml` file, which is found in either of these locations:

- `C:\ProgramData\GE\Operations Hub\uaa-config`
- `C:\ProgramData\GE\Proficy Authentication\uaa-config`

The keytab file contains crypto information, So it is strongly recommended to set a security for the file. The file should not be readable by non-privileged user accounts, except for the service account `NT SERVICE\uaaTomcat`.

7. Configure UAA with the SPN and keytab file.

- a. Create a new file `kerberos.yml` (or use a different name but with `.yml` extension) under the `sec` subdirectory of the `uaa-config` directory, with the following code:

```

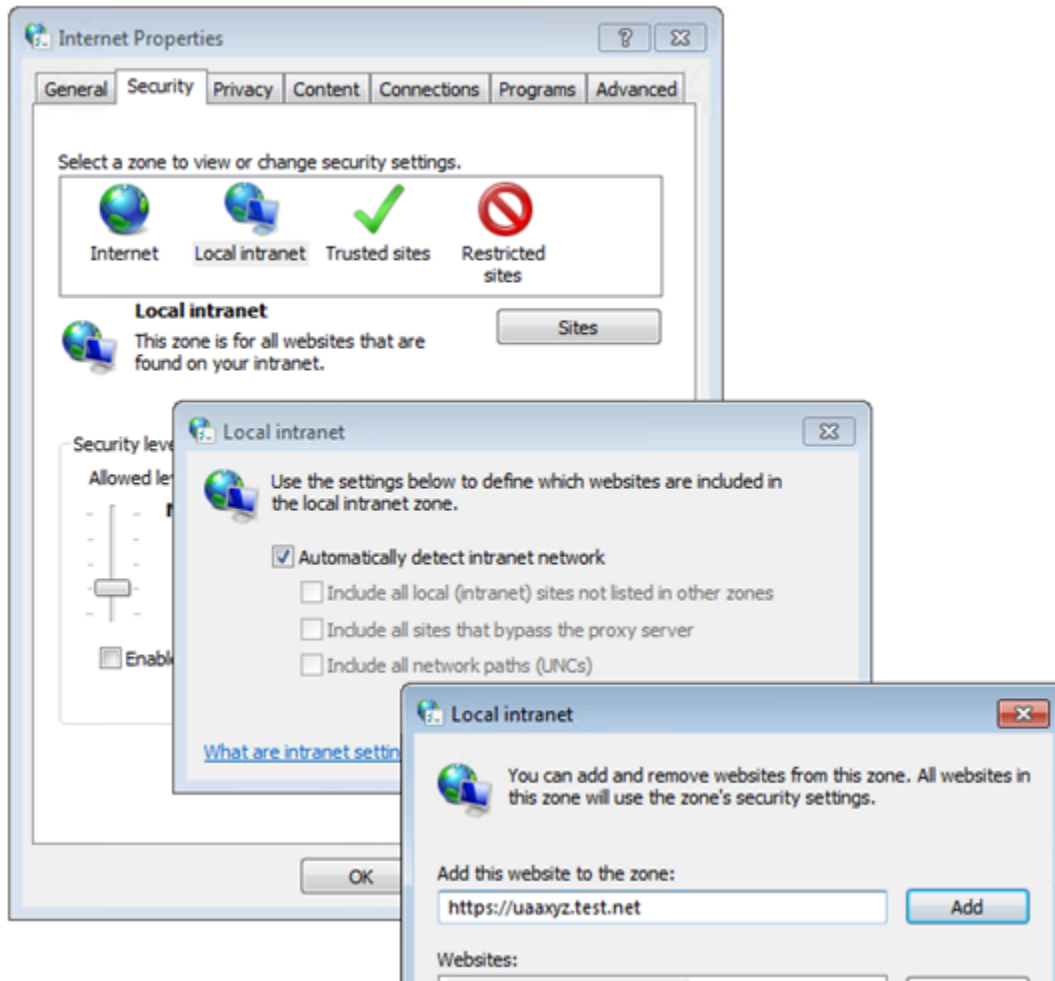
kerberos:
  service-principal: HTTP/xyzuaa.test.net@TEST.NET
  keytab-location: 'file:///C:/ProgramData/GE/Operations Hub/uaa-config/xyz.keytab'

```

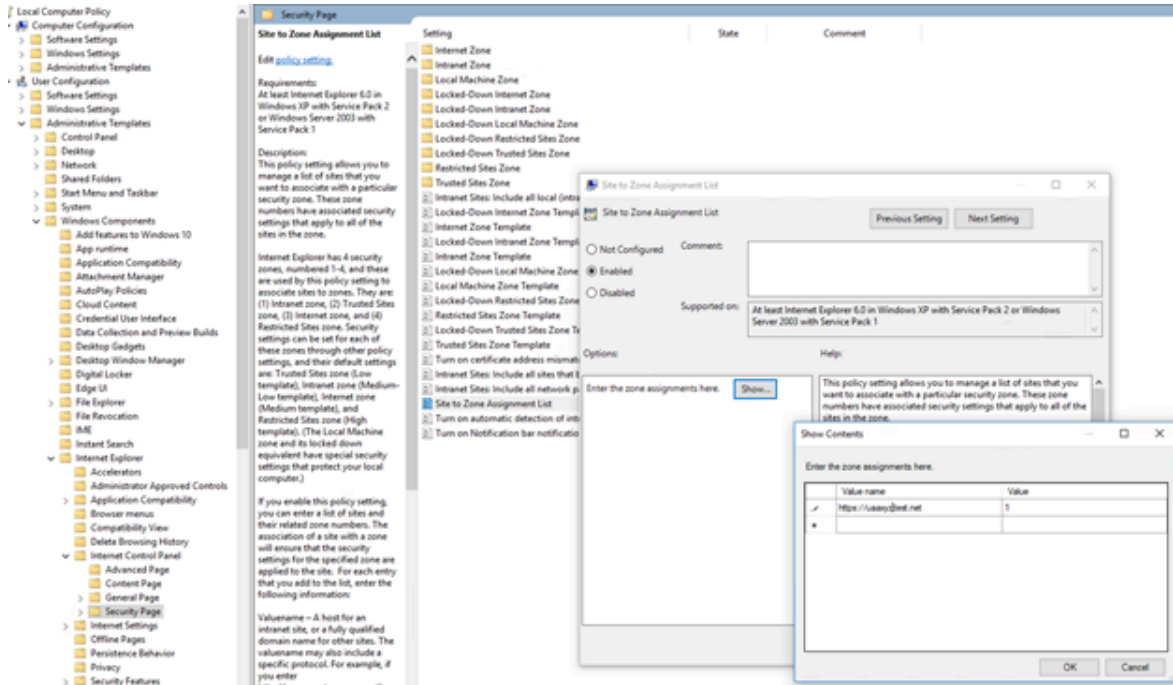
- b. Open `uaa.yml` file under `uaa-config` directory and copy the `kerberos` section at the end of the file as a template (the SPN and the full path to the keytab file as referenced in the above code).

8. On client machines, make sure that the Proficy Authentication host is recognized on the Local Intranet zone or as a Trusted Site.

If not recognized, the Chrome browser will not request a Kerberos ticket to send to Proficy Authentication. For test/staging purposes, it can be done via Control Panel as shown here:



If the setting is configured interactively using Control Panel, then it is effective only for one user on one client machine. To configure for all users on one client machine, use local group policy. In an enterprise setting, an administrator should configure client machines via group policy. You can access the policy from **User Configuration > Administrative Templates > Windows Components > Internet Explorer > Internet Control Panel > Security Page > Site to Zone Assignment List**, as shown here:



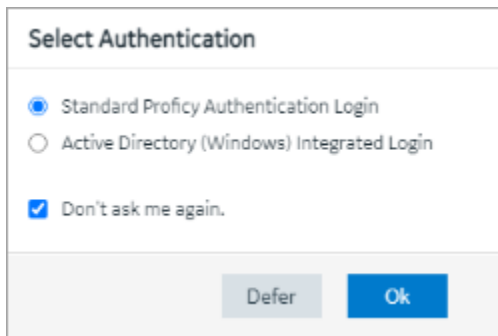
9. If Operations Hub is installed on a different machine than Proficy Authentication (i.e., in case of External Proficy Authentication or External UAA), then only the external UAA host name matters.
10. As an administrator, you may allow users to interactively choose an authentication option, or you may set it in the URLs you distribute to users.

a. Use a query parameter in Operations Hub Designer app or End app's URL.

For example, if a regular Designer app's URL is `https://xyz.test.net/iqp`, then a URL that enables Windows Auto-login would be: `https://xyz.test.net/iqp?authOption=kerberos`

This addition of `authOption` query parameter enables Windows Auto-login for the session.

b. If the authentication is not included in the URL, then the following screen appears:



Standard Proficy Authentication Login

Choose this option if you want to use the standard login (username/password or

	<p>SAML), or if Windows Auto-login has not been configured with Proficy Authentication.</p> <p>This is a regular login, which is based on username/password, including LDAP, or SAML.</p>
<p>Active Directory (Windows) Integrated Login</p>	<p>Choose this option only when it is set up with Proficy Authentication.</p> <p>This allows for autologin, wherein a user's domain login session is used to log in to Proficy Authentication.</p>
<p>Don't ask me again</p>	<p>Select this check box, if you don't want to display the <b>Select Authentication</b> screen every time you login.</p> <p>The system remembers the last selected authentication (between regular and autologin) and applies it for future logins.</p> <p>With <b>Don't ask me again</b> enabled, you can clear the last selected authentication only during logout.</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p><b>You have logged out</b></p> <hr/> <p>You should now close the browser,</p> <p><a href="#">or click here to login again.</a></p> <p><a href="#">You may also click here to clear the previously selected authentication option.</a></p> </div> <p>Select <b>You may also click here to clear the previously selected authentication option</b> to clear the saved selection. Once cleared, the clearing option is hidden from the logout screen.</p>

	Select <b>click here to login again</b> to return to the login page.
Defer	Select to dismiss this screen, and skip selecting an authentication. You have the choice to select authentication next time you login.

**Note:**

- It is *not* necessary for Proficy Authentication (or Operations Hub if different) host to be a domain member; it only needs to have a valid DNS record. However, both the user and the client machine that the user has logged into must be of a domain user/domain member respectively, in order to produce a Kerberos ticket to authenticate with Proficy Authentication.
- For Administrator's Console, the only way to use Windows Auto-login is to use the additional query parameter in the URL: `https://xyz.test.net/site/adminconsole?authOption=kerberos`

## High Availability

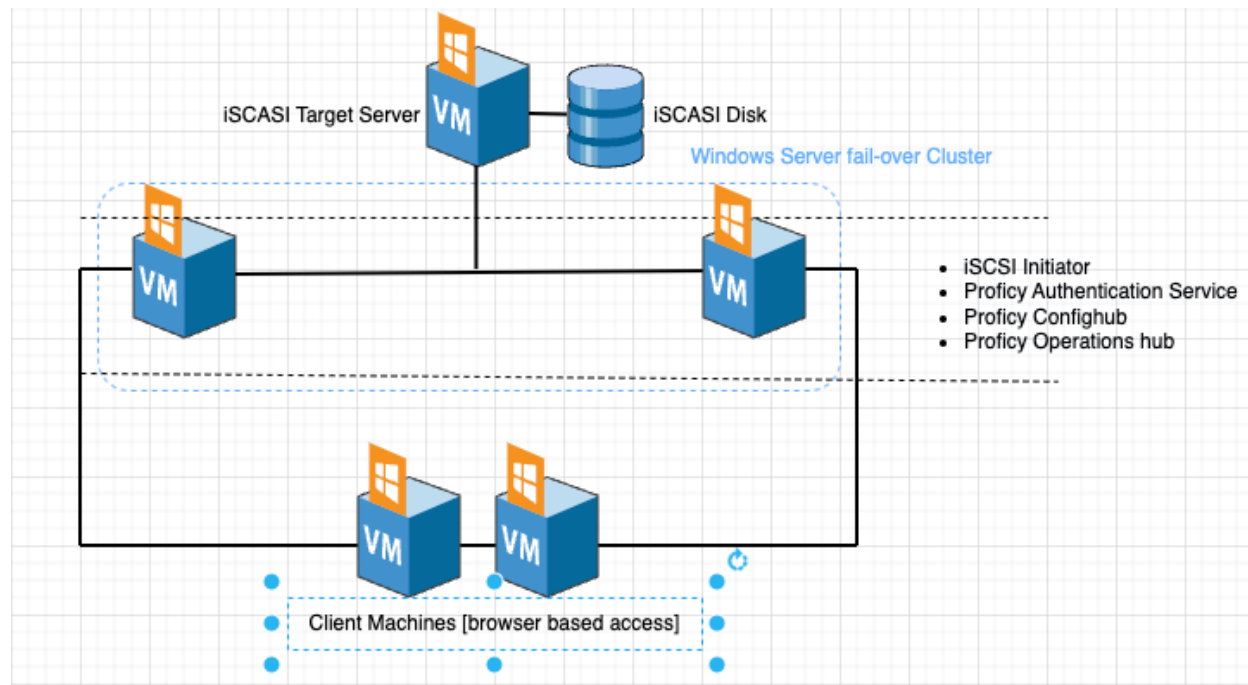
### Overview

In failover cluster technology, a group of independent computers work together to increase the availability and scalability of clustered roles (identified as nodes in a cluster). Nodes are clustered server machines running applications and services.

Failover cluster feature and file server roles are installed on the Node1 and Node2 servers (also called iSCSI initiators). A virtual disk is created on the iSCSI target server for shared storage. Failover clustering technology arranges for a backup server whenever the primary server has failed for any reason. So, if the primary server Node1 is down, then the backup server Node2 is automatically activated to replace the role of the primary server. This ensures uninterrupted access to shared storage and continuity of services even during failure of the primary server.

### Architecture Overview

The following image illustrates the simplest form of deploying the Windows failover cluster and iSCSI technology-based high available solution.



See [Set up a High Availability Cluster \(on page 158\)](#)

## Set up a High Availability Cluster

This topic describes how to set up a highly available server that is based on the Windows failover cluster and iSCSI technologies.

### **!** Important:

GE Vernova does not provide support for the Microsoft Cluster infrastructure. Our support is limited to the Proficy products installed on the cluster.

The information in this topic is an example configuration for Windows clustering intended to provide guidance only. You may need to adjust based on your specific requirements and environment.


In a clustered setup, all servers need to have the same hardware, operating system, and software. Prior to setting up a failover cluster, make sure to gather the minimum requirements for your environment. This document helps to set up a two-node failover cluster with examples:



<b>Node1</b>	iSCSI initiator (primary machine) connects to the target to utilize storage.
--------------	--

	<ul style="list-style-type: none"> <li>• Microsoft® Windows Server 2019/2022 virtual machine</li> <li>• MURHAOPSHUB1VM</li> </ul>
<b>Node2</b>	<p>iSCSI initiator (secondary machine) connects to the target to utilize storage.</p> <ul style="list-style-type: none"> <li>• Microsoft® Windows Server 2019/2022 virtual machine</li> <li>• MURHAOPSHUB2VM</li> </ul>
<b>NodeX</b>	<p>iSCSI target machine provides access to shared storage.</p> <ul style="list-style-type: none"> <li>• Microsoft® Windows Server 2019/2022 virtual machine</li> <li>• MUROPSHUBLEVM</li> </ul>

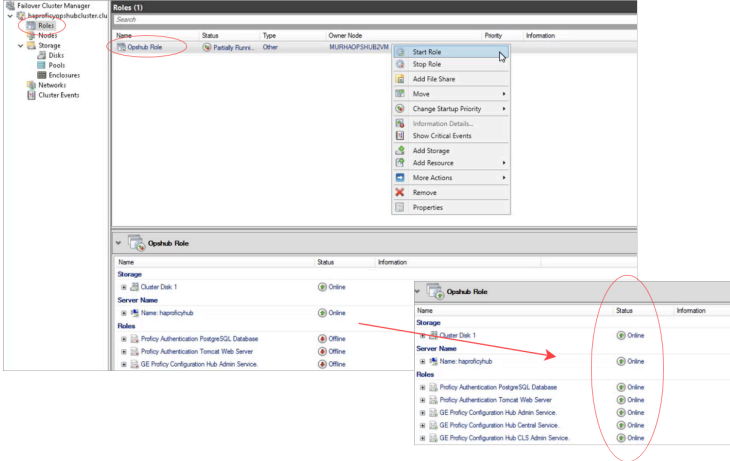


## Task Roadmap


The following table outlines the key milestones involved in accomplishing the high availability setup for Operations Hub.

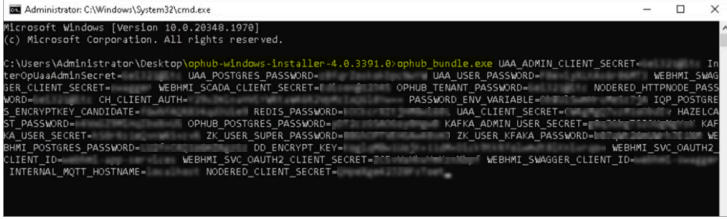
Task	Description
Set up the iSCSI target on NodeX.	<p>Complete the following steps:</p> <ol style="list-style-type: none"> <li>1. <a href="#">Configure iSCSI Target (on page 163)</a></li> <li>2. <a href="#">Create iSCSI Virtual Disk (on page 167)</a></li> </ol>
Set up the iSCSI initiators on Node1 and Node2.	<p>Complete the following steps:</p> <ol style="list-style-type: none"> <li>1. <a href="#">Configure iSCSI Initiator (on page 164)</a></li> <li>2. <a href="#">Initialize iSCSI Volume (on page 169)</a></li> </ol>
Configure a failover cluster for cluster nodes.	<p>Complete the following steps:</p> <ol style="list-style-type: none"> <li>1. <a href="#">Configure Failover Cluster Manager (on page 171)</a></li> <li>2. <a href="#">Configure Role (on page 177)</a></li> </ol>
Deploy Proficy Authentication and Configuration Hub on cluster nodes.	<p>Complete the following steps:</p> <ol style="list-style-type: none"> <li>1. Log in to the Node1 server.</li> </ol> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> In Failover cluster manager, ensure:</p> </div>

Task	Description		
	<div style="border: 1px solid #00a09a; border-radius: 10px; padding: 10px; margin-bottom: 10px;">  <ul style="list-style-type: none"> <li>◦ Node1 is the active node.</li> <li>◦ Node2 is paused.</li> </ul> </div> <p>a. Go to the shared drive.</p> <p>b. Create a folder named <code>Postgres</code>.</p> <p>c. Inside the <code>Postgres</code> folder, create another folder named <code>uaa</code>.</p> <p>d. <a href="#">Install Proficy Authentication on Cluster Nodes (on page 182)</a></p> <p>e. <a href="#">Install Configuration Hub on Cluster Nodes (on page 186)</a></p> <p>f. Open the Windows Services Management Console and configure the services as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Status &gt; <b>Stop</b></td> <td style="padding: 5px;"> <ul style="list-style-type: none"> <li>▪ Proficy Authentication PostgreSQL Database</li> <li>▪ Proficy Authentication Tomcat Web Server</li> </ul> </td> </tr> </table> <p>2. Log in to the Node2 server.</p> <div style="border: 1px solid #00a09a; border-radius: 10px; padding: 10px; margin-top: 10px;">  <p><b>Note:</b> In Failover cluster manager, ensure:</p> <ul style="list-style-type: none"> <li>◦ Node2 is the active node.</li> <li>◦ Node1 is paused.</li> </ul> </div> <p>a. <a href="#">Install Proficy Authentication on Cluster Nodes (on page 182)</a></p> <p>b. <a href="#">Install Configuration Hub on Cluster Nodes (on page 186)</a></p> <p>c. <a href="#">Add Proficy Authentication and Configuration Hub generic services (on page 195)</a></p> <p>d. <a href="#">Set dependencies for Proficy Authentication and Configuration Hub generic services (on page 197)</a></p>	Status > <b>Stop</b>	<ul style="list-style-type: none"> <li>▪ Proficy Authentication PostgreSQL Database</li> <li>▪ Proficy Authentication Tomcat Web Server</li> </ul>
Status > <b>Stop</b>	<ul style="list-style-type: none"> <li>▪ Proficy Authentication PostgreSQL Database</li> <li>▪ Proficy Authentication Tomcat Web Server</li> </ul>		



Task	Description
	<p>e. To bring all the added services online, right-click <code>Opshub Role</code> and select <b>Start Role</b>.</p>  <p>3. Replicate Cluster Nodes for Proficy Authentication and Configuration Hub (on page 200)</p>
<p>Restart both Node1 and Node2 servers.</p>	<p>To apply the Proficy Authentication and Configuration Hub updates, restart the machines that represent the nodes in the cluster.</p> <p>Test on both the nodes: Set up authentication and log in to Configuration Hub to verify the application's functionality.</p>
<p>Deploy Operations Hub on cluster nodes.</p>	<p>1. Log in to the Node1 server.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p> <b>Note:</b> In Failover cluster manager, ensure:</p> <ul style="list-style-type: none"> <li>◦ Node1 is the active node.</li> <li>◦ Node2 is paused.</li> </ul> </div> <p>a. Set up Junction Links for Shared Folders (on page 188)</p> <p>b. Install Operations Hub (on page 190)</p> <div style="border: 1px solid #FFD700; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p> <b>Attention:</b> Make sure to save a copy of the <code>temp_windows_time-stamp.env</code> while Operations Hub installation is in progress.</p> </div>

Task	Description						
	<p>c. Open the Windows Services Management Console and configure the services as follows:</p> <table border="1"> <tbody> <tr> <td>Startup Type &gt; <b>Disable</b></td> <td> <ul style="list-style-type: none"> <li>▪ Proficy Operations Hub Master Control</li> <li>▪ Proficy Operations Hub IQP Provisioner</li> <li>▪ Proficy Operations Hub UAA Provisioner Service</li> </ul> </td> </tr> <tr> <td>Startup Type &gt; <b>Automatic</b></td> <td> <ul style="list-style-type: none"> <li>▪ Proficy Operations Hub Httpd Reverse Proxy</li> <li>▪ Proficy Operations Hub OPC UA Browse Service</li> </ul> </td> </tr> <tr> <td>Status &gt; <b>Stop</b></td> <td> <ul style="list-style-type: none"> <li>▪ Proficy Operations Hub Master Control</li> <li>▪ Proficy Operations Hub IQP PostgreSQL Database</li> <li>▪ Proficy Operations Hub WebHMI PostgreSQL Database</li> </ul> </td> </tr> </tbody> </table> <p>2. Log in to the Node2 server.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> In Failover cluster manager, ensure:</p> <ul style="list-style-type: none"> <li>◦ Node2 is the active node.</li> <li>◦ Node1 is paused.</li> </ul> </div> <p>a. <a href="#">Set up Junction Links for Shared Folders (on page 188)</a></p> <p>b. Launch Command prompt and execute the Operations Hub executable file along with the password variables (extracted from .env temporary file). Pass the variables separated by spaces as shown here:</p>	Startup Type > <b>Disable</b>	<ul style="list-style-type: none"> <li>▪ Proficy Operations Hub Master Control</li> <li>▪ Proficy Operations Hub IQP Provisioner</li> <li>▪ Proficy Operations Hub UAA Provisioner Service</li> </ul>	Startup Type > <b>Automatic</b>	<ul style="list-style-type: none"> <li>▪ Proficy Operations Hub Httpd Reverse Proxy</li> <li>▪ Proficy Operations Hub OPC UA Browse Service</li> </ul>	Status > <b>Stop</b>	<ul style="list-style-type: none"> <li>▪ Proficy Operations Hub Master Control</li> <li>▪ Proficy Operations Hub IQP PostgreSQL Database</li> <li>▪ Proficy Operations Hub WebHMI PostgreSQL Database</li> </ul>
Startup Type > <b>Disable</b>	<ul style="list-style-type: none"> <li>▪ Proficy Operations Hub Master Control</li> <li>▪ Proficy Operations Hub IQP Provisioner</li> <li>▪ Proficy Operations Hub UAA Provisioner Service</li> </ul>						
Startup Type > <b>Automatic</b>	<ul style="list-style-type: none"> <li>▪ Proficy Operations Hub Httpd Reverse Proxy</li> <li>▪ Proficy Operations Hub OPC UA Browse Service</li> </ul>						
Status > <b>Stop</b>	<ul style="list-style-type: none"> <li>▪ Proficy Operations Hub Master Control</li> <li>▪ Proficy Operations Hub IQP PostgreSQL Database</li> <li>▪ Proficy Operations Hub WebHMI PostgreSQL Database</li> </ul>						

Task	Description
	 <p>c. Complete the installation wizard to start the installation. Refer to the <a href="#">Install Operations Hub (on page 190)</a> topic from step 2.</p> <p>d. Repeat <a href="#">step 1-c (on page 162)</a>.</p> <p>e. <a href="#">Add Operations Hub generic services (on page 195)</a></p> <p>f. <a href="#">Set dependencies for Operations Hub generic services (on page 197)</a></p> <p>g. To bring all the added services online, right-click <code>Opshub Role</code> and select <b>Start Role</b>.</p> <p>3. <a href="#">Replicate Cluster Nodes for Operations Hub (on page 202)</a></p>
<p>Restart both Node1 and Node2 servers.</p>	<p>To apply the Operations Hub updates, restart the machines that represent the nodes in the cluster.</p> <p>Test on both the nodes: Set up authentication and log in to Configuration Hub to verify the application's functionality.</p>

## Configure iSCSI Target

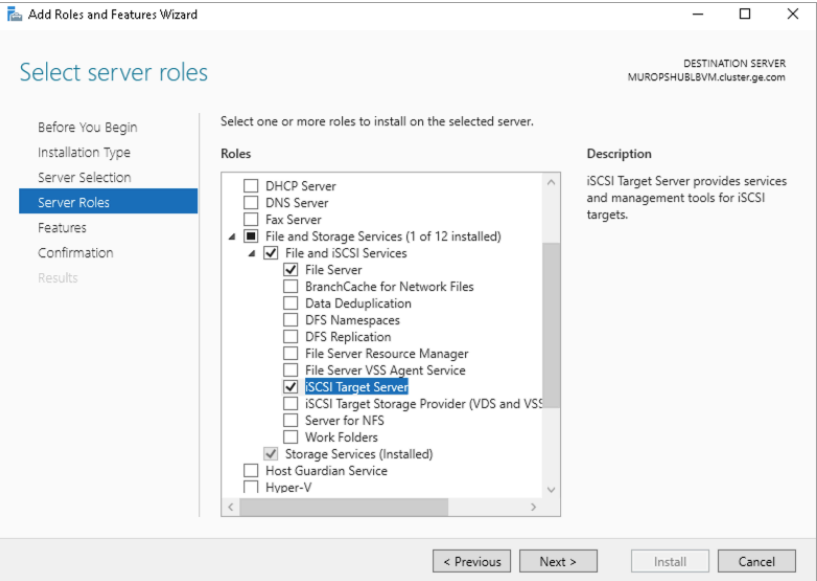
This topic describes how to configure an iSCSI target server.

Configure external storage using Windows Server 2019/2022.

For more information, refer to [Microsoft documentation](#).

1. Log in to the machine (NodeX) where you want to set up the iSCSI target server.
2. Go to **Start > Administrative Tools > Server Manager**.
3. From the Server Manager dashboard, select **Manage > Add roles and features**.
4. Complete **Add Roles and Features Wizard** with these options:

Section	What To Do
Before You Begin	Skip to the next section.

Section	What To Do
Installation Type	Select <b>Role-based or feature-based installation</b> .
Server Selection	a. Choose the option <b>Select a server from the server pool</b> . b. Under the server pool section, select your target server. You will be installing the role/feature on this server.
Server Roles	In the roles list box: a. Expand <b>File and Storage Services &gt; File and iSCSI Services</b> . b. Select the check box for <b>iSCSI Target Server</b> . 
Confirmation	Select <b>Install</b> .

When the installation is complete, restart the machine.

Log in to the same server again and [create a virtual disk \(on page 167\)](#).

## Configure iSCSI Initiator

This topic describes how to configure an iSCSI initiator and connect to the target server.

You must perform these steps on all the initiator server nodes you want to add to a cluster - Node1 and Node2.

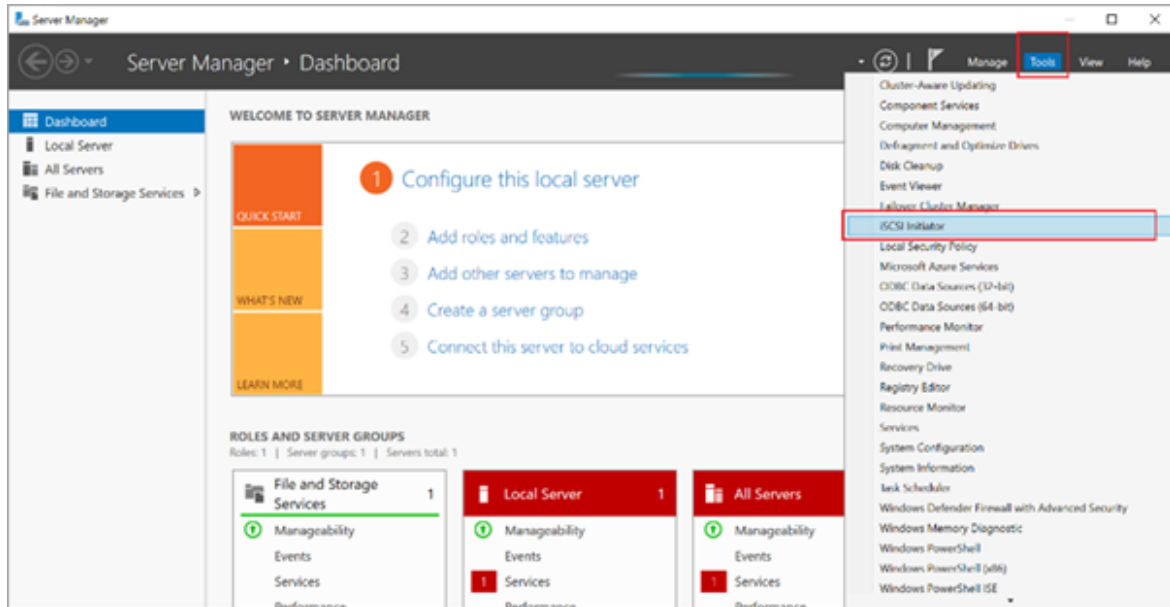
1. Log in to the Node1 server.
2. Go to **Start > Administrative Tools > Server Manager**.
3. From the Server Manager dashboard, select **Manage > Add roles and features**.

4. Complete **Add Roles and Features Wizard** with these options:

Section	What To Do
Before You Begin	Skip to the next section.
Installation Type	Select <b>Role-based or feature-based installation</b> .
Server Selection	<ul style="list-style-type: none"> <li>a. Choose the option <b>Select a server from the server pool</b>.</li> <li>b. Under the server pool section, select your Node1 server. You will be installing the role/feature on this server.</li> </ul>
Server Roles	In the roles list box: <ul style="list-style-type: none"> <li>a. Expand <b>File and Storage Services &gt; File and iSCSI Services</b>.</li> <li>b. Select the check box for <b>iSCSI Target Server</b>.</li> </ul>
Features	To allow the installation of Failover Cluster Manager: <ul style="list-style-type: none"> <li>a. In the features list box, select the check box for <b>Failover Clustering</b>.</li> </ul> <p>The <b>Add features that are required for Failover Clustering?</b> screen appears, which shows the dependencies that are installed with this feature.</p> <ul style="list-style-type: none"> <li>b. Select <b>Add Features</b>.</li> </ul>
Confirmation	Select <b>Install</b> .

The selected role and feature is installed on the Node1 server.

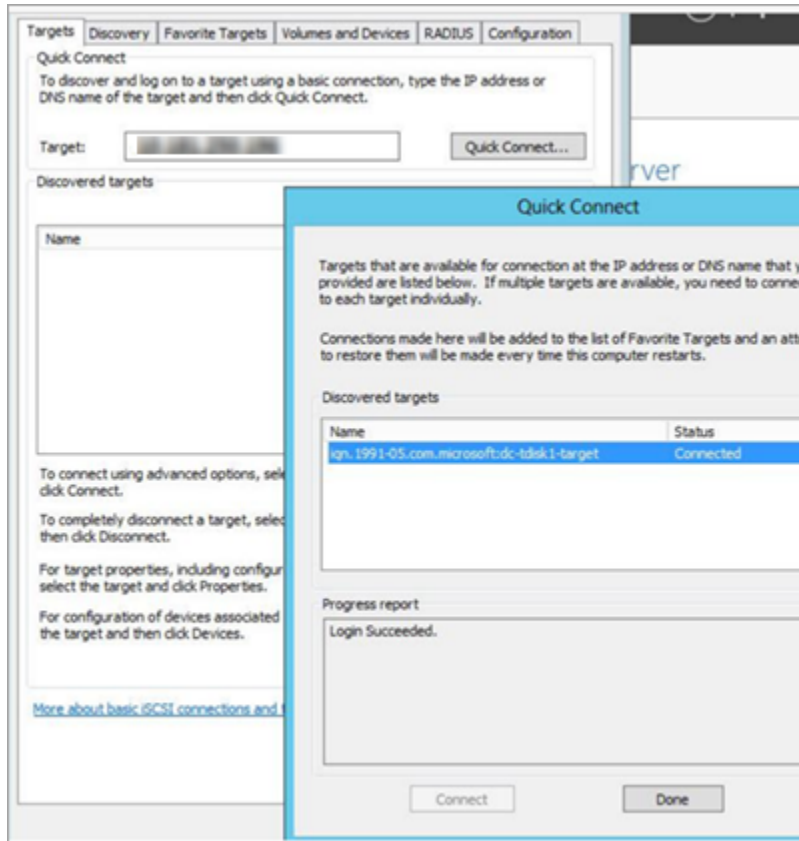
5. When the installation is complete, restart the machine.
6. Log in to the same server again and launch **Server Manager**.
7. From the **Tools** menu, select **iSCSI Initiator**.



8. In the **Target** field, enter the iSCSI target server address.

9. Select **Quick Connect**.

If connected, the login success appears as shown in the following figure:



10. Select **Done**, then **OK** to exit.

Node1 is configured successfully.

Log in to Node2 and repeat the steps.

## Create iSCSI Virtual Disk

This topic describes how to create a virtual disk on the iSCSI target server.

[Configure iSCSI Target \(on page 163\)](#)

1. Log in to the iSCSI target server.
2. Go to **Start > Administrative Tools > Server Manager**.
3. Go to **File and Storage Services > iSCSI**.
4. From the **TASKS** drop-down menu, select **New iSCSI Virtual Disk**.
5. Complete **New iSCSI Virtual Disk Wizard** with these options:

Section	What To Do
iSCSI Virtual Disk Location	The iSCSI target server and volume details are displayed.
iSCSI Virtual Disk Name	Enter a name for the virtual disk. For example, <code>sharedDisk</code> .
iSCSI Virtual Disk Size	<ol style="list-style-type: none"> <li>Enter the disk size. For example, <code>40GB</code>. The disk size depends on your database utilization and number of users.</li> <li>Select <b>Dynamically expanding</b>.</li> </ol>
iSCSI Target	<p>Select <b>New iSCSI target</b>.</p> <p>If the target is new, then it should be assigned later as described in step 8.</p>
Target Name and Access	Enter a name for the iSCSI target server. For example, <code>haopshubtarget</code> .
Access Servers	<p>Add the iSCSI initiators (Node1 and Node2) and enable them to access the iSCSI virtual disk. Follow these steps to add both the servers one at a time:</p> <ol style="list-style-type: none"> <li>Select <b>Add</b>. The <b>Add initiator ID</b> screen appears.</li> <li>Select <b>Enter a value for the selected type</b>.</li> <li>From the <b>Type</b> drop-down menu, choose any of the following options to enter a value: <ul style="list-style-type: none"> <li>If you select <b>DNS Name</b>, enter the DNS name of the computer where the iSCSI initiator is installed.</li> <li>If you select <b>IP Address</b>, then enter the IP address of the computer where the iSCSI initiator is installed.</li> <li>If you select <b>Mac Address</b>, then enter the MAC address of the computer where the iSCSI initiator is installed.</li> </ul> </li> <li>Select <b>OK</b> to exit.</li> </ol>
Enable authentication	Skip to the next section.
Confirmation	Select <b>Create</b> .

When the iSCSI virtual disk is created successfully, select **Close** to exit the wizard.

- In Server Manager, go to **File and Storage Services > iSCSI** and verify the newly created virtual disk is listed under iSCSI virtual disks.



The virtual disk status appears as `Not Connected`. This occurs when a new iSCSI target is selected during iSCSI virtual disk creation.

7. Right-click the `Not Connected` iSCSI virtual disk and select **Assign iSCSI Virtual Disk**.
8. Complete **Assign iSCSI Virtual Disk Wizard** with these options:

Section	What To Do
iSCSI Target	Select <b>Existing iSCSI target</b> and select the target server to connect.
Confirmation	Select <b>Assign</b> .

When the iSCSI virtual disk is assigned successfully, select **Close** to exit the wizard.

## Initialize iSCSI Volume

This topic describes how to initialize a virtual disk on the iSCSI initiator nodes, which are the server nodes in a cluster.

[Create iSCSI Virtual Disk \(on page 167\)](#)

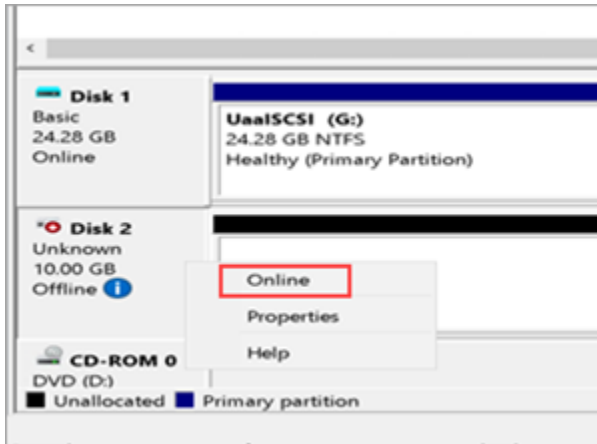
In the following steps to initialize a virtual disk, you will prepare the newly created disk for use, making it recognizable and accessible by the operating system.



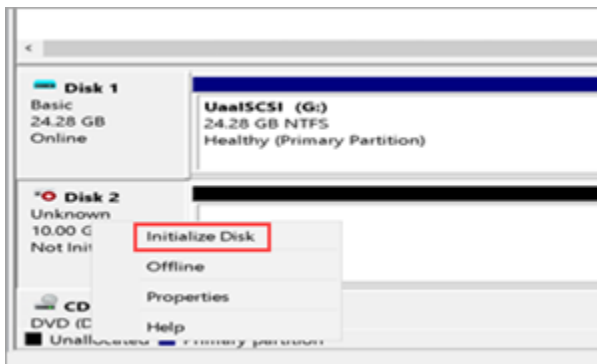
### Remember:

Perform these steps only once on any of the iSCSI initiator nodes. The changes apply to the other nodes in the cluster. For example, if you initialize a virtual disk on Node1, then there is no need to repeat the process on Node2.

1. Log in to any of the server nodes in a cluster (Node1 or Node2).
2. Go to **Control Panel > Administrator Tools > Computer Management > Storage > Disk Management**.
3. Look for the unknown disk, right-click and select **Online**.  
If the unknown disk is offline, you must bring it online.

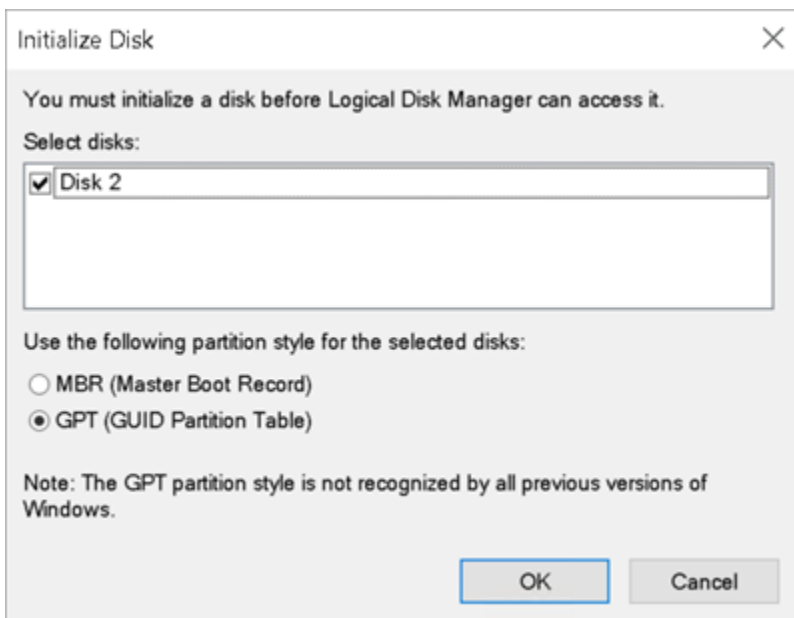


4. Right-click the unknown disk again and select **Initialize disk**.

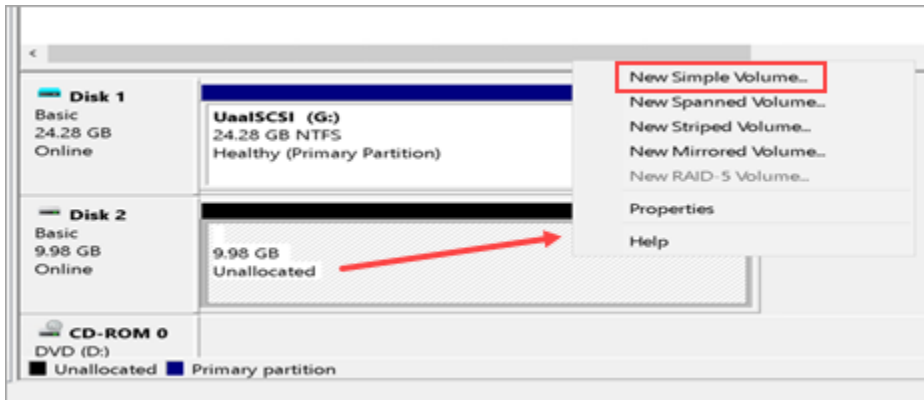


The **Initialize Disk** screen appears.

5. Select **OK**.



6. Right-click the unallocated space on the disk, and select **New Simple Volume**.



The **New Simple Volume Wizard** screen appears.

7. Complete the steps in the wizard to create a new volume.

You need to:

- Specify the size of the volume you want to create in megabytes (MB).
- Assign a drive letter to identify the partition.
- Format the volume with default settings.

The newly created volume should appear under **This PC** on whichever node you are logged in.

## Configure Failover Cluster

This topic describes how to configure a failover cluster.

In the following steps, we shall achieve these tasks:

- [Validating a cluster \(on page 172\)](#)
- [Creating a cluster \(on page 175\)](#)



### Remember:

Perform these steps only once on any of the iSCSI initiator nodes. The changes apply to the other nodes in the cluster. For example, if you create a cluster on Node1, then there is no need to repeat the process on Node2.

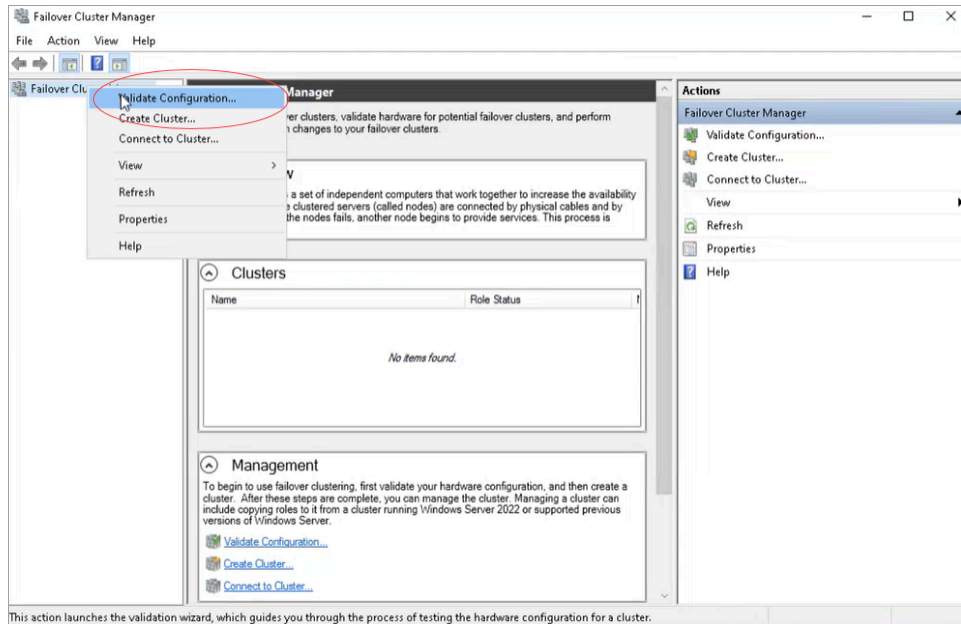
1. Log in to the iSCSI initiator node (Node1 or Node2).
2. Launch Failover Cluster Manager.

Go to **Start > Administrative Tools > Failover Cluster Manager**.

Before starting to create a cluster of nodes, you should validate whether the nodes that you are adding to the cluster are compatible with the cluster hardware requirement. For more information, refer to the [Microsoft documentation](#).

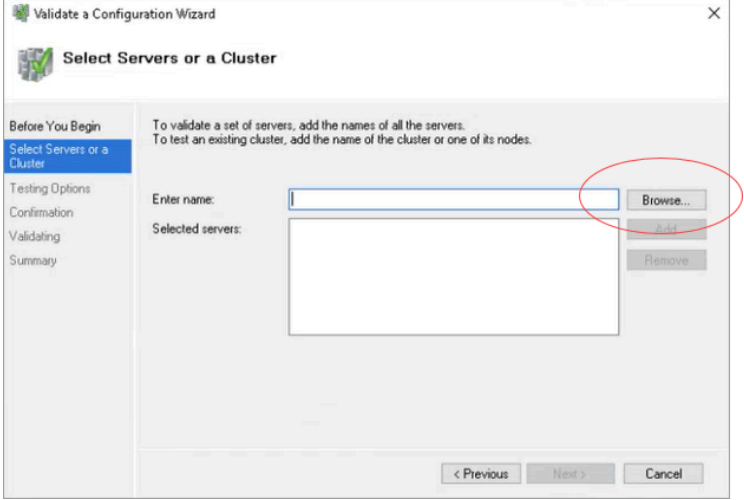
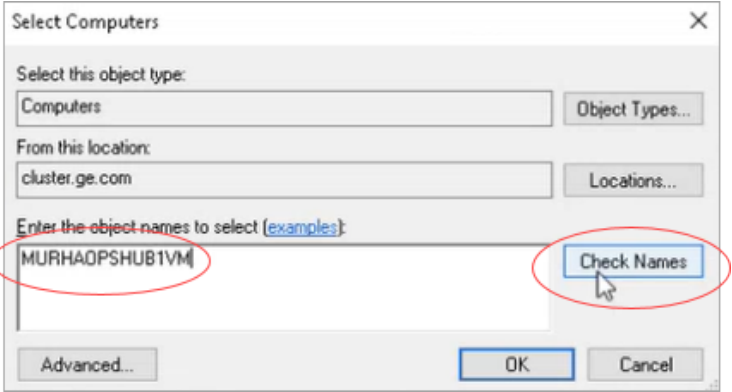
**Validating a Cluster:**

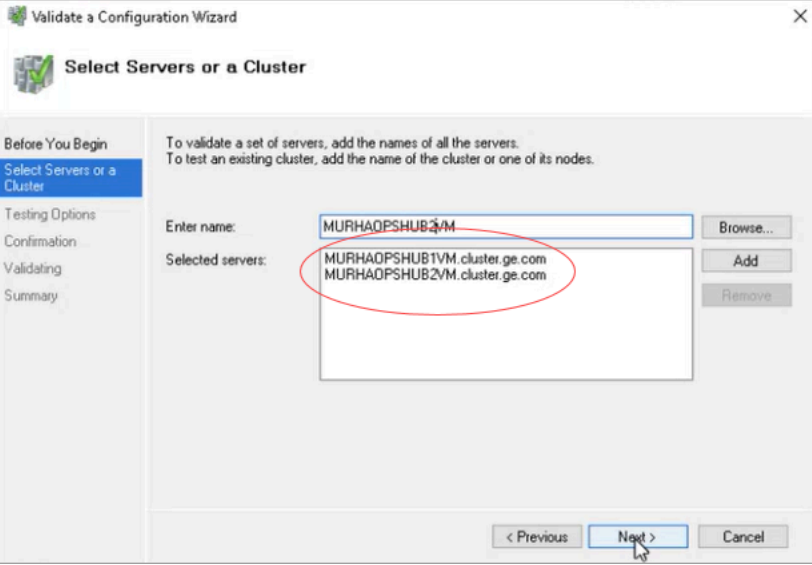
3. Right-click and select **Validate Configuration....**

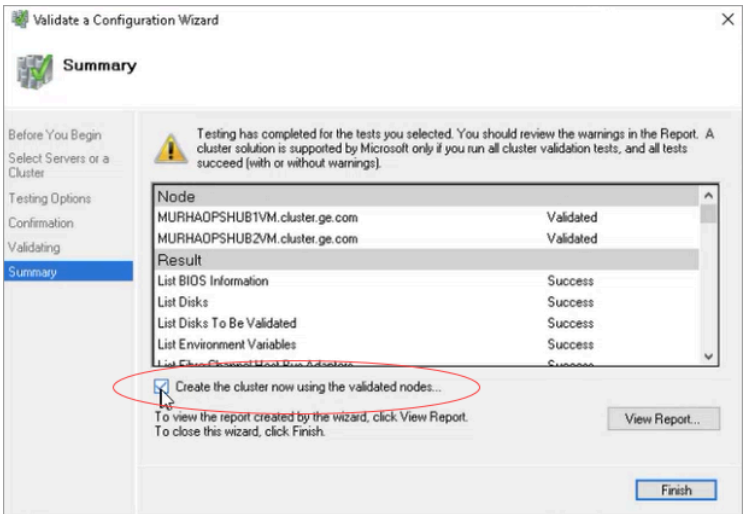


4. Complete **Validate a Configuration Wizard** with these options:

Section	What To Do
Before You Begin	Skip to the next section.

Section	What To Do
<p>Select Servers or a Cluster</p>	<p>Browse and locate the servers to validate:</p> <p>a. Select <b>Browse</b>.</p>  <p>b. Enter the server name and select <b>Check Names</b>.</p>  <p>c. After the server is located, select <b>OK</b>.</p> <p>d. To locate another node server, repeat the steps.</p> <p>Located node servers are displayed as shown here:</p>

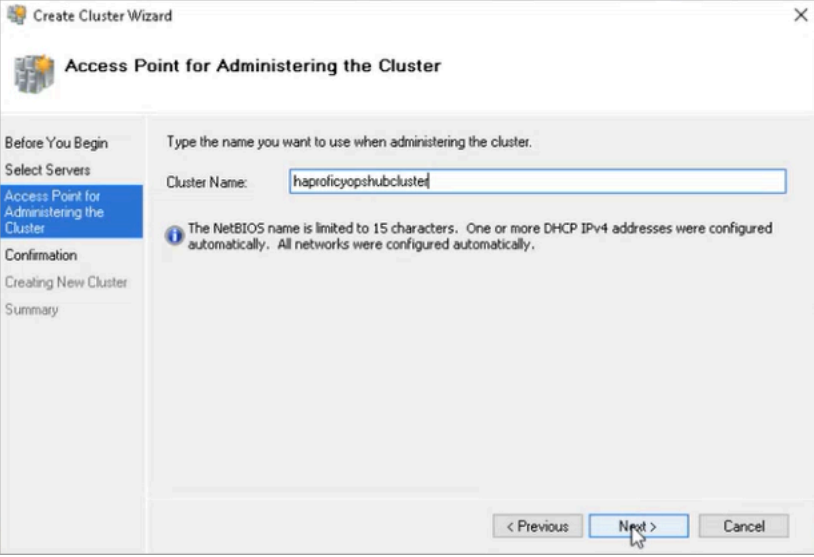
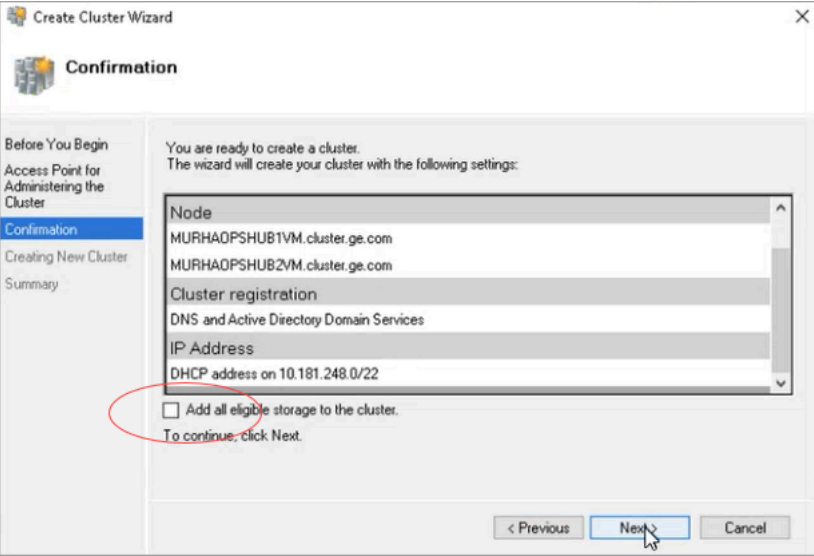
Section	What To Do
	 <p>Proceed to next.</p>
Testing Options	Select <b>Run all tests (recommended)</b> .
Confirmation	Review the list of tests run on the selected servers. The number of tests run are based on the roles installed on the server nodes.
Validating	This process may take several minutes depending on your network infrastructure, and the number of server nodes selected for validation.
Summary	<p>Once the validation process is complete:</p> <ol style="list-style-type: none"> <li>Select <b>View Report</b>.</li> <li>Review <b>Failover Cluster Validation Report</b> and fix any failed validations. You can ignore expected warnings. The validation report should be free of any errors, otherwise the cluster setup will not be successful.</li> <li>Select the check box for <b>Create the cluster now using the validated nodes...</b></li> </ol>

Section	What To Do
	 <p>d. Select <b>Finish</b>.</p>

**Creating a Cluster:**

5. Complete **Create Cluster Wizard** using these options:

Section	What To Do
Before You Begin	Skip to the next section.
Access Point for Administering the Cluster	Enter a unique name for your cluster. It is the virtual name assigned to the entire cluster. For example, <code>haproficiencyopshubcluster</code> .

Section	What To Do
	
Confirmation	<p>Clear the check box for <b>Add all eligible storage to the cluster</b>.</p> 
Creating New Cluster	<p>This process may take a while as there are several checks that must be run, and tests that are conducted while the system is configured.</p>
Summary	<p>Select <b>Finish</b>.</p>

[Configure Role \(on page 177\)](#)



## Configure Role

This topic describes how to configure a cluster role to make Proficy applications highly available.

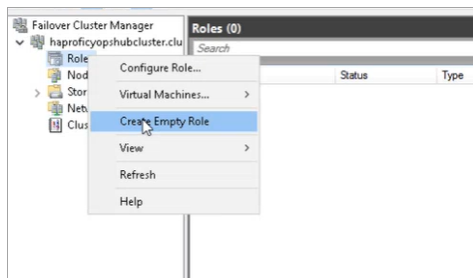
In the following steps, we shall create and configure a role to ensure that the necessary resources and services are highly available.



### Remember:

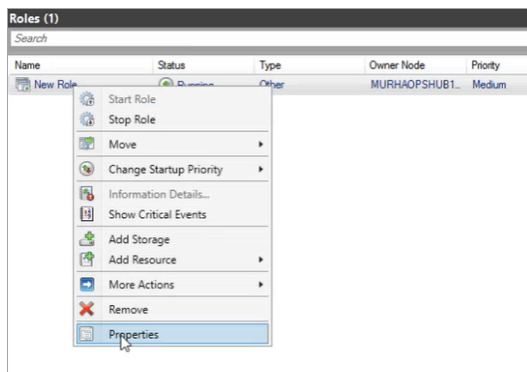
Perform steps 1-5 only once on any of the iSCSI initiator nodes. The changes apply to the other nodes in the cluster. For example, if you configure a role on Node1, then there is no need to repeat the process on Node2.

1. Log in to any of the iSCSI initiator nodes.
2. Launch Failover Cluster Manager.
  - Go to **Start > Administrative Tools > Failover Cluster Manager**.
3. Create an empty role.
  - a. In Failover Cluster Manager, expand your cluster name and go to **Storage > Disks**.  
The cluster name is the unique name entered when creating a cluster. Refer to [Configure Failover Cluster \(on page 171\)](#).
  - b. Right-click **Disks** and select **Add Disk**.  
The **Add Disks to a Cluster** screen appears.
  - c. Select the initialized iSCSI disk you want to add, and select **OK**.
  - d. In Failover Cluster Manager, expand your cluster name and select **Roles**.
  - e. Right-click **Roles > Create Empty Role**.



The newly created role appears in the Roles pane with the name `New Role`.

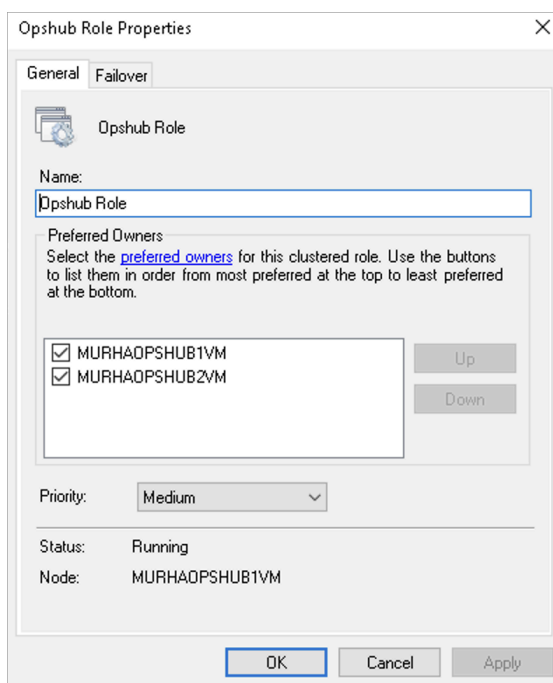
- f. Right-click `New Role` and select **Properties**.



The **New Role Properties** screen appears.

g. Enter a name for the new role. For example, `Opshub Role`.

You can assign the role to multiple node servers and set an order of preference.

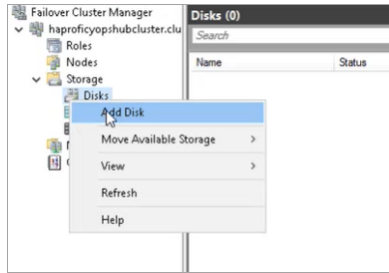


h. Select **Apply > OK**.

4. Add storage to the newly created (and renamed) empty role.

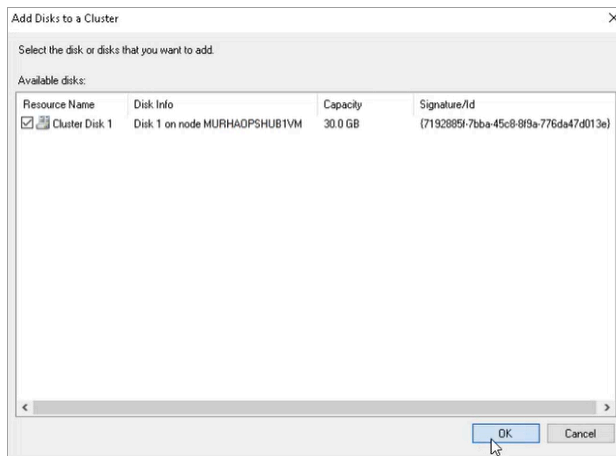
a. In Failover Cluster Manager, expand your cluster name and navigate to **Storage > Disks**.

b. Right-click **Disks > Add Disk**.

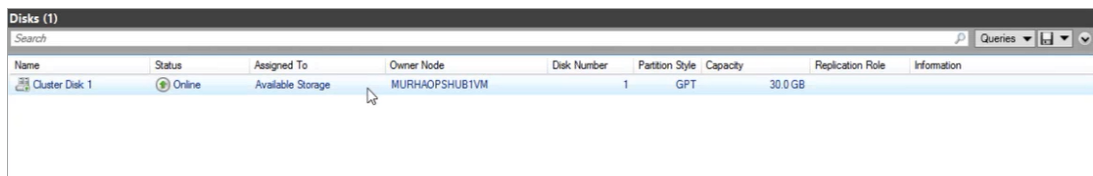


The **Add Disks to a Cluster** screen appears.

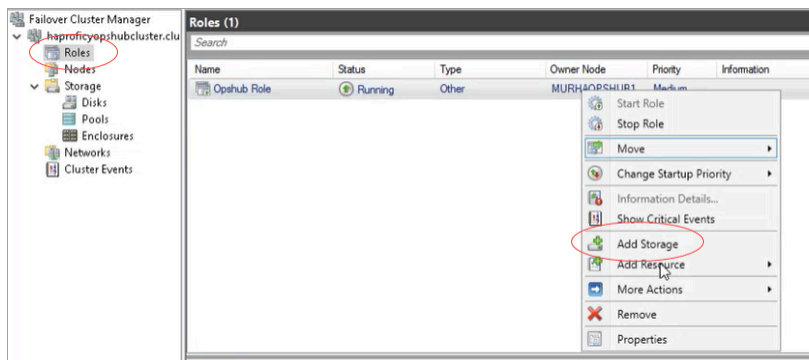
c. Ensure the cluster disk check box is selected and select **OK**.



The newly added disk appears in the Disks pane.

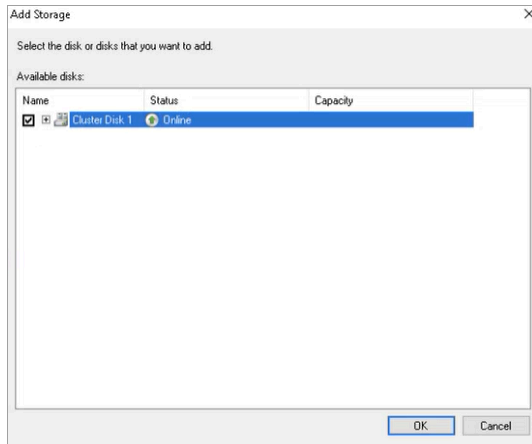


d. Go to **Roles**, right-click `Opshub Role` and select **Add Storage**.



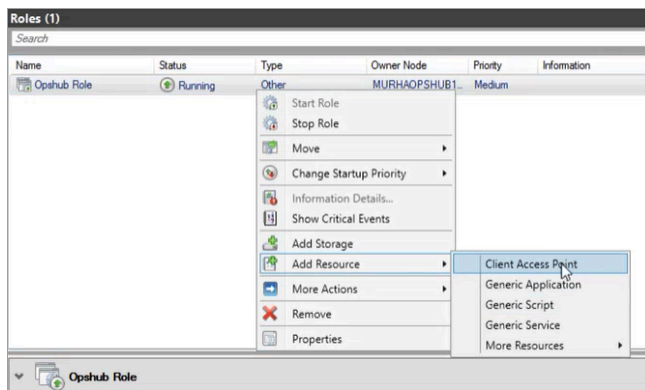
The **Add Storage** screen appears.

- e. Select the check box for the storage that is associated to the cluster, and select **OK**.





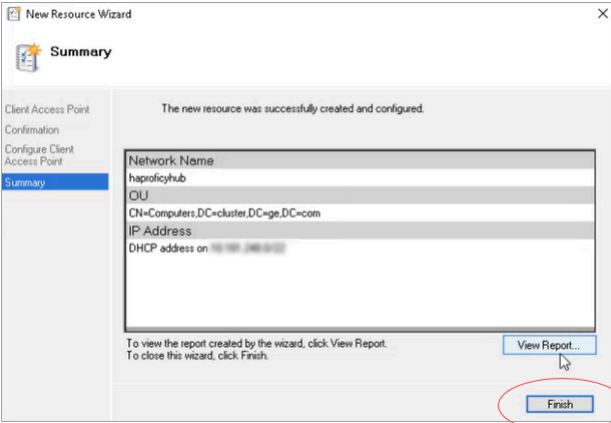
5. Add client access point to the newly created (and renamed) empty role.

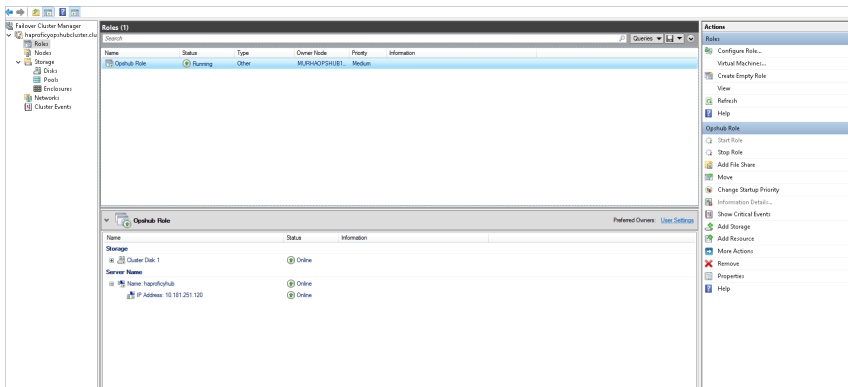
- a. Right-click `Opshub Role` and select **Add Resource > Client Access Point**.



- b. Complete **New Resource Wizard** with the following options.

Section	What To Do
Client Access Point	<p>Enter a name. For example, <code>haproficyhub</code>.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p> <b>Remember:</b> The client access point is different from the cluster name. It is used by external clients to connect to services provided by the cluster.</p> </div> <p>Make a note of this name. You need to provide the fully qualified domain name while installing Operations Hub.</p>

Section	What To Do												
	For example, <code>haproficynhub.cluster.ge.com</code> wherein <code>cluster.ge.com</code> is the domain where cluster is installed. Make sure all the initiator nodes are in the same domain name.												
Confirmation	The network name and IP address are displayed for confirmation. <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <b>Note:</b>                          After creating this resource, the IP address and the name should be added to the <code>hosts</code> file on the node servers configured for high availability.                     </div>												
Configure Client Access Point	Verifies the validity of the client access point settings and creates a new resource.												
Summary	Select <b>Finish</b> . <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;">  <p>The screenshot shows the 'New Resource Wizard' window at the 'Summary' step. The message states: 'The new resource was successfully created and configured.' The summary table contains the following information:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Field</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Network Name</td> <td>haproficynhub</td> </tr> <tr> <td>OU</td> <td>OU</td> </tr> <tr> <td>CN=Computers.DC=cluster.DC=ge.DC=com</td> <td>CN=Computers.DC=cluster.DC=ge.DC=com</td> </tr> <tr> <td>IP Address</td> <td>10.101.201.100</td> </tr> <tr> <td>DHCP address on</td> <td>10.101.201.100</td> </tr> </tbody> </table> <p>At the bottom of the wizard, there are two buttons: 'View Report...' and 'Finish'. The 'Finish' button is circled in red in the original image.</p> </div>	Field	Value	Network Name	haproficynhub	OU	OU	CN=Computers.DC=cluster.DC=ge.DC=com	CN=Computers.DC=cluster.DC=ge.DC=com	IP Address	10.101.201.100	DHCP address on	10.101.201.100
Field	Value												
Network Name	haproficynhub												
OU	OU												
CN=Computers.DC=cluster.DC=ge.DC=com	CN=Computers.DC=cluster.DC=ge.DC=com												
IP Address	10.101.201.100												
DHCP address on	10.101.201.100												



6. Update the `hosts` file.**Important:**

Perform this step on all the nodes - Node1, Node2, NodeX.

a. Open the `hosts` file in a text editor.

```
..\Windows\System32\Drivers\etc\hosts
```

## b. Add the network name and IP address as shown here:

```

4 #
5 # This file contains the mappings of IP addresses to host names. Each
6 # entry should be kept on an individual line. The IP address should
7 # be placed in the first column followed by the corresponding host name.
8 # The IP address and the host name should be separated by at least one
9 # space.
10 #
11 # Additionally, comments (such as these) may be inserted on individual
12 # lines or following the machine name denoted by a '#' symbol.
13 #
14 # For example:
15 #
16 #     102.54.94.97    rhino.acme.com      # source server
17 #     38.25.63.10    x.acme.com          # x client host
18 #
19 # localhost name resolution is handled within DNS itself.
20 #
21 #::: localhost
22 #::: localhost
23 # 10.255.255.255 haproficyhub
24 # 10.255.255.255 haproficyhub.cluster.ge.com

```

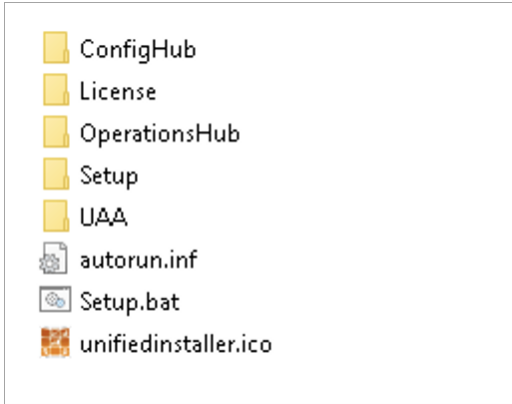
## Install Proficy Authentication on Cluster Nodes

This topic describes Proficy Authentication installation setup in a high available environment.

For a fresh installation, you can proceed directly with the procedural steps outlined in this topic. However, if you intend to use an existing database, follow these steps before you begin with the procedural steps:

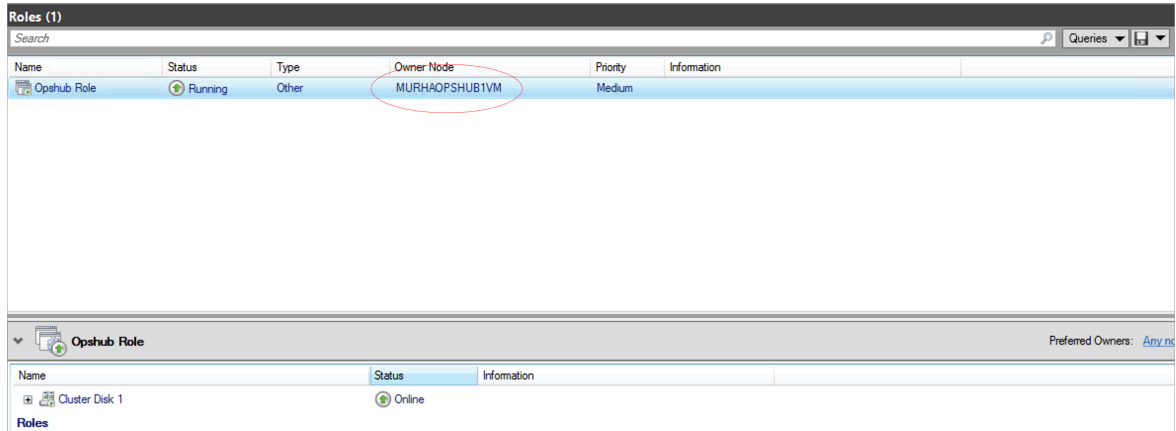
1. Log in to the node server (Node1 or Node2) where you want to install Proficy Authentication. In failover cluster manager, make sure that the cluster is configured to use the shared drive (from NodeX). For example, if you plan to install on Node1, then the shared drive `E:\` should be accessible on Node1.
2. Copy your existing Proficy Authentication database (located in the Postgres database location) to the shared drive.
3. Make a note of the location path where you copied the database. For example, `E:\postgres\uaa`. You need to provide this path during Proficy Authentication installation.

You should also download the latest Operations Hub ISO installation media from Salesforce. Then mount the file and place the files and folders in a shared drive accessible to the nodes in a cluster.



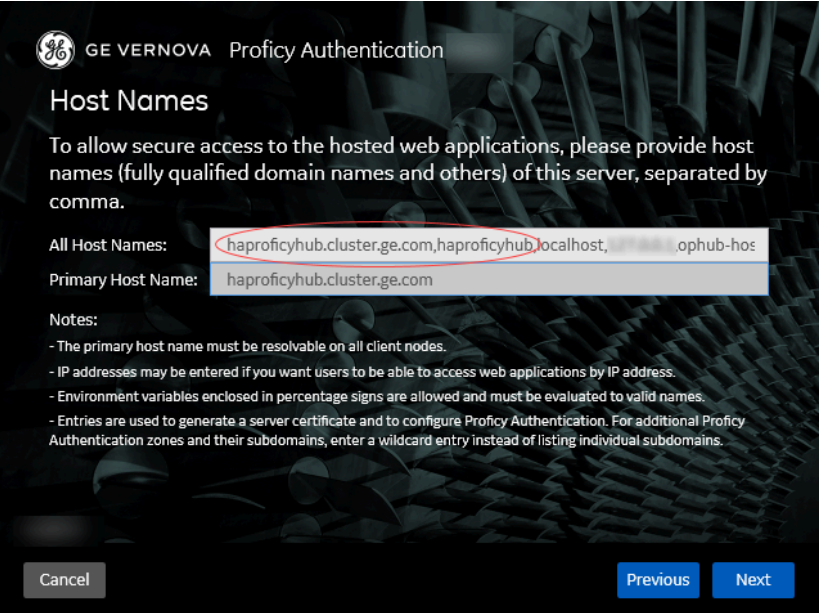
To install Proficy Authentication on the iSCSI initiators (Node1 and Node2), make sure the shared drive is available on the node where you want to run the installation.

1. Log in to the iSCSI initiator Node1 server.
2. Open Failover Cluster Manager and verify that the cluster role is associated to the node where you want to install Proficy Authentication.

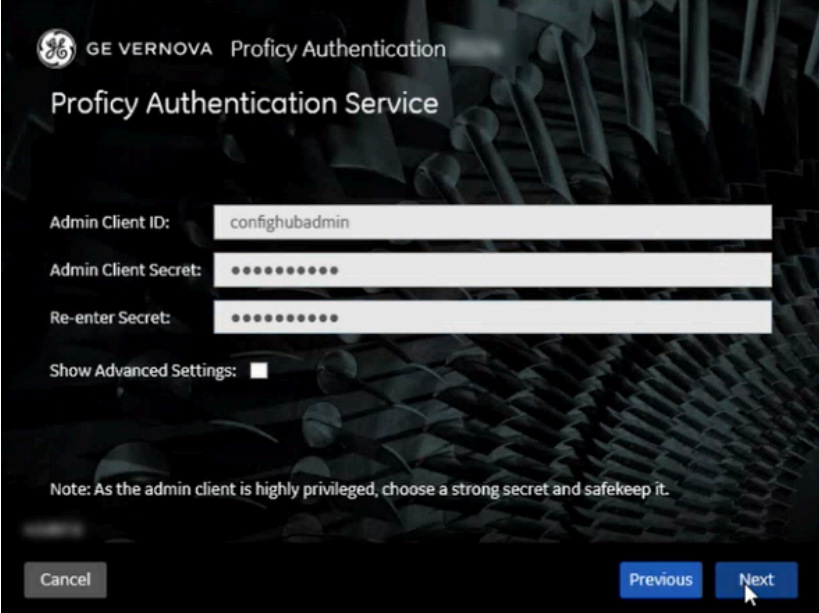



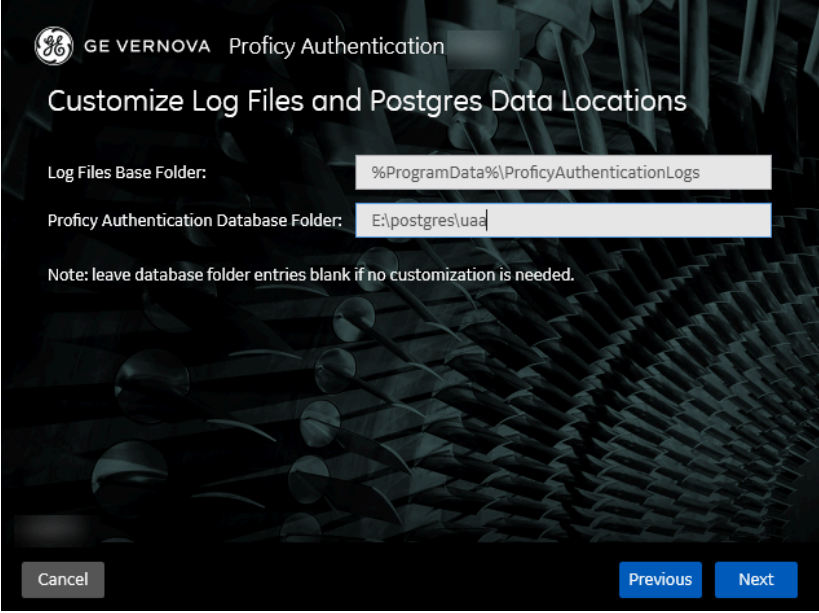
3. In the downloaded ISO files/folders, open the **UAA** folder and run `Proficy_Authentication_Bundle.exe` to start Proficy Authentication installation. The welcome screen appears.
4. Do the following:

Screen	Do This
Welcome	Select <b>Next</b> .
TCP port check	Select <b>Next</b> .

Screen	Do This
<p>Host Names</p>	<p>In <b>All Host Names</b> field, enter the fully qualified domain name of the client access point, followed by the client access point itself, and then any additional hostname/s (see screenshot).</p>  <p>The screenshot shows the 'Host Names' configuration screen. At the top, it says 'GE VERNOVA Proficy Authentication'. Below that is the title 'Host Names' and a paragraph: 'To allow secure access to the hosted web applications, please provide host names (fully qualified domain names and others) of this server, separated by comma.' There are two input fields: 'All Host Names:' with the value 'haproficymhub.cluster.ge.com,haproficymhub,localhost, .ophub-hos' and 'Primary Host Name:' with the value 'haproficymhub.cluster.ge.com'. Below these are 'Notes:' with three bullet points: '- The primary host name must be resolvable on all client nodes.', '- IP addresses may be entered if you want users to be able to access web applications by IP address.', and '- Environment variables enclosed in percentage signs are allowed and must be evaluated to valid names.' At the bottom, there are three buttons: 'Cancel', 'Previous', and 'Next'.</p>
<p>Proficy Authentication Service</p>	<p>Enter the following fields and select <b>Next</b>.</p> <ul style="list-style-type: none"> <li>◦ <b>Admin Client ID</b></li> <li>◦ <b>Admin Client Secret</b></li> <li>◦ <b>Re-enter Secret</b></li> </ul>



Screen	Do This
	 <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> In a clustered environment, ensure that the client id and secret are identical across nodes (Node1 and Node2) to facilitate the application's access to shared resources.</p> </div>
<p>Select Drive for Programs and Data</p>	<p>To associate an existing database, enter the shared drive location path where you copied the Proficy Authentication database. Refer to the <a href="#">steps at the beginning of this topic (on page 182)</a>.</p>

Screen	Do This
	
You are ready to install	Select <b>Install</b> .

## Install Configuration Hub on Cluster Nodes

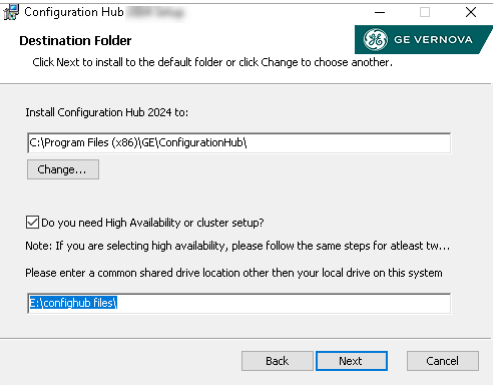
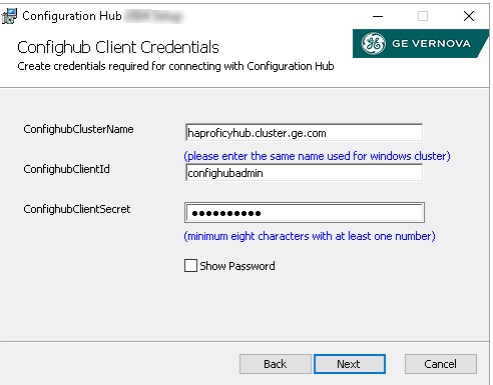
This topic describes how to install Configuration Hub in a high available environment.


Log in to a cluster node.

Follow these steps to install Configuration Hub on all the cluster nodes.

1. In the downloaded ISO files/folders, open the **ConfigHub** folder and run `ConfigHubInstaller.msi` to start Configuration Hub installation.  
The welcome screen appears.
2. Do the following:

Screen	Do This
Welcome	Select <b>Next</b> .
License agreement	<ol style="list-style-type: none"> <li>a. Select the <b>I accept the terms in the License Agreement</b> check box.</li> <li>b. Select <b>Next</b>.</li> </ol>

Screen	Do This
Destination Folder	<p>a. Proceed with the default install location, (or) select <b>Change...</b> to specify a different location path for installation.</p> <p>b. Select the <b>Do you need High Availability or cluster setup?</b> check box.</p> <p>c. Enter the location path for shared network folder.</p> <p>d. Select <b>Next</b>.</p> 
Port Information	Select <b>Next</b> .
Confighub Client Credentials	<p>a. Provide these values:</p> <ul style="list-style-type: none"> <li>▪ <b>ConfighubClusterName:</b> Enter the cluster client access point. For example, <code>haproficyhub.cluster.ge.com</code></li> <li>▪ <b>ConfighubClientId:</b> Enter the client ID to log in to the Configuration Hub application.</li> <li>▪ <b>ConfighubClientSecret:</b> Enter the secret password to authenticate the client for logging in to the Configuration Hub application.</li> </ul> <p>b. Select <b>Next</b>.</p> 

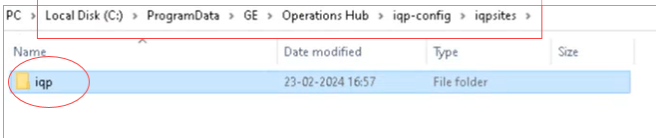
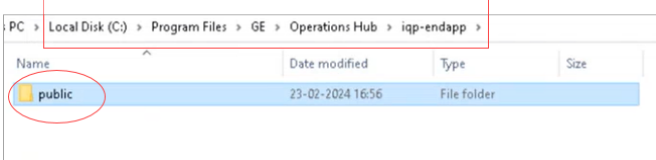
Screen	Do This
	<div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;">  <b>Note:</b>                      In a clustered environment, ensure that the client id and secret are identical across nodes (Node1 and Node2) to facilitate the application's access to shared resources.                 </div>
Ready to install Configuration Hub	Select <b>Install</b> .

## Set up Junction Links for Shared Folders

This topic describes how to create junction links to shared folders and provide easy access to shared resources in your failover cluster setup.

Repeat the steps in this topic on other nodes in the cluster where you want to create junction links for shared folders.

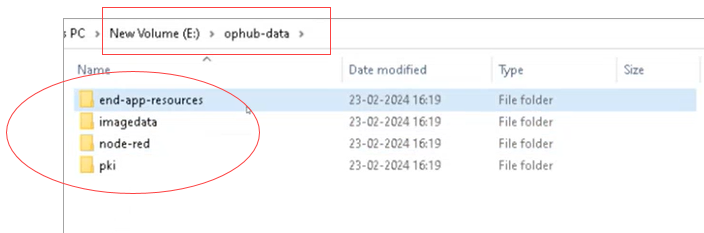
1. Log in to Node1 and make sure the shared drive is available on this server.
2. Navigate to the location described in the following table and create the respective folder structure.

Location	Create Folder Structure
C:\ProgramData\GE	Operations Hub\iqp-config\iqpsites\iqp 
C:\Program Files\GE	Operations Hub\iqp-endapp\public 


3. Create shared drive folders.

- a. Navigate to the shared drive (for example, E:).
- b. Create a top-level folder with any name. For example, `ophub-data`.
- c. In `ophub-data` folder, create the sub-folders (can be any name) described in the following table:

Create Sub-Folder	Purpose
<code>end-app-resources</code>	to store plug-ins
<code>imagedata</code>	to store image files
<code>node-red</code>	to store Node-RED application files
<code>pki</code>	to store trust certificates



4. Open Command Prompt as Administrator and run the following commands.

 **Note:**  
Make sure to replace the folder paths and names with your specific directory structure.

To link `end-app-resources` sub-folder:

```
mklink /J "C:\Program Files\GE\Operations Hub\iqp-endapp\public\custom" "E:\ophub-data\end-app-resources"
```

Link `imagedata` sub-folder:

```
mklink /J "C:\ProgramData\GE\Operations Hub\iqp-config\iqpsites\iqp\imagedata" "E:\ophub-data\imagedata"
```

Link `node-red` sub-folder:

```
mklink /J "C:\ProgramData\GE\Operations Hub\node-red" "E:\ophub-data\node-red"
```

Link `pki` sub-folder:

```
mklink /J "C:\ProgramData\GE\Operations Hub\pki" "E:\ophub-data\pki"
```

You have successfully created junction links between the local folders on Node1 and the corresponding folders on the shared drive.

```

Administrator: Command Prompt
Microsoft Windows [Version 10.0.20348.1970]
(c) Microsoft Corporation. All rights reserved.

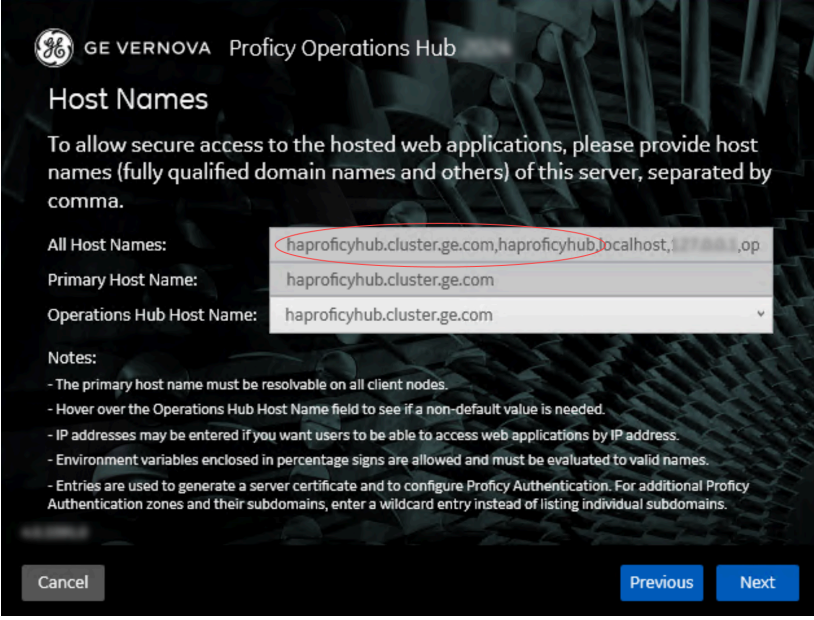

C:\Users\Administrator>mklink /J "C:\Program Files\GE\Operations Hub\lqp-endapp\public\custom" "E:\ophub-data\end-app-resources"
Junction created for C:\Program Files\GE\Operations Hub\lqp-endapp\public\custom <<====>> E:\ophub-data\end-app-resources
C:\Users\Administrator>mklink /J "C:\ProgramData\GE\Operations Hub\lqp-config\lqpsites\lqp\imagedata" "E:\ophub-data\imagedata"
Junction created for C:\ProgramData\GE\Operations Hub\lqp-config\lqpsites\lqp\imagedata <<====>> E:\ophub-data\imagedata
C:\Users\Administrator>mklink /J "C:\ProgramData\GE\Operations Hub\lqp\pk1" "E:\ophub-data\pk1"
Junction created for C:\ProgramData\GE\Operations Hub\lqp\pk1 <<====>> E:\ophub-data\pk1
C:\Users\Administrator>mklink /J "C:\ProgramData\GE\Operations Hub\node-red" "E:\ophub-data\node-red"
Junction created for C:\ProgramData\GE\Operations Hub\node-red <<====>> E:\ophub-data\node-red
C:\Users\Administrator>_
    
```

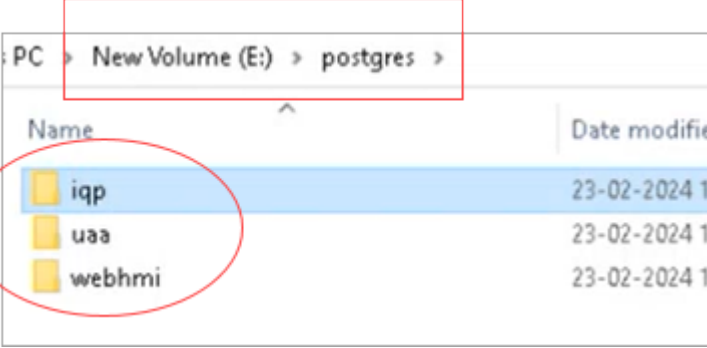
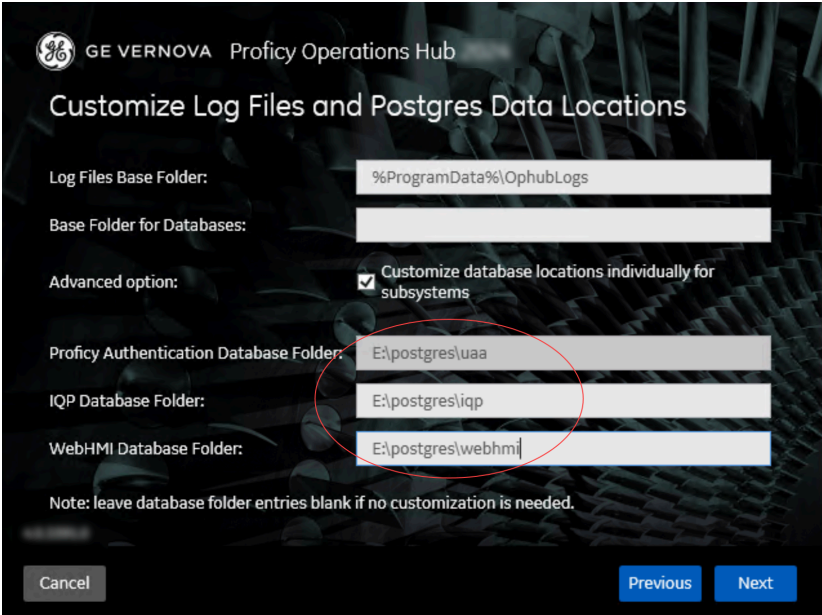
Log in to Node2 and repeat the steps to create junction links.

## Install Operations Hub on Cluster Nodes

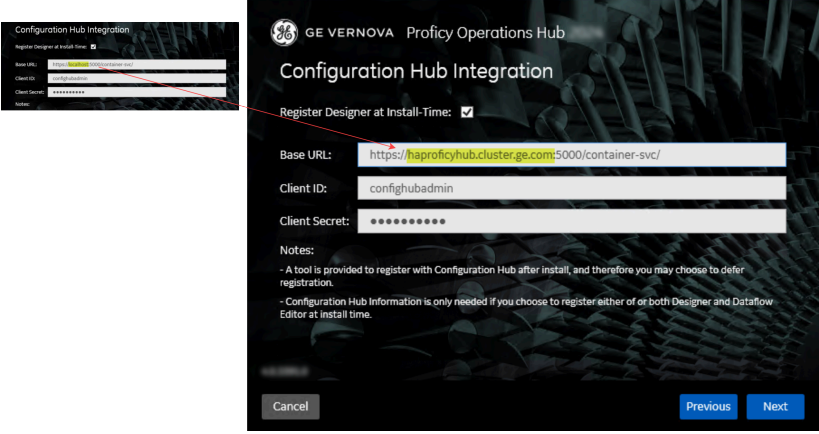
1. In the downloaded ISO files/folders, open the **OperationsHub** folder and run `ophub_bundle.exe` to start Operations Hub installation.  
The welcome screen appears.
2. Do the following:

Screen	Do This
Welcome	Select <b>Next</b> .
License agreement	<ol style="list-style-type: none"> <li>a. Select the <b>Accept</b> check box.</li> <li>b. Select <b>Next</b>.</li> </ol>
TCP port check	Select <b>Next</b> .
Host Names	Default values are populated. Make sure your cluster name reflects in the following fields: <ul style="list-style-type: none"> <li>◦ <b>All Host Names:</b> Enter the fully qualified domain name of the client access point, followed by the client access point itself, and then any additional hostname/s (see screenshot).</li> <li>◦ <b>Primary Host Name</b></li> </ul>

Screen	Do This
	
<p>Proficy Authentication Service</p>	<p>Default values are populated.</p> <p>Select <b>Next</b>.</p>
<p>Create Tenant Admin Account</p>	<p>Enter the following fields and select <b>Next</b>.</p> <ul style="list-style-type: none"> <li>◦ <b>User Id</b></li> <li>◦ <b>Password</b></li> <li>◦ <b>Re-enter Password</b></li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b></p> <p>In a clustered environment, ensure that the user id and password are identical across nodes (Node1 and Node2) to facilitate the application's access to shared resources.</p> </div>
<p>Customize Log Files and Postgres Data Locations</p>	<p>Under 'Advanced option', you need to enter the path to the shared drive folder. To do so, ensure/create this folder structure in your shared drive: (note that we already created the <code>Postgres &gt; uaa</code> structure in a previous step.)</p> <ul style="list-style-type: none"> <li>◦ Postgres             <ul style="list-style-type: none"> <li>▪ <code>iqp</code></li> <li>▪ <code>uaa</code></li> <li>▪ <code>webhmi</code></li> </ul> </li> </ul>

Screen	Do This
	 <p>Enter the location path as shown here:</p> 
<p>Install Dataflow Editor</p>	<p>If you want to install the Dataflow Editor tool along with Operations hub, provide details on this screen and select <b>Next</b>.</p>
<p>Configuration Hub Integration</p>	<p>Replace 'localhost' with your cluster's client access point name and select <b>Next</b>.</p>



Screen	Do This
	
You are ready to install	Select <b>Install</b> .

**Important:**

While the Operations Hub installation is in progress, do the following:

1. Access the Windows temporary files folder.

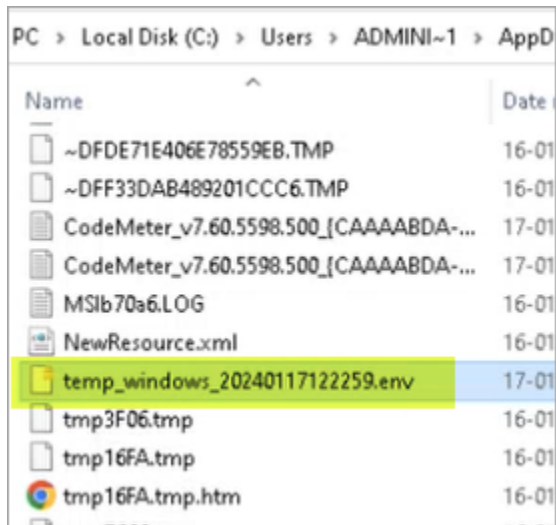
Open the **Run** dialog, type `%temp%` and press ENTER on your keyboard.

2. Locate and copy the `temp_windows_<timestamp>.env` file.
3. Save the copied file to a different location.

**Important:**

Do not store the `.env` file on the nodes servers. Consider storing the file on a dedicated Secret Manager server, which is isolated and configured to communicate only with the cluster nodes.

This temporary file contains installation parameter values, including auto-generated ones, which are crucial for installing Operations Hub on Node2.



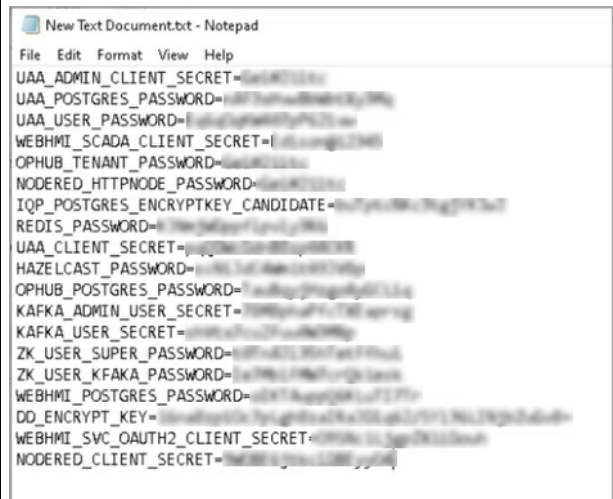
Open (preserved temporary file) `temp_windows_<timestamp>.env` in a text editor, and extract the following information.



**Tip:**

Within the temporary file, search and retain the following data (and their unique values). Remove all other data.

- UAA\_ADMIN\_CLIENT\_SECRET
- UAA\_POSTGRES\_PASSWORD
- UAA\_USER\_PASSWORD
- OPHUB\_TENANT\_PASSWORD
- NODERED\_HTTPNODE\_PASSWORD
- CH\_CLIENT\_AUTH
- UAA\_ZONE\_URL
- PASSWORD\_ENV\_VARIABLE
- IQP\_POSTGRES\_ENCRYPTKEY\_CANDIDATE
- REDIS\_PASSWORD
- UAA\_CLIENT\_SECRET
- HAZELCAST\_PASSWORD
- OPHUB\_POSTGRES\_PASSWORD
- KAFKA\_ADMIN\_USER\_SECRET
- KAFKA\_USER\_SECRET
- ZK\_USER\_SUPER\_PASSWORD
- ZK\_USER\_KFAKA\_PASSWORD



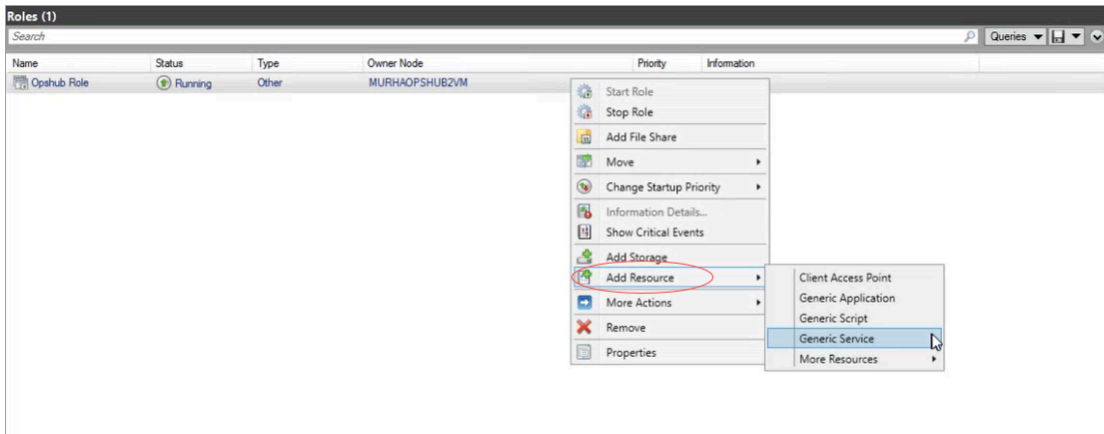
<ul style="list-style-type: none"> <li>• WEBHMI_POSTGRES_PASSWORD</li> <li>• DD_ENCRYPT_KEY</li> <li>• WEBHMI_SVC_OAUTH2_CLIENT_SECRET</li> <li>• NODERED_CLIENT_SECRET</li> </ul>	
--	--

We shall pass the information variables as command line arguments when executing Operations Hub installation on Node2.

## Add a Generic Service

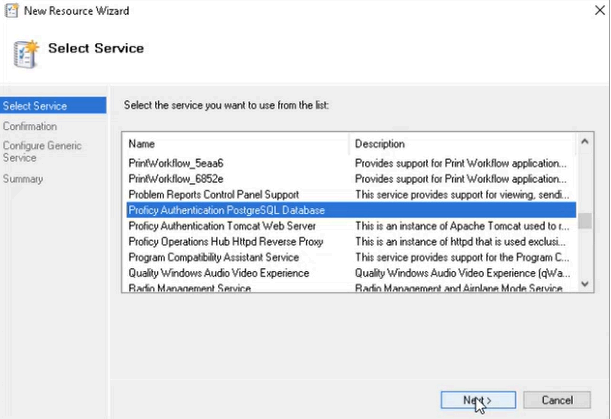
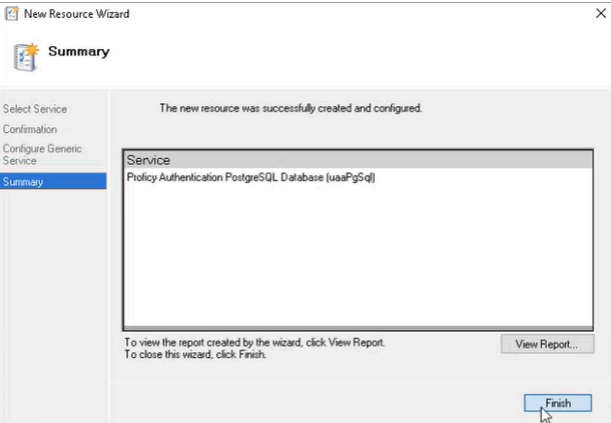
Follow the steps to add the generic services one by one to a role.

1. In Failover Cluster Manager, right-click `Opshub Role` (renamed empty role) and select **Add Resource > Generic Service**.



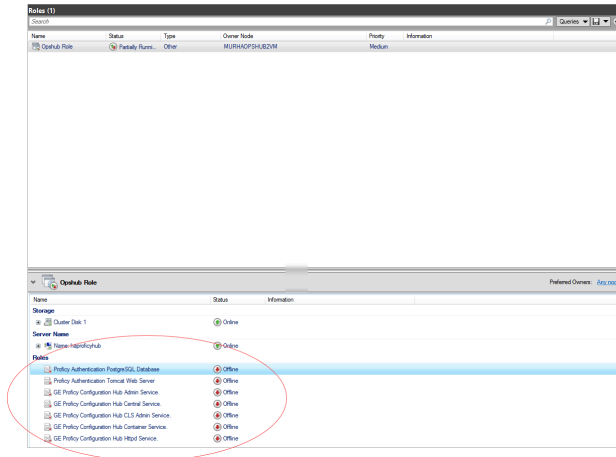
2. Complete **New Resource Wizard** with the following options:

Section	What To Do
Select Service	In the services list, select the service.

Section	What To Do
	 <p>See the list of generic services to add for Proficy Authentication and Configuration Hub <i>(on page 197)</i>.</p> <p>See the list of generic services to add for Operations Hub <i>(on page 197)</i>.</p>
Confirmation	Skip to the next section.
Configure Generic Service	Skip to the next section.
Summary	<p>Select <b>Finish</b>.</p> 

3. Repeat steps 1-2 to add all the other services in a similar manner.

As you add services one by one to the role, they appear in the bottom pane:



### Generic Services for Proficy Authentication and Configuration Hub:

- Proficy Authentication PostgreSQL Database
- Proficy Authentication Tomcat Web Server
- ConfighubAdminService
- ConfighubHttpdService
- ConfighubContainerService

### Generic Services for Operations Hub:

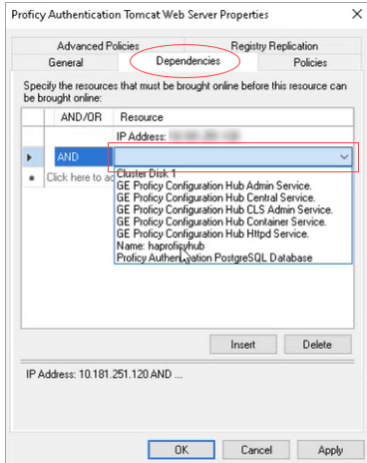
- Operations Hub IQP PostgreSQL Database
- Operations Hub IQP Tomcat Web Server
- Operations Hub Node Red service
- Operations Hub WebHMI PostgreSQL Database
- Operations Hub WebHMI Tomcat Web Server
- Operations Hub WebHMI Data Distributor
- Operations Hub IQP EndApp
- Operations Hub OPC UA Browse Service

## Configure Dependencies for Services

### Add a Generic Service *(on page 195)*

When you configure dependencies for a failover cluster role, you are essentially specifying the order in which resources (including generic services) should start and stop.

1. In Failover Cluster Manager, go to the list of generic services added to the role.
2. Right-click a generic service and select **Properties**.  
The properties screen for that service appears.
3. On the **Dependencies** tab, select a row and choose from a drop-down list of values.



4. Add all dependencies for the respective generic service in the prescribed order.

Refer to the [list of dependencies to add for Proficy Authentication and Configuration Hub \(on page 198\)](#).

Refer to the [list of dependencies to add for Operations Hub \(on page 199\)](#).

5. Select **Apply** > **OK** to save and exit.



6. Repeat steps 1-5 to add dependencies for all the other services in a similar manner.

**Dependencies for Proficy Authentication and Configuration Hub Services:**

Generic Service	Add Dependencies
Proficy Authentication PostgreSQL Database	a. <IP Address> b. <hostname>

Generic Service	Add Dependencies
Proficiency Authentication Tomcat Web Server	a. <IP Address> b. <hostname> c. Proficiency Authentication PostgreSQL Database
ConfighubAdminService	a. <IP Address> b. <hostname>
ConfighubHttpdService	a. <IP Address> b. <hostname>
ConfighubContainerService	a. <IP Address> b. <hostname>

**Dependencies for Operations Hub Services:**

Generic Service	Add Dependencies
Operations Hub IQP PostgreSQL Database	a. <IP Address> b. <hostname>
Operations Hub IQP Tomcat Web Server	a. <IP Address> b. <hostname> c. Operations Hub IQP PostgreSQL Database
Operations Hub Node Red service	a. <IP Address> b. <hostname>
Operations Hub WebHMI PostgreSQL Database	a. <IP Address> b. <hostname>
Operations Hub WebHMI Tomcat Web Server	a. <IP Address> b. <hostname> c. Operations Hub WebHMI PostgreSQL Database
Operations Hub WebHMI Data Distributor	a. <IP Address> b. <hostname>
Operations Hub IQP EndApp	a. <IP Address> b. <hostname>
Operations Hub OPC UA Browse Service	a. <IP Address> b. <hostname>

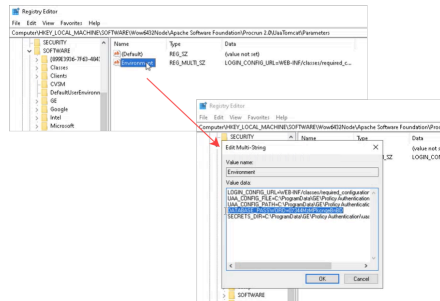
## Replicate Cluster Nodes for Proficiency Authentication and Configuration Hub

This topic describes how to replicate nodes for Proficiency Authentication and Configuration Hub in a failover setup.

In a failover setup, you have to create and maintain identical instances of a computing node. These steps ensure that if the primary node fails, the replica (duplicate node/s) is ready to take over.

### Copy/Paste Database Password from Latest to Previous Installation:

1. Copy DATABASE\_PASSWORD key value from the latest installation.
  - a. Log in to the node (in a cluster) where the latest Operations Hub installation was performed.  
In our example scenario, it is Node2.
  - b. Open Registry Editor.  
On the Windows taskbar, type `regedit` in the search box, then select Registry Editor (Desktop app) from the results.
  - c. Navigate to `Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Apache Software Foundation\Procrun 2.0\UaaTomcat\Parameters`.
  - d. Open the **Environment** key.
  - e. Copy the **DATABASE\_PASSWORD** value.



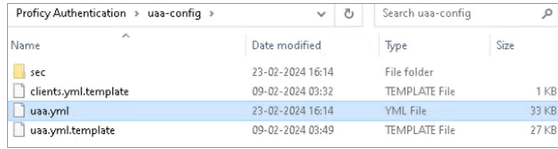
2. Paste DATABASE\_PASSWORD key value to a previous installation.
  - a. Log in to the node (in a cluster) where you performed the first installation of Operations Hub.  
In our example scenario, it is Node1.
  - b. Repeat steps 1-b, 1-c, and 1-d.
  - c. Paste the **DATABASE\_PASSWORD** value to overwrite the existing value.

### Copy/Paste UAA.yaml from Latest to Previous Installation:



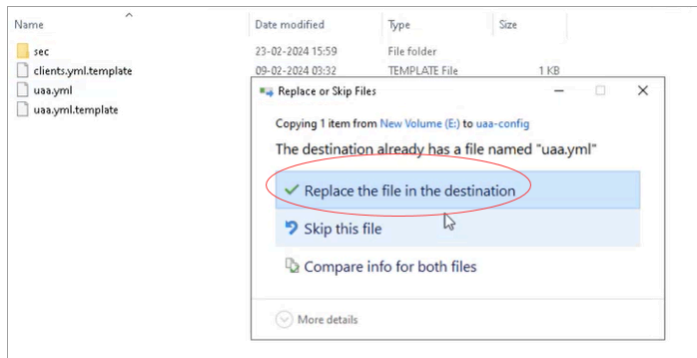
3. Copy the `UAA.yaml` file from the latest installation.

- a. On Node2, navigate to `C:\ProgramData\GE\Proficy Authentication\uaa-config`.
- b. Copy the `UAA.yaml` file.



4. Overwrite the `UAA.yaml` file in the previous installation.

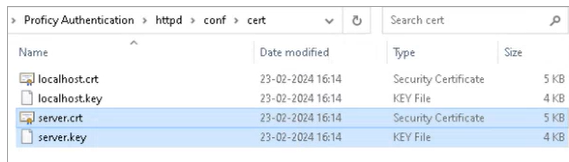
- a. On Node1, navigate to `C:\ProgramData\GE\Proficy Authentication\uaa-config`.
- b. Paste the `UAA.yaml` file copied from Node2.



**Copy/Paste Security Certificates from Latest to Previous Installation:**

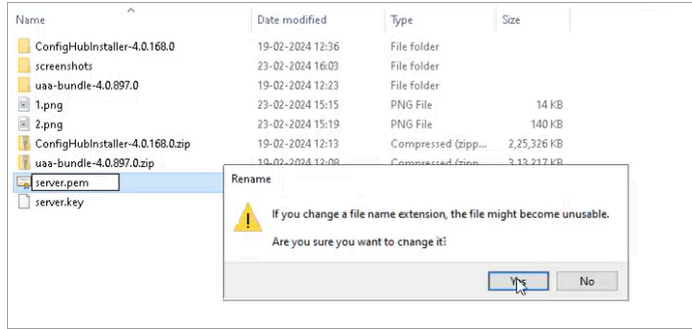
5. Copy the security certificates from the latest installation.

- a. On Node2, navigate to `C:\Program Files\GE\Proficy Authentication\httpd\conf\cert`.
- b. Copy the `server.crt` and `server.key` files.

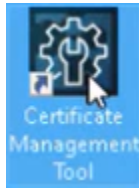


6. Overwrite the security certificates in the previous installation.

- a. On Node1, navigate to `C:\Program Files\GE\Proficy Authentication\httpd\conf\cert`.
- b. Paste the `server.crt` and `server.key` files copied from Node2.
- c. After copying the certificates (to Node1), change `server.crt` file extension to `server.pem`.

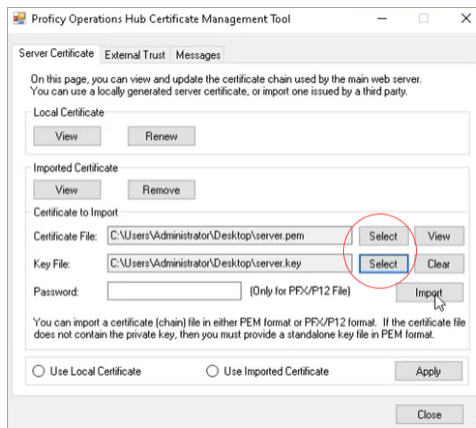


d. On Node1, open **Certificate Management Tool** from the desktop shortcut.



Update the following field values as described:

<b>Certificate File</b>	Select the <code>server.pem</code> file created in the earlier step (refer to step 6-c).
<b>Key File</b>	Select the <code>server.key</code> file.



e. Select **Import** to import the files.

f. Select **Close** to exit.

## Replicate Cluster Nodes for Operations Hub

This topic describes how to replicate nodes for Operations Hub in a failover setup.

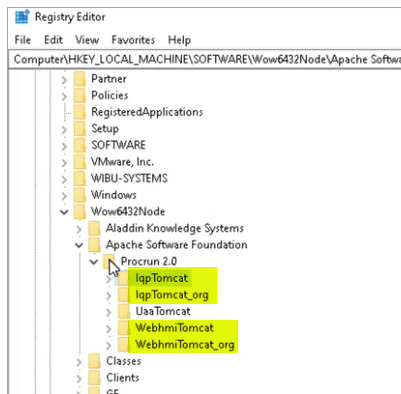
In a failover setup, you have to create and maintain identical instances of a computing node. These steps ensure that if the primary node fails, the replica (duplicate node/s) is ready to take over. In the following steps, nodes are synchronized.

1. Repeat all the steps described in this topic: [Replicate Cluster Nodes for Proficy Authentication and Configuration Hub \(on page 200\)](#).

### Export/Import Registry Files from Latest to Previous Installation:

2. Export `IqpTomcat` and `WebhmiTomcat` registry files from the latest installation (Node2).
  - a. Navigate to `Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Apache Software Foundation\Procrun 2.0\IqpTomcat`.
  - b. Right-click `IqpTomcat`, select **Export** and save on Node2.
  - c. Navigate to `Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Apache Software Foundation\Procrun 2.0\WebhmiTomcat`.
  - d. Right-click `WebhmiTomcat`, select **Export** and save on Node2.
3. Import `IqpTomcat` and `WebhmiTomcat` registry files to the previous installation (Node1).
  - a. Navigate to `Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Apache Software Foundation\Procrun 2.0\IqpTomcat`.
  - b. Right-click `IqpTomcat`, select **Rename** and save as `IqpTomcat_org`.
  - c. Navigate to `Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Apache Software Foundation\Procrun 2.0\WebhmiTomcat`.
  - d. Right-click `WebhmiTomcat`, select **Rename** and save as `WebhmiTomcat_org`.
  - e. Copy the exported `IqpTomcat` and `WebhmiTomcat` registry files from Node2 to the Node1 server.

f. Double-click and add both the registry files on Node1.



**Copy/Paste Hazelcast Password from `IqpTomcat_org` to `IqpTomcat`:**

4. Copy HAZELCAST\_PASSWORD key value from (renamed) `IqpTomcat_org`.
  - a. On Node1 registry editor, navigate to `Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Apache Software Foundation\Procrun 2.0\IqpTomcat_Org\Parameters`.
  - b. Open the **Environment** key.
  - c. Copy the **HAZELCAST\_PASSWORD** value.
5. Paste HAZELCAST\_PASSWORD key value to `IqpTomcat`.
  - a. On Node1 registry editor, navigate to `Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Apache Software Foundation\Procrun 2.0\IqpTomcat\Parameters`.
  - b. Paste the **HAZELCAST\_PASSWORD** value to overwrite the existing value.

## Upgrade to Operations Hub SIM in a High-Availability Cluster

This topic describes how to apply SIM upgrades to the existing version in a highly available server.

See [Set up a High Availability Cluster \(on page 158\)](#).

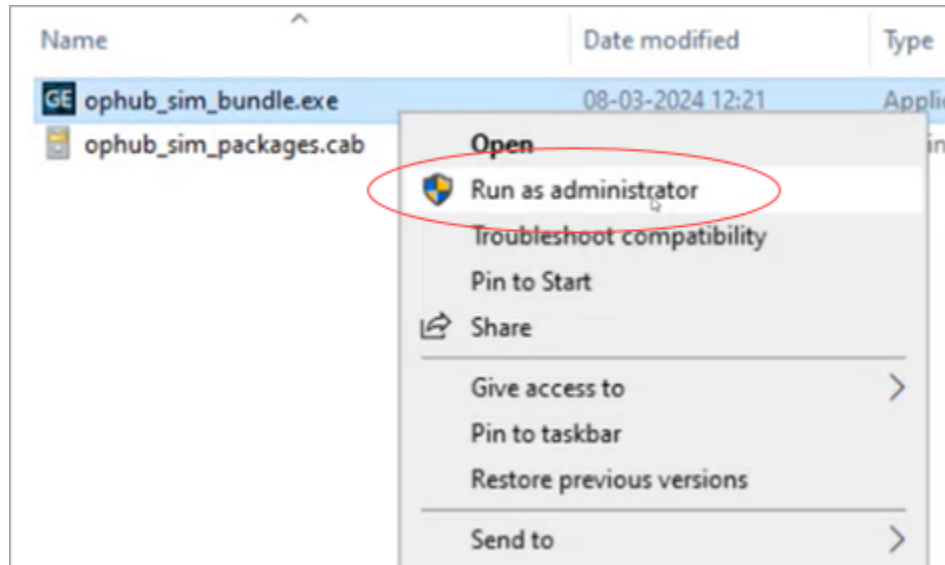
Download the Operations Hub SIM installer package from Salesforce.

1. On the Node1 server, launch Windows Failover Cluster Manager.
 

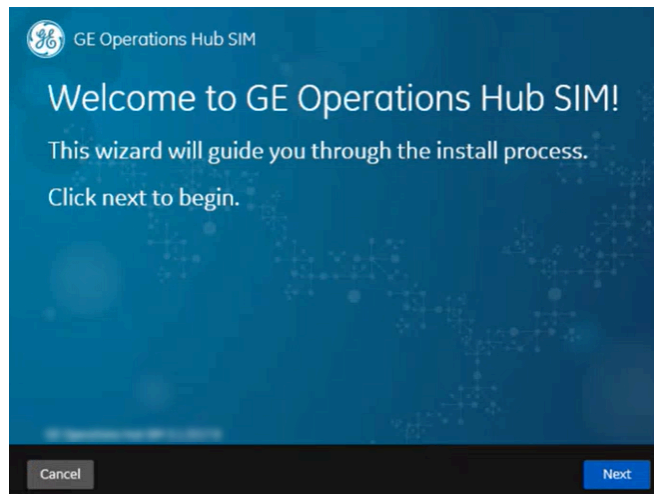
Ensure that:

  - Node1 is **Active**
  - Node2 is **Paused**
2. Install the SIM package on Node1.

- a. Run the executable file as an administrator to start Operations Hub SIM installation.



- b. Navigate the wizard to begin the installation process.



3. After successful installation on Node1, move the cluster to Node2 in Windows Failover Cluster Manager.
- Ensure that:
- Node1 is **Paused**
  - Node2 is **Active**
4. Install the SIM package on Node2.  
Repeat step 2 on the Node2 machine.
5. After successful installation on Node2, restart both Node1 and Node2 servers to apply changes.
6. Verify that you can successfully log in to Operations Hub on both nodes.

## Upgrade to Operations Hub New Release in a High-Availability Cluster

This topic describes how to upgrade to a new version of Operations Hub in a highly available server.

See [Set up a High Availability Cluster \(on page 158\)](#).

Download the latest Operations Hub ISO installation media from Salesforce. Then mount the file and place the files and folders in a shared drive accessible to the nodes in a cluster.

1. On the Node1 server, launch Windows Failover Cluster Manager.

Ensure that:

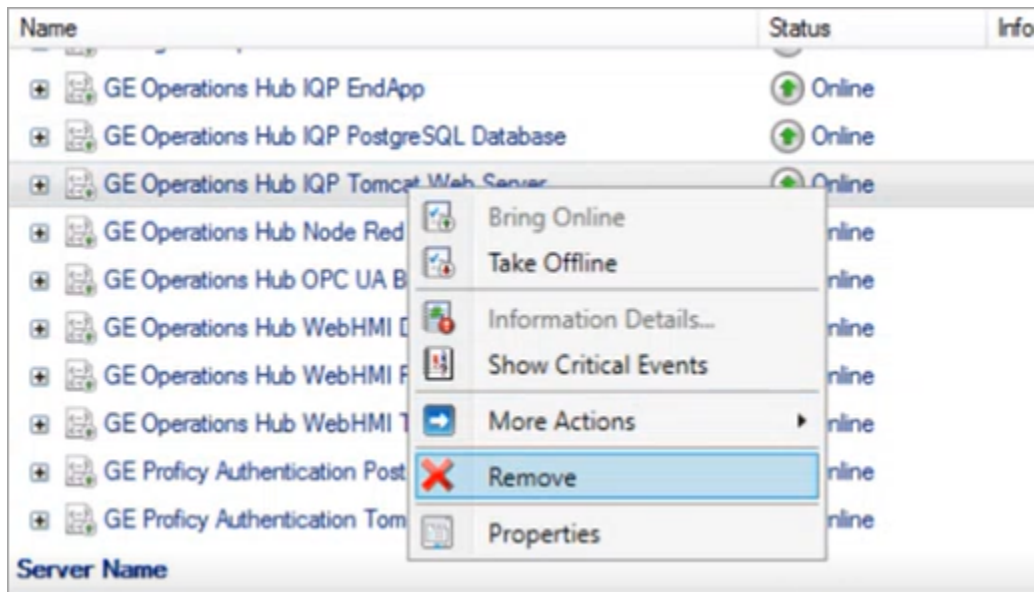
- Node1 is **Active**
  - Node2 is **Paused**
2. Remove services from failover role.

- a. In Failover Cluster Manager, navigate to **Roles > Ophub Role**.

Refer to [Configure Role \(on page 177\)](#).

The list of services added to the role are displayed.

- b. Right-click on a service, select **Remove**, and repeat this step for all services to remove them.

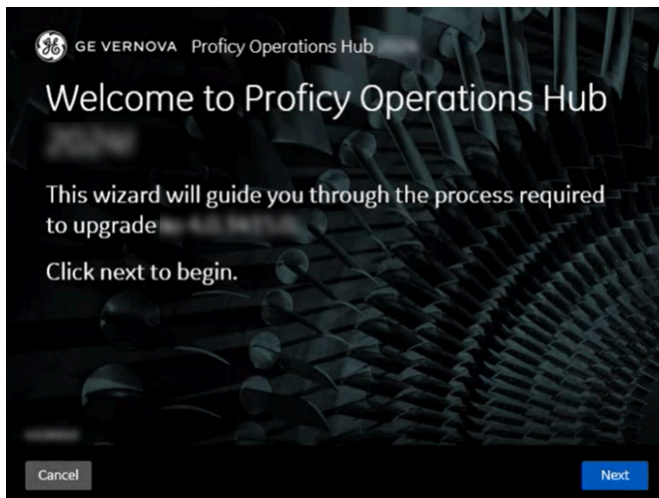


3. Open the Windows Services Management Console and configure the services as follows:

Startup Type > <b>Automatic</b>	Proficy Operations Hub Master Control
---------------------------------	---------------------------------------

Startup Type > <b>Manual</b>	<ul style="list-style-type: none"> <li>◦ Proficity Operations Hub IQP Provisioner</li> <li>◦ Proficity Operations Hub UAA Provisioner Service</li> </ul>
Status > <b>Start</b>	<p>Verify all these services are running:</p> <ul style="list-style-type: none"> <li>◦ Proficity Operations Hub Master Control</li> <li>◦ Operations Hub IQP PostgreSQL Database</li> <li>◦ Operations Hub IQP Tomcat Web Server</li> <li>◦ Operations Hub Node Red service</li> <li>◦ Operations Hub WebHMI PostgreSQL Database</li> <li>◦ Operations Hub WebHMI Tomcat Web Server</li> <li>◦ Operations Hub WebHMI Data Distributor</li> <li>◦ Operations Hub IQP EndApp</li> <li>◦ Operations Hub OPC UA Browse Service</li> <li>◦ Proficity Authentication PostgreSQL Database</li> <li>◦ Proficity Authentication Tomcat Web Server</li> <li>◦ ConfighubAdminService</li> <li>◦ ConfighubHttpdService</li> <li>◦ ConfighubContainerService</li> </ul>

4. On Node1, upgrade your existing Operations Hub installation to the latest version.
  - a. Run the executable file as an administrator to upgrade Operations Hub.
  - b. Navigate the wizard, proceed with default values to begin the installation upgrade process.



5. After successful installation, open the Windows Services Management Console and configure the services as follows:

Startup Type > <b>Disable</b>	<ul style="list-style-type: none"> <li>◦ Proficy Operations Hub Master Control</li> <li>◦ Proficy Operations Hub IQP Provisioner</li> <li>◦ Proficy Operations Hub UAA Provisioner Service</li> </ul>
Status > <b>Stop</b>	<ul style="list-style-type: none"> <li>◦ Proficy Operations Hub Master Control</li> <li>◦ Proficy Authentication Tomcat Web Server</li> </ul>

6. Move the cluster to Node2 in Windows Failover Cluster Manager.

Ensure that:

- Node1 is **Paused**
- Node2 is **Active**

7. Repeat steps 3-5 on Node2 machine.

8. Add Proficy Authentication, Configuration Hub, and Operations Hub generic services and their dependencies to failover role.

Refer to [Add a Generic Service \(on page 195\)](#) and [Configure Dependencies for Services \(on page 197\)](#).

9. [Replicate Cluster Nodes for Operations Hub \(on page 202\)](#).

10. On both Node1 and Node2, ensure that the following service is configured as follows:

Startup Type > <b>Automatic</b>	Operations Hub Httpd Service
Status > <b>Start</b>	

11. Restart both Node1 and Node2 machines to apply changes.

12. Verify that you can successfully log in to Operations Hub (classic and new layout) on both nodes.

## Perform Backup and Restore in a High-Availability Cluster

This topic describes the process of creating a backup of a database and restoring it on a server that is highly available.

The backup or restore process must be executed on the **Active** node, making sure to include all necessary data and configurations in the backup.

### Create a Backup:

1. On the Node1 server, launch Windows Failover Cluster Manager.

Ensure that:



- Node1 is **Active**
  - Node2 is **Paused**
2. Update the `pg_ident.conf` file in all three database folders.

- a. Access the shared drive in your clustered environment, where the database folders are located.



- b. Go to each folder and open `pg_ident.conf` in a text editor.

Location path:

- `iqp > data-v13 > pg_ident.conf`
- `uaa > data-v13 > pg_ident.conf`
- `webhmi > data-v13 > pg_ident.conf`

- c. Add both nodes as shown in the following screenshot. Save and close the file.

The `pg_ident.conf` file initially contains only one entry for the node where the last installation was performed.

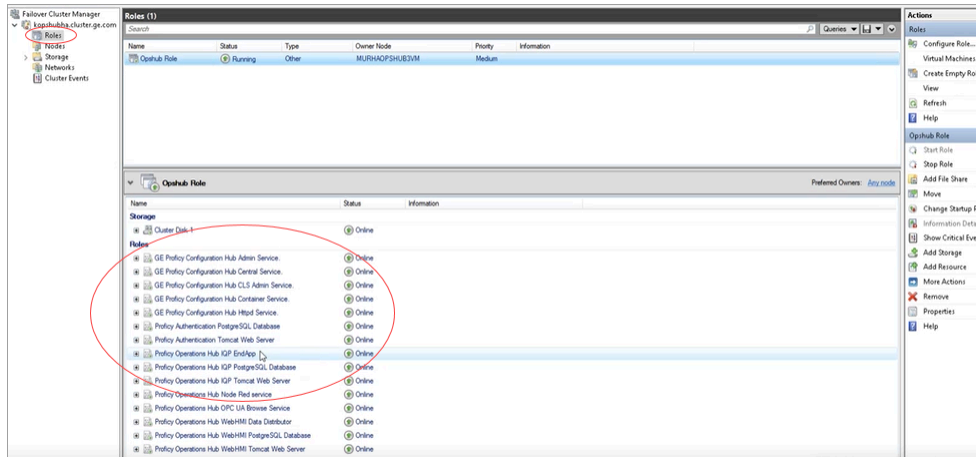
```

pg_ident.conf - Notepad
File Edit Format View Help
# will be substituted for \1 (backslash-one) if present in
# PG-USERNAME.
#
# Multiple maps may be specified in this file and used by pg_hba.conf.
#
# No map names are defined in the default configuration. If all
# system user names and PostgreSQL user names are the same, you don't
# need anything in this file.
#
# This file is read on server startup and when the postmaster receives
# a SIGHUP signal. If you edit the file on a running system, you have
# to SIGHUP the postmaster for the changes to take effect. You can
# use "pg_ctl reload" to do that.
#
# Put your actual configuration here
#-----
# MAPNAME      SYSTEM-USERNAME    PG-USERNAME
ophub_map "SYSTEM\NT AUTHORITY" postgres
ophub_map Administrator@MURHAOPSHUB3VM postgres
ophub_map Administrator@MURHAOPSHUB4VM postgres

```

3. In Windows Failover Cluster Manager, right-click on each service (listed below) and select **Take Offline**.

- Operations Hub IQP Tomcat Web Server
- Operations Hub WebHMI Tomcat Web Server
- Operations Hub WebHMI Data Distributor
- Operations Hub IQP EndApp
- Operations Hub OPC UA Browse Service



4. Run the backup script.

See [Back Up the Operations Hub Database \(on page 78\)](#).

5. To bring the services online, right-click on each service (listed below) and select **Bring Online**.

- Operations Hub IQP Tomcat Web Server
- Operations Hub WebHMI Tomcat Web Server
- Operations Hub WebHMI Data Distributor
- Operations Hub IQP EndApp
- Operations Hub OPC UA Browse Service

**Restore a Database:**

6. On the server you want to restore the Operations Hub database, repeat steps 1-3.

7. Run the restore script.

See [Restore the Operations Hub Database \(on page 78\)](#).

8. Repeat step 5 to bring services online.

## Configure OPC UA in a High-Availability Cluster

This topic describes how to set up OPC UA servers or clients to operate in a clustered environment.

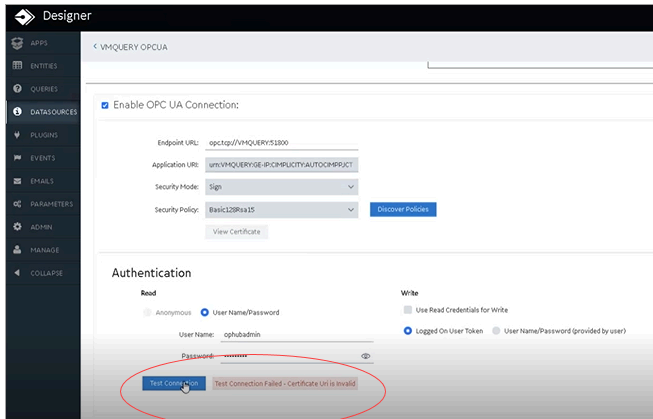
1. Log in to Operations Hub (Node1 or Node2) and create a data source with OPC UA configuration. For steps to create a data source, refer to [Add a Data Source with OPC UA Configuration \(Classic\) \(on page 429\)](#).

2. Open Windows Failover Cluster Manager and switch to the other node in the cluster.

3. Log in to Operations Hub (on the other node) and open the data source created in step 1.

4. Select **Test Connection**.

A message appears indicating that the test connection has failed.



In the next steps we shall fix the issue with connection failure.

5. On the node that is currently active, navigate to `C:\Program Files\GE\Operations Hub\BrowseService`.
6. Locate and open the `ServerConfig.xml` file in a text editor.
7. Search for the term `[NodeName]` and replace (along with the parenthesis) all the instances (ignore instances within comments) with the name of the Node, where OPC UA was initially configured (the Node in step 1).

```

<!--Settings for the thread pools used in the server application-->
<ThreadPoolSettings>
  <MinSizeTransactionManager>1</MinSizeTransactionManager>
  <MaxSizeTransactionManager>10</MaxSizeTransactionManager>
  <MinSizeSubscriptionManager>1</MinSizeSubscriptionManager>
  <MaxSizeSubscriptionManager>10</MaxSizeSubscriptionManager>
</ThreadPoolSettings>
<!--Build information for the server application software-->
<ProductUri>urn:ge.com:ifix:UAServer</ProductUri>
<ManufacturerName>GE Digital</ManufacturerName>
<ProductName>ifix UA Server</ProductName>
<SoftwareVersion>6.1.0</SoftwareVersion>
<BuildNumber>100</BuildNumber>
<!--Build information end-->
<!--Server instance information defined for the server installation.
[NodeName] can be used as placeholder for the computer name. -->
<ServerUri>urn:MURHAOPSHUB3VM:proficy:webmi:dataservices</ServerUri>
<ServerName>OPSHUBMURHAOPSHUB3VM</ServerName>
<!--Server instance information end-->
<!--Configuration for supported user identity tokens-->
<UserIdentityTokens>
  <!--Enable anonymous login true/false-->
  <EnableAnonymous>true</EnableAnonymous>
  <!--Enable user/password login true/false-->
  <EnableUserPw>true</EnableUserPw>
  <!--Enable certificate based user login true/false-->
  <EnableCertificate>false</EnableCertificate>
  <!--The security policy to use when encrypting or signing the UserIdentityToken when it is passed to the server.
This security policy is only applied for None Endpoints. For other Endpoints we use the security policy of the Endpoint.-->
  <SecurityPolicy>http://opcfoundation.org/UA/SecurityPolicy#Basic256Sha256</SecurityPolicy>
  <!--Configuration for file based certificate store to handle user certificates.-->
  <DefaultUserCertificateStore>
    <CertificateTrustListLocation>C:\ProgramData\GE\Operations Hub\pki\trusted\certs</CertificateTrustListLocation>
    <CertificateRevocationListLocation>C:\ProgramData\GE\Operations Hub\pki\trusted\crl</CertificateRevocationListLocation>
    <IssuersCertificatesLocation>C:\ProgramData\GE\Operations Hub\pki\issuers\certs</IssuersCertificatesLocation>
    <IssuersRevocationListLocation>C:\ProgramData\GE\Operations Hub\pki\issuers\crl</IssuersRevocationListLocation>
  </DefaultUserCertificateStore>

```

8. Save and close the `ServerConfig.xml` file.
9. Open the Windows Services Management Console and restart `Proficy Operations Hub OPC UA Browse Service`.
10. Open the data source created with OPC UA configuration again and test the connection.

# Chapter 3. User Guide

## Overview

### Overview of Operations Hub

Operations Hub is an end-to-end solution for developing, managing, and delivering applications to leverage the capabilities of big data analytics and the internet of things.

Using Operations Hub, you can create applications that will collect and analyze data from a machine or a server, and trigger actions based on certain events.

Operations Hub provides you with a user-friendly interface to create components of an application such as [queries \(on page 314\)](#), [database tables \(on page 292\)](#) (called entities), [events \(on page 362\)](#), [email templates \(on page 372\)](#), [users \(on page 384\)](#), and so on without the need to use your programming skills. You can also design pages and dashboards using these components.

Advantages of using Operations Hub:

- Operations Hub is quick, easy, and cost-effective. You do not need programming skills to develop an application.
- The Operations Hub applications use HTML5 and CSS3, and hence, they are platform-independent.
- You can access an application using a computer or a mobile device.
- You can provide controlled access to an application and data based on user roles.
- You can create entities and queries for a relational database.



**Note:**

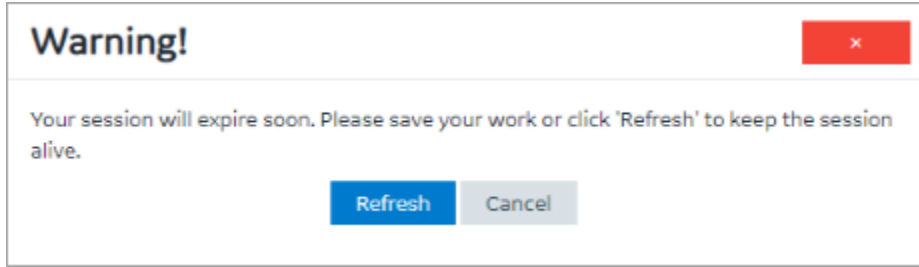
If you have installed only the Operations Hub add-on for Historian, you cannot create, modify, or delete an application or a component of an application. You can only access the Historian analysis application.

## Refresh Session Timeout

Refresh the session to reset its expiration time.

Operations Hub login session expires based on the [configured timeout settings \(on page 85\)](#). When the session is close to expiration, an alert appears requesting to save your work.

Select **Refresh** to reset the session timeout settings, and continue with your work.



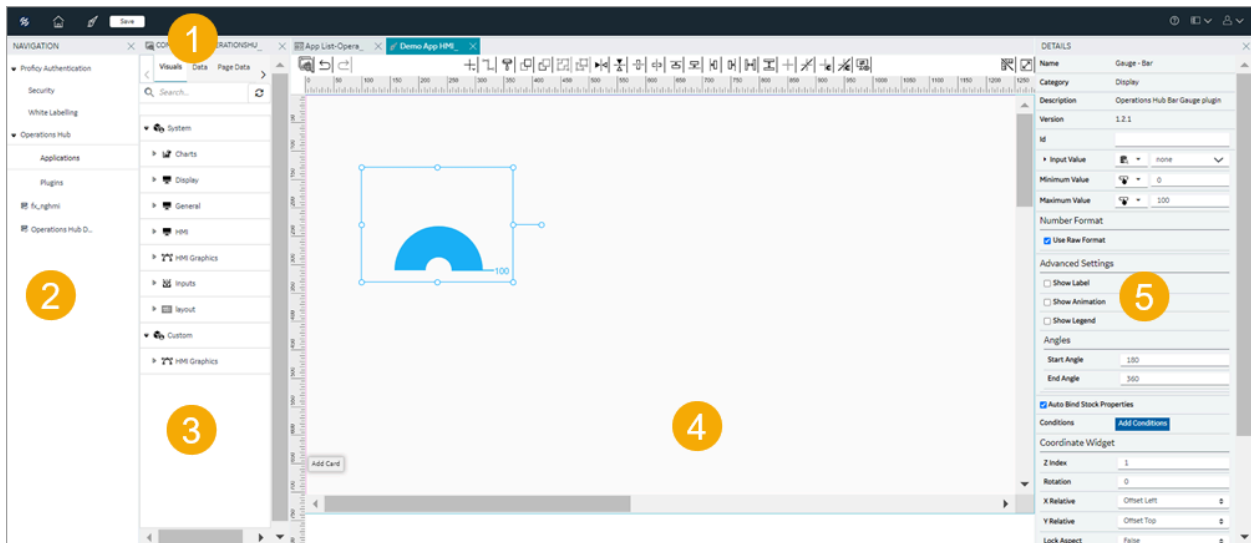
The session expires if the warning is left unacknowledged. You must log back in to Operations Hub to start a new session, and resume your work. Any unsaved work prior to a session timeout will be lost.

## Operations Hub (New Layout)

### Panels Layout

This topic provides an overview of the latest Operations Hub application layout.

Log in to the latest version of Operations Hub via Configuration Hub and access the Operations Hub home page. The following screen provides an overview of all the panels that appear in the Operations Hub new layout.









1	Toolbar Menu <i>(on page 214)</i>
2	Navigation Panel <i>(on page 214)</i>
3	Components Panel <i>(on page 218)</i>
4	Display Panel <i>(on page 231)</i>

5

[Details Panel \(on page 236\)](#)

## Toolbar Menu

The toolbar contains the following menus:

	Select this icon to reload the application.
	Select this icon to work in the configuration mode, wherein you are connected to the Configuration Hub navigation panel.
	Select this icon to work in the Operations Hub designer mode. The Configuration Hub navigation panel is disconnected to allow more work area for Operations Hub designer.
Save	The <b>Save</b> button on the toolbar is highlighted whenever you modify settings.
	Select this icon to access Operations Hub online documentation.
	Select the icon to open/close <b>Navigation</b> and <b>Details</b> panels for a clutter-free workspace.
	Select this icon to logout of the application.

## Navigation Panel

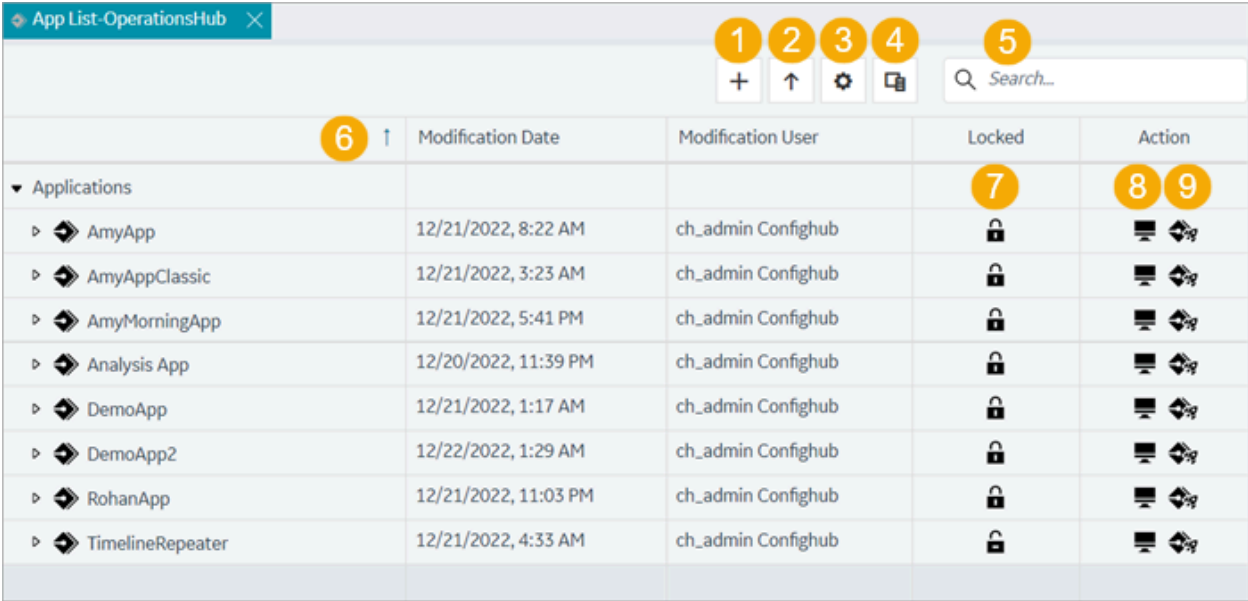
This topic provides an overview of the navigation panel from Configuration Hub in the Operations Hub new layout.

On this panel, you can navigate to other Proficy applications installed within your Configuration Hub environment. Under Operations Hub, you have access to the following areas:

- [Applications \(on page 214\)](#)
- [Plug-ins \(on page 217\)](#)

## Applications


On the applications homepage, you can perform tasks as described in the following table.



1	Creates a new application.
2	<p>Imports application and pages.</p> <p>Refer to these topics for step-by-step instructions:</p> <ul style="list-style-type: none"> <li>• <a href="#">Import an Application (on page 278)</a></li> <li>• <a href="#">Import a Page (on page 465)</a></li> </ul>
3	<p>Allows to perform the following actions:</p> <ul style="list-style-type: none"> <li>• <b>App Actions:</b> A selection check box appears next to the applications and allows to perform related operations.</li> <li>• <b>Page Actions:</b> A selection check box appears next to the pages and allows to perform page related operations. You must select the app to show page check box.</li> <li>• <b>Clear:</b> Clears all selection check boxes.</li> </ul>
4	<p>Opens a <b>Column Chooser</b> dialog. Select the check box for the columns you want to show on the applications homepage. To hide columns, clear the respective check box.</p> <ul style="list-style-type: none"> <li>• <b>Description:</b> Displays a column that contains a brief description of each app/page.</li> <li>• <b>Creation Date:</b> Displays a column that tracks the date and time when the app/page was originally created in Operations Hub.</li> </ul>

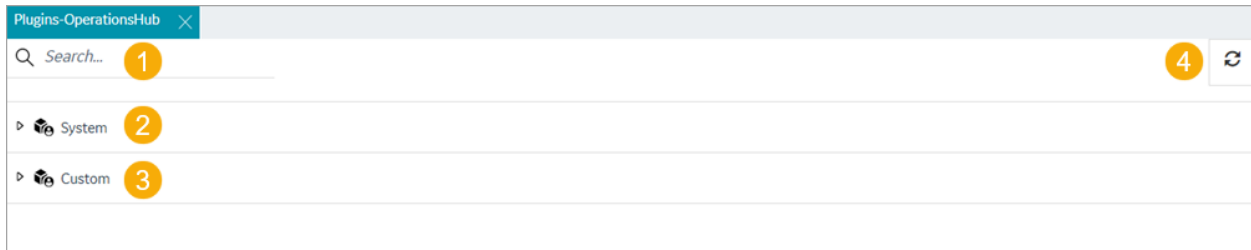
	<ul style="list-style-type: none"> <li>• <b>Creation User:</b> Displays a column that contains the user ID who initially created the app/page.</li> <li>• <b>Modification Date:</b> Displays a column that tracks the date and time when the app/page was last modified.</li> <li>• <b>Modification User:</b> Displays a column that contains the user ID who last modified the app/page.</li> <li>• <b>Locked:</b> Displays a column that contains a lock/unlock status to indicate the editing status for the app.</li> <li>• <b>Navigation Order:</b> Displays a column that contains a numerical value representing the order in which the pages are navigated.</li> </ul> <p>By default, application pages are sorted alphabetically on page load. To sort pages by their runtime navigation order, select the <b>Order</b> column header. This sorted order is how the pages will be arranged at runtime when the application is launched.</p> <p>You also have the option to change the sequence of pages: Select a page and then move it to a different position in the order by dragging it. The sequence order can be modified only if the App is in unlocked state.</p> <p>To revert to the alphabetical order, simply select the column header that contains application page names.</p>
5	Enter keywords to search for applications or pages.
6	Sorts columns in ascending or descending order. The status is indicated by the up/down arrow on each sortable column header.
7	Indicates whether the application is in a locked or unlocked state.
8	<p>Allows to perform tasks on the selected application or page. You can either:</p> <ul style="list-style-type: none"> <li>• Select this icon for the app/page to access task actions, (OR)</li> <li>• Right-click the app/page to access task actions.</li> </ul> <p>Existing app/page names are quickly editable on the homepage itself.</p>



	<div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;">  <b>Note:</b>                  Applications/pages created in the Operations Hub Classic version cannot be modified in the new Operations Hub layout. Such applications are marked as legacy apps. You can only preview them.             </div> <p>Refer to these topics for step-by-step instructions:</p> <ul style="list-style-type: none"> <li>• <a href="#">Create an Application (on page 265)</a></li> <li>• <a href="#">Modify Settings (on page 489)</a></li> <li>• <a href="#">Copy an Application (on page 269)</a></li> <li>• <a href="#">Export an Application (on page 274)</a></li> <li>• <a href="#">Delete an Application (on page 286)</a></li> <li>• <a href="#">Grant Group Access to Page within an Application (on page 446)</a></li> <li>• <a href="#">Create a Page (on page 450)</a></li> <li>• <a href="#">Copy a Page (on page 456)</a></li> <li>• <a href="#">Delete a Page (on page 469)</a></li> </ul>
9	Opens the end application.

## Plug-ins

On the plug-ins homepage, you can perform tasks as described in the following table:



1	Enter keywords to search for plug-ins.
2	Expand <b>System</b> to view the system plug-ins available in Operations Hub.  See also <a href="#">Visuals Tab (on page 220)</a> .
3	Expand <b>Custom</b> to view custom plug-ins.  If you have saved any customized plug-ins, then they appear under custom plug-ins.
4	Reloads the plug-ins screen.

For a high-level panel layout, see [Panels Layout \(on page 213\)](#).

## Components Panel

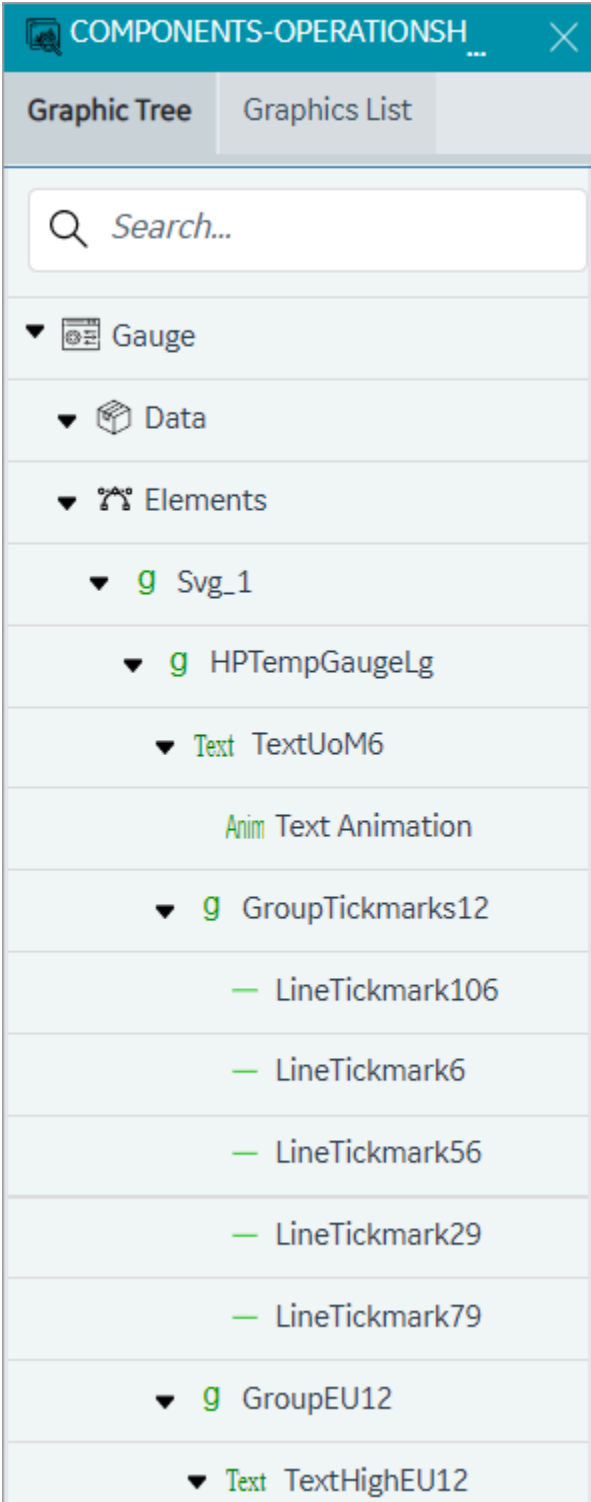
This topic provides an overview of the components panel in the Operations Hub new layout.

On Operations Hub components panel, you can access the following tabs for designing application pages:

- [Visuals \(on page 220\)](#)
- [Data \(on page 224\)](#)
- [Page Data \(on page 228\)](#)
- [Page Visuals \(on page 229\)](#)

On Operations Hub components panel, you can access the following tabs while working with the SVG editor:

- **Graphic Tree:** On this tab, expand the tree-view structure to review the properties currently configured for the graphic.
- **Graphics List:** On this tab, you can access all the plug-ins listed under the custom category.



For a high-level panel layout, see [Panels Layout \(on page 213\)](#).

## Visuals Tab

This tab provides access to system and custom plug-ins in Operations Hub.

You can configure the plug-ins to work with the components of an application, such as entities and queries.

1. Open an application page.
2. Select the **Visuals** tab.
3. Drag-and-drop the plug-ins to design your page.

You can also double-click a plug-in to add to the page.

Following list of plug-in categories are available as **System** plug-ins:

- [Charts \(on page 220\)](#)
- [Display \(on page 221\)](#)
- [General \(on page 222\)](#)
- [HMI \(on page 222\)](#)
- [HMI Graphics \(on page 223\)](#)
- [Inputs \(on page 223\)](#)
- [Layout \(on page 224\)](#)

The **Custom** plug-ins contains the list of plug-ins saved with custom functionality. Refer to [About HMI Graphics \(on page 788\)](#).


### Plug-in Enhanced Preview

Enhanced preview enables to access the real-time data preview within the page designer itself. Some of the plug-ins under [Charts \(on page 220\)](#), [Display \(on page 221\)](#), and [Inputs \(on page 223\)](#) are powered with an enhanced preview feature. This means that the plug-in preview (within the designer) is the same as the result that appears in the end application. Refer to the respective plug-in categories for a full list of plug-ins that support enhanced preview.

Currently, the enhanced preview feature works only when the data is bound to the plug-in using the [manual \(on page 238\)](#) option. Data binding via other methods does not support enhanced preview.

### Charts

Except [Timeline \(on page 614\)](#), [Spider Chart \(on page 611\)](#), [Trend Card \(on page 619\)](#), and [Histogram \(on page 601\)](#), the enhanced preview feature is available for all the charts category plug-ins.

<a href="#">Bullet Graph (on page 598)</a>	Compares a single value to a target value. Available variants are bullet graph and bar graph.
<a href="#">Histogram (on page 601)</a>	Creates a visual representation of data distribution.
<a href="#">Spider Chart (on page 611)</a>	Visualizes data in a web-like pattern to compare and analyze multiple data sets.
<a href="#">Trend Card (on page 619)</a>	Helps to analyze data trends over a time period.  <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;">  <b>Note:</b> Do not rotate the trend card plug-in in the page designer. </div>
<a href="#">Variwide Chart (on page 642)</a>	Each column in a variwide chart has a separate width to represent the third dimension. Helps to analyze multi-dimensional data.
<a href="#">Sparkline (on page 609)</a>	Visualizes events over a time span. The chart displays each data point of a set of time series data as a separate event along a horizontal line. Creates tiny data charts that can fit into compact areas in your application.
<a href="#">Line Chart (on page 592)</a>	Use a line chart to visualize data using data points.
<a href="#">Pareto Chart (on page 607)</a>	Graphically summarize and display the relative importance of the differences between groups of data.
<a href="#">Pie Chart (on page 596)</a>	Visualize data using data points that belong to different categories.
<a href="#">Timeline (on page 614)</a>	Create visual charts that help to monitor the progress of your events.


## Display

Except [DataGrid \(on page 715\)](#) and [Pivot Grid \(on page 729\)](#), the enhanced preview feature is available for all the display category plug-ins.

<a href="#">Gauge Bar (on page 723)</a>	Presents data in simple bar format.
<a href="#">Gauge Circular (on page 725)</a>	Measure data values on a radial scale.
<a href="#">Gauge Linear (on page 727)</a>	Measure data values on a linear scale.
<a href="#">Solid Gauge (on page 734)</a>	Displays data in six different styles with alert and color limits.

<a href="#">DataGrid (on page 715)</a>	Displays data in a tabular format. Supports grouping, filtering, and sorting column data. You can also animate the data cells.
<a href="#">Pivot Grid (on page 729)</a>	Visualize data in a multi-dimensional format. You can apply conditions to format cells, filter rows/columns by value, and export data to a CSV file.
<a href="#">Image (on page 743)</a>	Insert images in your application.
<a href="#">Indicator (on page 746)</a>	Indicator with range limits and styling.
<a href="#">Simple Indicator (on page 745)</a>	Simple indicator is a lighter version of the indicator plug-in.
<a href="#">List (on page 750)</a>	Display data in bullet points.
<a href="#">Text Display (on page 751)</a>	Create display-only text in your application.
<a href="#">Value Display (on page 738)</a>	Displays data values with a variety of configurable properties.

## General

<a href="#">Favorite Organizer (on page 759)</a>	Create folders and organize your favorite trend charts.
<a href="#">iFrame (on page 765)</a>	Load information from external sources.
<a href="#">Breadcrumb (on page 756)</a>	Shows the hierarchy to the current asset and allows the user to select any item in the list to trigger a change of context to that asset. Use a breadcrumb for easy navigation in your application.  <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;">  <b>Note:</b> Do not rotate the breadcrumb plug-in in the page designer. </div>
<a href="#">HTML Editor (on page 763)</a>	Helps to create and edit HTML code.

## HMI

<a href="#">Alarm Card (on page 685)</a>	Provides details of the active alarms by their severity levels in the HMI/SCADA system for the selected asset.
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<a href="#">Alarm Count (on page 697)</a>	Provides the total alarm count by their severity levels in the whole HMI/SCADA system.
<a href="#">CIMPPLICITY HMI Web-space (on page 645)</a>	Opens a web-based interface to remotely access and interact with the CIMPPLICITY HMI and SCADA systems without the need for installing the CIMPPLICITY software on each device.
<a href="#">iFIX HMI Webspace (on page 673)</a>	Opens a web-based interface to remotely access and interact with the iFIX HMI and SCADA systems without the need for installing the iFIX software on each device.
<a href="#">Mimic Card (on page 697)</a>	Displays mimics from the SCADA systems.

## HMI Graphics

Use the following list of graphics based on your specific application and industry requirements. See [About HMI Graphics \(on page 788\)](#).

Gauge	High performance HMI graphic to represent pressure, flow, temperature or level gauges.
Mixer	High performance HMI graphic to represent agitators or batch mixers.
Motor	High performance HMI graphic to represent AC/DC motors, etc.
Pump	High performance HMI graphic can be configured to provide real-time feedback on the pump's status, such as flow rate, pressure, temperature, etc.
Tank	High performance HMI graphic to represent storage, mixing, or pressure tanks.
Valve	High performance HMI graphic to represent centrifugal, displacement, or gear pumps.

## Inputs

The enhanced preview feature is available for all the input category plug-ins.

<a href="#">Button (on page 575)</a>	Trigger an action in your application.
<a href="#">Check Box (on page 577)</a>	Create mutually exclusive data options.

<a href="#">Date Picker (on page 578)</a>	Display date and time in a variety of formats.
<a href="#">Dropdown (on page 583)</a>	Create a drop-down list from which operators can select between multiple choices.
<a href="#">DateTime Range Picker (on page 581)</a>	Display and edit beginning and ending date time pairs.
<a href="#">Radio Button (on page 586)</a>	Create radio button selection list.
<a href="#">Slider (on page 588)</a>	Generate a slider selection format.
<a href="#">Text Area (on page 589)</a>	Create a text area in your application.
<a href="#">Text Input (on page 590)</a>	Insert a text box wherein the operator can enter data that goes in to the database.
<a href="#">Toggle (on page 591)</a>	Create a toggle switch.

## Layout

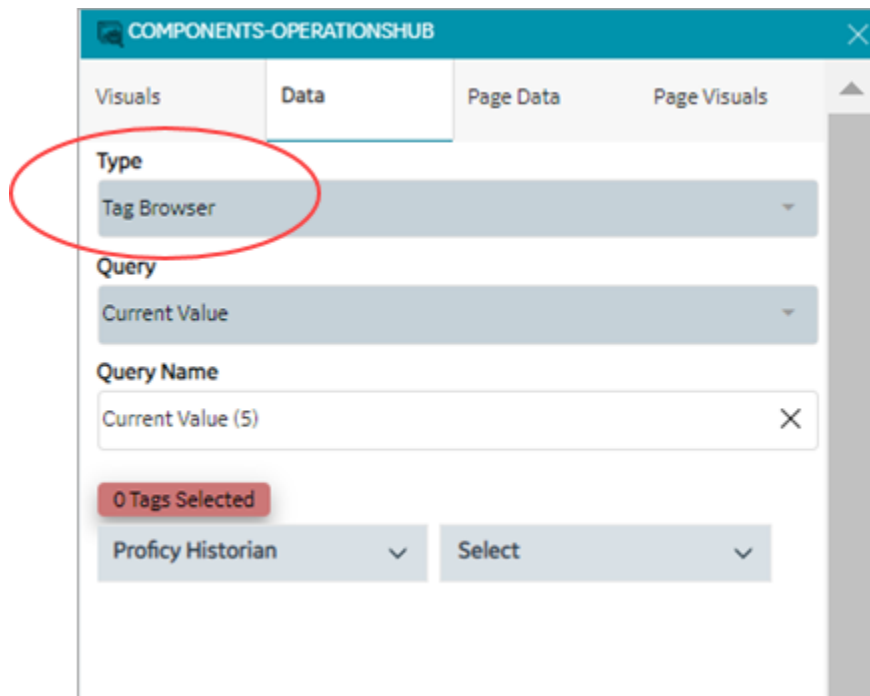
<a href="#">Interactive Map (on page 252)</a>	Create a coordinate/flex interactive map layout.
<a href="#">Repeater (on page 254)</a>	Create a flex repeater layout.

## Data Tab

This tab displays the data types you can apply to the plug-ins.

Select your data type from the **Type** drop-down field.





Choose from the following data types:

- Tag Browser *(on page 225)*
- Query *(on page 226)*
- Globals *(on page 226)*
- Admin Functions *(on page 227)*
- M2M Functions *(on page 227)*
- Asset Management Functions *(on page 228)*

## Tag Browser

You can browse a data source and select the properties/tags.

1. From **Type**, select `Tag Browser`.
2. From **Query**, select an extension query.

The selected query is populated in **Query Name**.

3. Browse the data source and select the check box for the tag/s you want add.
4. Drag and drop the tags on the plug-in to bind data.

## Query

To learn more about creating and working with queries in Operations Hub, refer to [About Queries \(on page 314\)](#).

1. From **Type**, select `Query`.
2. From **Query Type**, select the query type you want to use. The query types appear in the list box based on the queries you created in the Operations Hub classic version. For example, if you select `Extension Of Entity`, additional selection fields appear.

<code>Extension</code>	<p>Populates extension type of queries in the <b>Query</b> field.</p> <p>Select an extension query to add to the plug-in. The selected query is populated in <b>Query Name</b>.</p>
<code>Entity</code>	<p>Populates entities in the <b>Query</b> field.</p> <p>Select an entity to add to the plug-in. The selected entity is populated in <b>Query Name</b>.</p>

3. Select **+ Add**.

## Globals

To learn more about global variables in Operations Hub, refer to [Globals \(on page 829\)](#).

1. From **Type**, select `Globals`.
2. From **Globals**, select any of these options:

<code>System</code>	<p>Is associated to a computer's settings. Populates system date/time variables.</p>
<code>Output</code>	<p>Is associated to query data fields. Populates available queries in the <b>Query</b> field.</p> <ol style="list-style-type: none"> <li>a. Select a query to populate its date fields.</li> <li>b. Select a data field from <b>Outputs</b>.</li> </ol>
<code>Custom</code>	<p>Allows you create your own customized global variable.</p> <ol style="list-style-type: none"> <li>a. Enter a name for the variable.</li> <li>b. Choose from the available data types to define the variable.</li> </ol>

URL Parameters

Is associated to a URL address. Enter a name for the variable.

3. Select **+ Add Global**. All added globals appear on the **Page Data** tab.
4. Go to **Page Data** tab and select the global. The global details appear on the details panel.
5. On the details panel, you can specify the **Global Type** as **App** or **Page** global.
6. For custom and URL parameter global, enter the **Initial Value**.

## Admin Functions

Use these functions to perform system administration tasks.

1. From **Type**, select **Admin Functions**.
2. Select from:

Send Email	Sends an email to specified recipient/s using the email sender service.
DeleteAlertInstance	Deletes the alert set for an asset object instance.
StartStopAlertInstance	Starts and stops the alert set for an asset object instance.
Get all apps	Retrieves a list of all applications in Operations Hub.
Get all apps for user id	Retrieves a list of all applications in Operations Hub that are associated with a specific user ID.
Delete image on hard disk	Deletes the image file on the logged-in user's hard disk.
GetAllAlerts	Retrieves a list of all alerts in Operations Hub.
appGetCurrentUser	Retrieves the current user of the application.
GetEventByName	Retrieves an event by its name.

3. Select **+ Add**.

## M2M Functions

Perform machine-to-machine functions to control and manage devices remotely.

1. From **Type**, select **M2M Functions**.
2. Select from:

Send_MQTT_Command	Sends a command to a device using the MQTT (Message Queuing Telemetry Transport) protocol. The device must be configured with IQP MQTT.
Send_REST_Command	Sends a command to a device using the REST (Representational State Transfer) protocol.

3. Select **+ Add**.

## Asset Management Functions

Use these functions to manage and track assets, such as devices and systems.

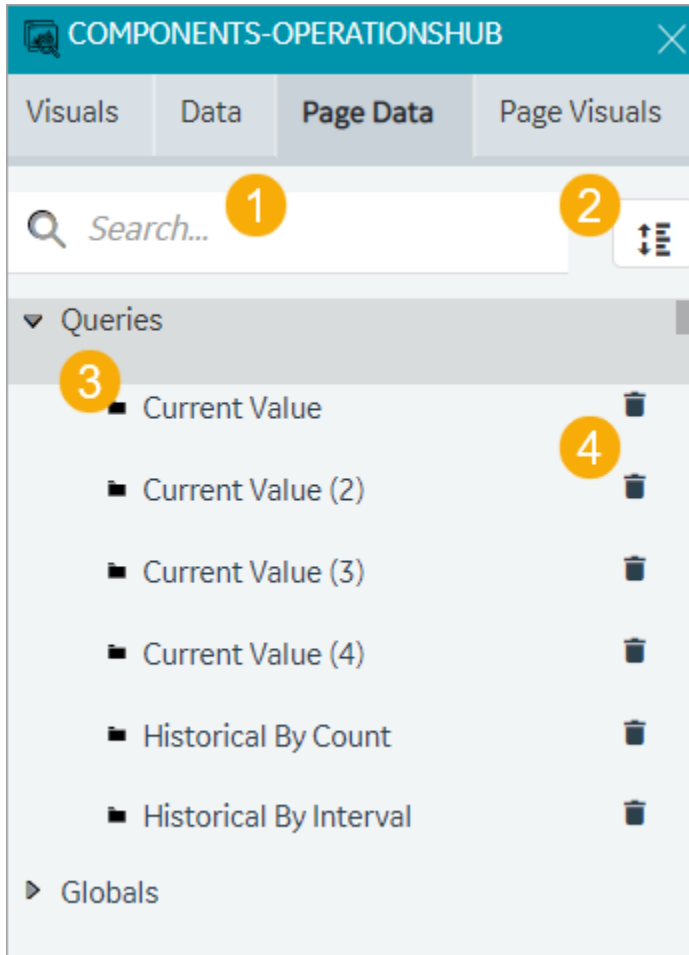
1. From **Type**, select `Asset Management Functions`.
2. Select from:


Add new device type	Creates a new category to classify similar type of devices.
Add new metric to device type	Adds a new measurement unit to the device type.
Add new device	Adds a new device (for example, Pump).
Add new thing	Adds a new thing (IoT devices)
Add new group	Creates a new group to gather and manage similar devices or things.
Add device or thing to group	Assigns a device or thing to a group.
Add new device cloud	Adds a new device cloud, which can be used to host and manage devices remotely.
Add new cloud account	Adds a new cloud account, which can be used to manage devices that are hosted on a cloud service.

3. Select **+ Add**.

## Page Data Tab

This tab displays the data applied to the page.

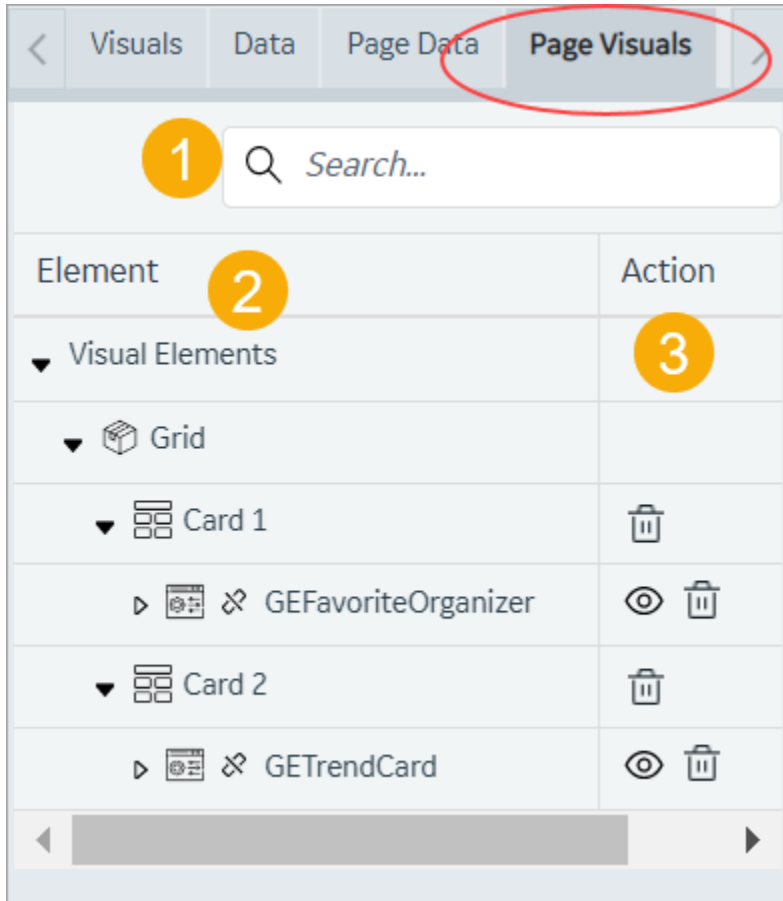


1	Enter keywords to search within the data (queries, globals, etc.) that is bound to the page.
2	When enabled, the icon turns blue  . In this mode, you can drag and rearrange the order of queries. To move a query up/down in a ordered list, simply select and drag the query item, and then drop it on the new location (up/down).
3	A tree-view of the data that is bound to the page.
4	Option to delete the data bound to the page.

## Page Visuals Tab

This tab displays a visual overview of all the elements or objects on the page.

1. Open an application page.
2. Select **Page Visuals** tab.
3. Select any object on the page to locate its hierarchy in the tree layout.



1	Enter keywords to search within the elements added to the page.
2	<p>Elements added to the page appear in a tree data structure showing their hierarchical relationship.</p> <p>To sort the elements in ascending/descending order, select the <b>Element</b> column header.</p> <p>Plug-ins may also carry one or more IDs on a page (if defined). Such elements are listed under the respective plug-in with their unique ID name.</p>
3	You can perform the following actions:

- Delete at card-level. The card and the plug-ins within the card are deleted from the page.
- Delete a plug-in added to the page.
- Show/Hide a plug-in on the page.

## Display Panel

This topic provides an overview of the display panel in the Operations Hub new layout.

The display panel serves as the display area for working with applications and their pages within Operations Hub.

See [Grid \(on page 239\)](#).

See [Page Building Tools \(on page 232\)](#).

For a high-level panel layout, see [Panels Layout \(on page 213\)](#).

## Use Keyboard Shortcuts

These are the computer keyboard shortcut keys to perform UI operations:

UI Operation	Windows	Mac
Copy	Ctrl+C	Command+C
Paste	Ctrl+V	Command+V
Duplicate	Ctrl+D	Command+D
Toggle line connector mode	L	L
Toggle ruler	Ctrl+R	Command+R
Redo	Ctrl+Y	Command+Y
Undo	Ctrl+Z	Command+Z

## Perform Operations Using Multi-Selection

You can select multiple objects on a layout or [page visuals tab \(on page 229\)](#) and apply [building tool operations \(on page 232\)](#). To select multiple objects, hold down the `shift` key on your keyboard and select the objects on the layout or visuals tab. Apart from using the build tools to manipulate multiple selected objects at a time, you can also:

- Move all selected objects to a different position within the layout by dragging them or using arrow keys.
- Resize/Scale all selected objects collectively.

## Move Objects Using Arrow Keys

Using the arrow keys on your keyboard, you can control the movement or positioning of an object. You can also select and move multiple objects on a layout.

1. Select the object/s you want to move.
2. Use left/right/up/down arrow key to move left/right/upward/downward on the display area.

The object/s moves one pixel per key stroke.

3. To continuously move the object/s in the associated direction, long press the respective key and release when done.

On the Details panel, notice the **Offset Left** and **Offset Right** values are automatically adjusted to reflect the new position of the moved object/s.

## Copy and Paste Objects on a Layout

You can duplicate object/s by copy/pasting them. Once copied, you can paste the duplicate in the desired location within the layout. In this way, you can create an identical copy of the object/s. This action allows you to easily create multiple instances of the same object without manually recreating it from scratch. Duplicates can be modified independently.

## Page Building Tools

Use these tools to design visually appealing application pages.

Building tool operations can be applied to graphics, widgets/plugin-ins, and lines. You can either select a single object, or use [multi-selection \(on page 231\)](#) to apply these operations.



Tool	Description
Data Panel	Select the data panel icon to show or hide the <a href="#">components panel (on page 218)</a> and increase the display panel work area.
Hide Ruler	Select this icon to show or hide the ruler. The ruler appears by default when you create a page.



Tool	Description
Add Card	<p>Adds a card on the page. A card is a container that holds the plug-in objects.</p> <ul style="list-style-type: none"> <li>• See <a href="#">Coordinate Card (on page 248)</a></li> <li>• See <a href="#">Flexbox Card (on page 240)</a></li> </ul>
Refresh View	<p>The page refresh icon appears when you edit a page. If the layout gets distorted, refresh the page.</p> <p>During user interface operations (in particular when using Flexbox layout, or after Undo/Redo operations), the display panel's canvas area might get distorted or misaligned. To recover the page, select the refresh icon to reload the view.</p>
Delete	Deletes the selected object on the layout.
Undo	Undo an action on the page.
Redo	Redo an action on the page.
Line Connector On/Off	Activates or deactivates the line connector. Use the line connector tool to connect and draw a relationship between two plug-in objects on the page. See <a href="#">Line Connector (on page 234)</a> .
Bring To Front	When objects overlap on the page, brings the selected object to the very top of the stacking order, making it visually appear in front of all other plug-ins. Apply this if you want the plug-in to be fully visible and not concealed by any other object.
Bring Forward	When objects overlap on the page, moves the selected object one step forward in the stacking order.
Send Backward	When objects overlap on the page, moves the selected object one step backward in the stacking order.
Send To Back	When objects overlap on the page, sends the selected object to the very bottom of the stacking order, making it visually appear behind all other plug-ins. Apply this if you want the plug-in to be positioned at the back, most likely overlapped by other elements.
Horizontal Flip	Turns the object to create its mirror image.
Vertical Flip	Turns the object upside-down.

Tool	Description
Align Left	Horizontally aligns all the objects to the left side of the page.
Align Center	Horizontally aligns all the objects towards the center of the page.
Align Right	Horizontally aligns all the objects to the right side of the page.
Align Top	Vertically aligns all the objects towards the top of the page.
Align Middle	Vertically aligns all the objects towards the center of the page.
Align Bottom	Vertically aligns all the objects towards the bottom of the page.
Distribute Horizontally	Horizontally aligns the selected objects and evenly distributes the space between them.
Distribute Vertically	Vertically aligns the selected objects and evenly distributes the space between them.
Guide On/Off	Shows the guidelines on the page.
Guide	Hides the guidelines on the page.
Guide and Snap On/Off	Shows the page guidelines, and object snap points.
Guide and Snap Off	Hides the page guidelines, and object snap points.
Launch/Screen Preview	Launches the end application.
Full Screen	Select the full screen icon to display in the full screen mode.

## Line Connector



A line connector is a tool to show a connection between two or more objects.

Place two visual objects next to each other on a page, and draw a line connector to link them. You can draw straight line connectors or angle line connectors to link visual objects. You can use the [line connector properties \(on page 235\)](#) to:

- Customize line connector arrowheads to help explain the direction of the flow from one object to the other.
- Apply varied line styles.
- Add a unique color and thickness to the lines.

## Draw Line Connector

To draw a line connector, follow these steps:

1. On the page designer [toolbar \(on page 232\)](#), select  to activate the line connector.
2. Single-click/mouse-click on the page where you want to draw.
3. Start to draw the line by dragging the mouse in the direction you want the line to go. To add a vertex in line, single-click.
4. To end the line connector, Shift-click. (On the keyboard, hold down the `Shift` key and release the mouse-click.)
5. To deactivate the line connector, select  on the page designer [toolbar \(on page 232\)](#).


## Add Vertex

A vertex is a node/point on the line connector. You can add a vertex on the line connector to help demonstrate the relationships between multiple objects. To add a vertex to any line connector:

1. Select the line connector, for which you want to add a vertex.
2. Double-click to select the area on the line connector where you want to add a vertex.
3. Drag the vertex to create an angle.

## Delete Line Connector

To delete a line connector:

1. Select the line connector you want to delete.
2. Select  that appears next to the line connector. You can also select the `Delete` key on the keyboard to delete the line connector.

## Line Connector Properties

Property	Description
Color	Use the color palette to apply a color to the line.
Width	Enter a width to set the thickness of the line.
Stroke Type	Define how you want the line to appear:

Property	Description
	<ul style="list-style-type: none"> <li>• <code>solid</code>: Creates a solid line.</li> <li>• <code>dots</code>: Creates a dotted line.</li> <li>• <code>dashes</code>: Creates a dashed line.</li> </ul>
Start Marker  End Marker	<p>Define a start/end line marker from these options:</p> <ul style="list-style-type: none"> <li>• <code>smallArrowMarker</code>: Adds a small-sized arrowhead.</li> <li>• <code>mediumArrowMarker</code>: Adds a medium-sized arrowhead.</li> <li>• <code>largeArrowMarker</code>: Adds a large-sized arrowhead.</li> <li>• <code>vertexMarker</code>: Adds a circle.</li> <li>• <code>none</code>: No line marker is added.</li> </ul>
Middle Marker	<p>Define a line marker for the points in the middle of the line:</p> <ul style="list-style-type: none"> <li>• <code>circle</code>: Adds a circle.</li> <li>• <code>none</code>: No line marker is added.</li> </ul>
Layer	<p>These layers are defined for line connectors so that they appear either above or behind the plug-ins in the end application.</p> <ul style="list-style-type: none"> <li>• <code>back</code>: The line connector is sent to the back, when overlapped by any object on the page.</li> <li>• <code>front</code>: The line connector is brought to the front, when overlapped by any object on the page.</li> </ul>
Rounded Corners	<p>Select this check box if you want a round corner instead of a pointed corner.</p>

## Details Panel

This topic provides an overview of the details panel in the Operations Hub new layout.

All the properties/settings specific to your current selection appear on the details panel.

- [Access application settings \(on page 489\)](#).
- [Access page settings \(on page 446\)](#).
- You can modify and save plug-in properties.
- Select source/target data. See [Bind Your Data to Plug-ins \(on page 237\)](#).
- Access animation properties in the SVG editor mode.

For a high-level panel layout, see [Panels Layout \(on page 213\)](#).

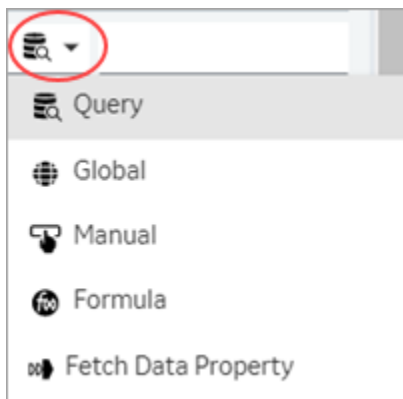
## Bind Your Data to Plug-ins

This topic describes the available options to configure source and target data.

In Operations Hub, you can select from the following options to pass values to the plug-in from your data source. You can also specify a target data source to receive data from a plug-in.

- [Query \(on page 237\)](#)
- [Global \(on page 238\)](#)
- [Manual \(on page 238\)](#)
- [Formula \(on page 238\)](#)
- [Fetch Data Property \(on page 238\)](#)

On the plug-in's details panel, you can choose the options from a drop-down menu.



### Query

When using a query to configure **source data**, select at least one output field.

<b>Alias</b>	Option to enter a temporary name for the query's output field.
<b>Output Field</b>	<p>Lists all the data fields available in the selected query.</p> <p>On executing the query, data is retrieved from the data source for the selected output fields.</p> <p>For example, a weather application might use a query to retrieve the current temperature, humidity, and precipitation levels for a particular location, and use these fields as the basis for its output.</p>
<b>+Add</b>	To include additional query output fields, select this option.

<b>+Add All</b>	If you want to include all the query output fields, then select this option.
-----------------	--

When using a query to configure **target data**, select at least one input field.

<b>Input Field</b>	<p>Lists all the data fields available in the selected query.</p> <p>The selected input fields are used to execute the query to retrieve data.</p> <p>For example, a weather application might include input fields where you can specify the location, temperature unit, or forecast duration.</p>
<b>+Add</b>	To include additional query input fields, select this option.

To learn more about creating and working with queries in Operations Hub, refer to [About Queries \(on page 314\)](#).

## Global

This option allows you to select a global variable to configure source data and target data.

To learn more about various types of global variables in Operations Hub, refer to [Globals \(on page 829\)](#).

## Manual

This option allows you to manually enter the values for the plug-in. You can also access [enhanced preview \(on page 220\)](#) of the real-time data within the page designer. The plug-in preview is the same as the result that appears in the end application.

## Formula

Select **Add Formula** to create a formula that returns values for the plug-in.

## Fetch Data Property

This option is view-only. It applies when you drag-and-drop tag data on a plug-in. The drag-and-drop action automatically fetches the data from the data source, and updates values to a list of applicable properties.

On drag-and-drop, the **Fetch Data Property** label appears for:

- Minimum and Maximum scale values
- Engineering unit
- Data range values


In case you drag-and-drop multiple tags on a plug-in, then values fetched from the first tag are applicable to the above listed properties.

## Grid

This topic describes the grid layout properties.

This layout appears like a grid structure divided into rows and columns. Within each grid cell, you can add multiple card layouts, with a mix of both flexbox and coordinate. The access to creating such hybrid layouts depends on your licensing. By default, the grid has 12 rows and 12 columns.

### Properties

Field Name	Description
Grid Type	<p>Choose from these grid types:</p> <ul style="list-style-type: none"> <li>• <code>fit</code>: The grid fits to the size of the available space irrespective of the specified number of rows and columns.</li> <li>• <code>fixed</code>: This is the default option. The grid appears in a fixed size based on the specified number of column and rows.</li> <li>• <code>verticalFixed</code>: The grid's row height is fixed. Column width is adjustable to fit to the size of the available space.</li> <li>• <code>horizontalFixed</code>: The grid's column width is fixed. Row height is adjustable to fit to the size of the available space.</li> </ul> <div style="border: 1px solid #00a0e3; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b>  <code>fit</code> type grid layout is flexible, and it grows and shrinks to fit the objects, preventing the need for scrolling. <code>fixed</code> type grid layout maintains a constant size and may display scrollbars when the objects exceed the pre-defined dimensions.</p> </div>
Mobile Breakpoint	This value determines the page grid layout adjustment on a mobile device.
Margin	This value determines the size of the gap between the rows and columns.
Display Grid	<p>Choose how you want to display the grid on the page:</p> <ul style="list-style-type: none"> <li>• <code>always</code>: Shows the grid lines on the page.</li> <li>• <code>onDrag&amp;Resize</code>: Allows to drag and resize grid columns and rows.</li> <li>• <code>none</code>: Hides the grid lines on the page.</li> </ul>

Field Name	Description
Fixed Col Width	Appears when <b>Grid Type</b> is <code>fixed</code> and <code>horizontalFixed</code> . Enter a value to set a fixed width for the grid columns.
Fixed Row Height	Appears when <b>Grid Type</b> is <code>fixed</code> and <code>verticalFixed</code> . Enter a value to set a fixed width for the grid rows.
Min Cols	Appears when <b>Grid Type</b> is <code>fit</code> and <code>verticalFixed</code> . Enter a value to set minimum width for the grid columns.
Max Cols	Appears when <b>Grid Type</b> is <code>fit</code> and <code>verticalFixed</code> . Enter a value to set maximum width for the grid columns.
Min Rows	Appears when <b>Grid Type</b> is <code>fit</code> and <code>horizontalFixed</code> . Enter a value to set minimum width for the grid rows.
Max Rows	Appears when <b>Grid Type</b> is <code>fit</code> and <code>horizontalFixed</code> . Enter a value to set maximum width for the grid rows.
Row Height Ratio	Appears when <b>Grid Type</b> is <code>fit</code> .
Outer Margin	Appears when <b>Grid Type</b> is <code>fit</code> , <code>verticalFixed</code> , and <code>horizontalFixed</code> .

## Flexbox Card

This layout offers a flexible and responsive design structure.

This is the default card layout when you start to design application pages. A flexbox card aligns and distributes the items along a main axis. Objects placed within a flexbox card are laid out next to each other, row-wise or column-wise. When we drag and drop plug-in objects, they get rearranged to follow the one-dimensional layout concept.

The ideal way to use a flexbox card is when you have objects that require flexibility to grow and shrink, and fit within the layout. Use the flexbox properties to control the alignment and distribution of the objects (items).



## Flexbox Properties

Field Name	Description
Columns	The card occupies the specified number of columns on the <a href="#">page grid (on page 239)</a> .
Rows	The card occupies the specified number of rows on the <a href="#">page grid (on page 239)</a> .
Position X	Applies to the horizontal placement of the card on the page. When the value is 0, the card is placed on the left-most side of the page. As you increase the value, the card moves away from the left side of the page.
Position Y	Applies to the vertical placement of the card on the page. When the value is 0, the card is placed at the top of the page. As you increase the value, the card moves away from the top of the page.
Flex Direction	<p>The objects are arranged next to each other based on these placement directions:</p> <ul style="list-style-type: none"> <li>• <b>Row</b>: The objects within the card are placed horizontally, from left to the right.</li> <li>• <b>Column</b>: The objects within the card are placed vertically, from top to bottom.</li> <li>• <b>Row reverse</b>: The objects within the card are placed horizontally, from right to left.</li> <li>• <b>Column reverse</b>: The objects within the card are placed vertically, from bottom to top.</li> </ul> <p>See <a href="#">Flex Row (on page 245)</a>, <a href="#">Flex Row and Column (on page 246)</a>.</p>
Flex Wrap	<p>By default, objects within the card are not wrapped.</p> <ul style="list-style-type: none"> <li>• <b>Nowrap</b>: All the objects within the card try to fit into a single line, as per the flex direction.</li> <li>• <b>Wrap</b>: The objects are evenly spaced, and are arranged in multiple lines, as per the flex direction. The wrap orientation is from top to bottom.</li> <li>• <b>Wrap reverse</b>: The objects are evenly spaced, and are arranged in multiple lines, as per the flex direction. The wrap orientation is from bottom to top.</li> </ul>

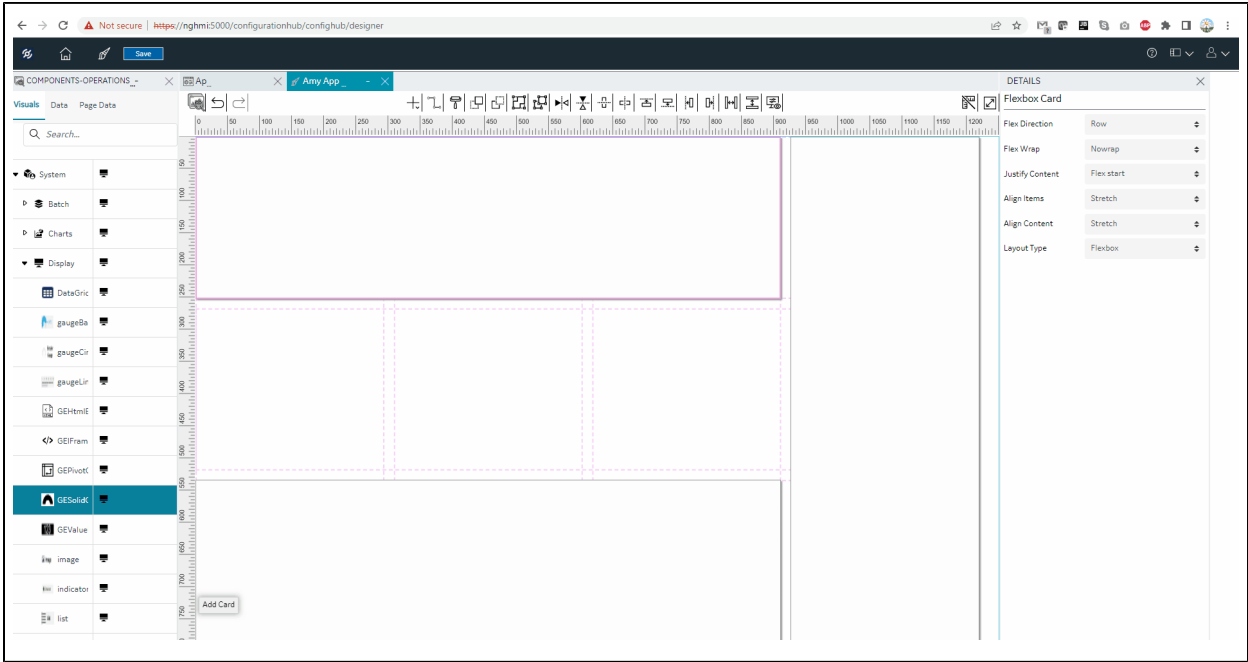
Field Name	Description
	See <a href="#">Flex Wrap (on page 246)</a> .
Justify Content	<p>You can choose from these options to align objects along the main axis (left to right):</p> <ul style="list-style-type: none"> <li>• <b>Flex start</b>: Objects are pushed towards the start of the direction (left).</li> <li>• <b>Flex end</b>: Objects are pushed towards the end of the direction (right).</li> <li>• <b>Center</b>: Objects are pushed towards the center of the direction (horizontal center).</li> <li>• <b>Space between</b>: Objects are evenly spaced on a single line.</li> <li>• <b>Space around</b>: Objects are evenly spaced on a single line, with equal amount of space around them.</li> </ul>
Align Items	<p>You can choose from these options to align objects along the cross axis (top to bottom):</p> <ul style="list-style-type: none"> <li>• <b>Flex start</b>: Objects are pushed towards the start of the direction (top).</li> <li>• <b>Flex end</b>: Objects are pushed towards the end of the direction (bottom).</li> <li>• <b>Center</b>: Objects are pushed towards the center of the direction (vertical center).</li> <li>• <b>Baseline</b>: Objects choose a baseline (for example, title of the object) and align accordingly.</li> <li>• <b>Stretch</b>: Objects stretch to fill the card.</li> </ul>
Layout Type	<p>Choose from the following card layouts before starting to design your pages:</p> <ul style="list-style-type: none"> <li>• <b>Coordinate</b>: Objects dropped on this layout stay where they are on the page. See <a href="#">Coordinate Card (on page 248)</a>.</li> <li>• <b>Flexbox</b>: Objects dropped on this layout are automatically arranged on a single line.</li> </ul>
Row Gap	Provide a value to specify the spacing or gap between rows in a flexbox layout. It defines the vertical space between adjacent flex items when stacked vertically within the layout.
Column Gap	Provide a value to specify the spacing or gap between columns in a flex layout. It defines the horizontal space between flex items when arranged in multiple columns within the layout.

Field Name	Description
Unit	<p>Apply a unit of measurement for the row/column gap values.</p> <ul style="list-style-type: none"> <li>• Pixel (px) values reflect the exact pixel size on the screen.</li> <li>• Percent (%) values reflect percentage of the parent container's size.</li> </ul>
Flex Grow	<p>Enter a value for the object to grow in size with the flexbox layout. The value determines how much the object will grow in comparison to other objects within the layout.</p>
Flex Shrink	<p>Enter a value for the object to shrink in size with the flexbox layout. The value determines how much the object will shrink in comparison to other objects within the layout.</p>
Flex Basis	<p>This default property is the initial size of the objects within the flexbox layout. You can grow/shrink this size.</p>
Style	<p>Select these check boxes to format the objects:</p> <ul style="list-style-type: none"> <li>• <b>Rounded Corners</b>: Adds a rounded corner instead of a pointed corner.</li> <li>• <b>Custom Colors</b>: Adds color.</li> </ul>
Function	<p>Layout functionalities:</p> <ul style="list-style-type: none"> <li>• <b>Card</b>: This is the regular flexbox layout option without any additional functionalities.</li> <li>• <b>Interactive Map</b>: This flexbox layout includes an interactive map functionality. See <a href="#">Interactive Map (on page 252)</a>.</li> <li>• <b>Repeater</b>: This flexbox layout includes a repeater functionality. You can create multiple instances of a plug-in dropped in a repeater layout. Refer to <a href="#">Repeater (on page 254)</a> layout properties.</li> </ul>
Background Image	<p>See <a href="#">Set Background Image (on page 247)</a>.</p>
Show/Hide	<p>Select <b>+Add Conditions</b> to create conditions to show or hide the card. See <a href="#">Apply Conditions (on page 828)</a>.</p>
Height	<p>This value dynamically sets the height of the plug-in on a flexbox layout.</p> <p>The plug-in dimensions are determined by the layout mechanism being used (coordinate or flex layout). The height and width values are not considered from the plug-in manifest.</p>

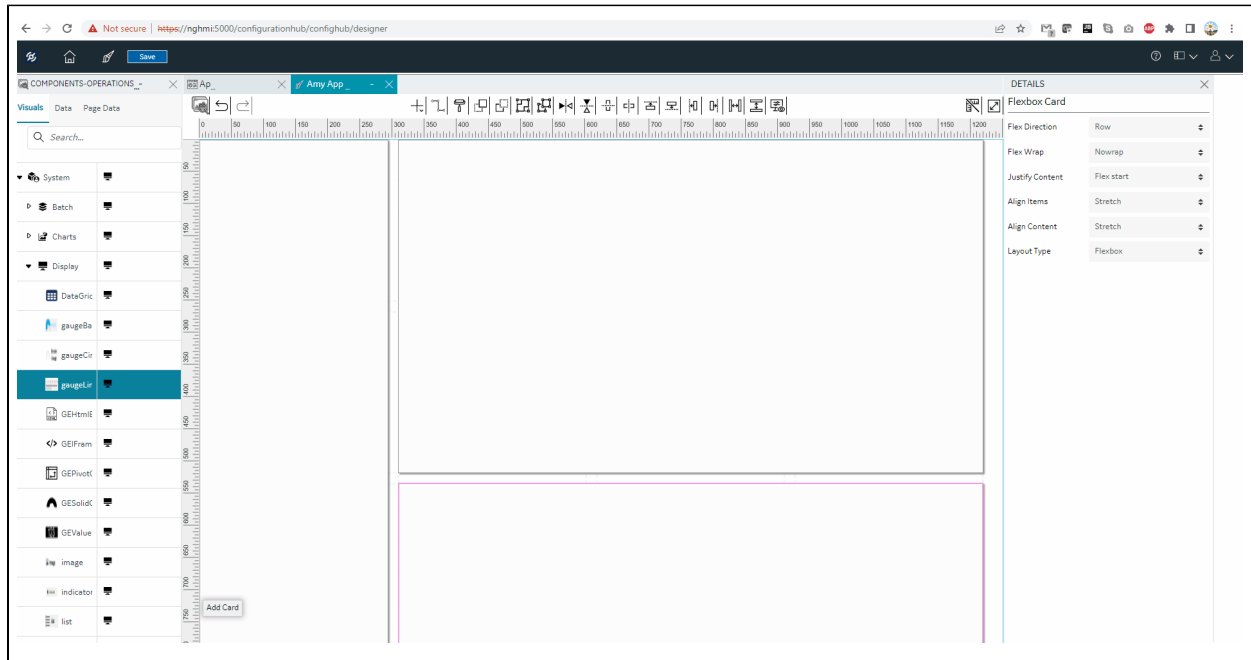
Field Name	Description
Width	<p>This value dynamically sets the width of the plug-in on a flexbox layout.</p> <p>The plug-in dimensions are determined by the layout mechanism being used (coordinate or flex layout). The height and width values are not considered from the plug-in manifest.</p>
Unit	<p>Apply a unit of measurement for the height/width values.</p> <ul style="list-style-type: none"> <li>• Pixel (px) values reflect the exact pixel size on the screen.</li> <li>• Percent (%) values reflect percentage of the parent container's size.</li> </ul>
Flex Grow	<p>The value determines how much the plug-in should grow with respect to other objects placed on the same flex layout. Enter a numeric value, which represents the proportion of available layout area the plug-in should occupy.</p> <p>Example: If two plug-ins have flex grow values of 1 and 2 respectively, the second plug-in takes up twice as much area as the first plug-in.</p>
Flex Shrink	<p>The value determines how much the plug-in can shrink if there is not enough area available on a flex layout. Enter a numeric value to specify the desirable shrink size.</p> <p>If the total size of the flex objects exceeds the size of the layout, the flex shrink value determines how much each object should shrink relative to others. If the flex shrink value is higher, then the plug-in will shrink more than other items with lower values.</p>
Flex Basis	<p>The value determines the initial size of the plug-in before the remaining area is distributed among the flex objects. Flex basis can be overridden by flex grow and flex shrink properties.</p> <p>You can enter a value in pixels or percentage. <code>auto</code> indicates that the plug-in size is determined by its content or other layout properties.</p>
Align Self	<p>An individual plug-in aligns itself in the following manner within a flex layout along the cross-axis, perpendicular to the main-axis defined by the flex-direction property.</p> <ul style="list-style-type: none"> <li>• <code>auto</code>: Inherits the alignment value of its parent container.</li> <li>• <code>flex-start</code>: Aligns itself at the start of the cross-axis.</li> <li>• <code>flex-end</code>: Aligns itself at the end of the cross-axis.</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"><li>• <code>center</code>: Aligns itself at the center of the cross-axis.</li><li>• <code>baseline</code>: Aligns itself at the baseline of the cross-axis.</li><li>• <code>stretch</code>: Stretches to fill the entire cross-axis.</li></ul>

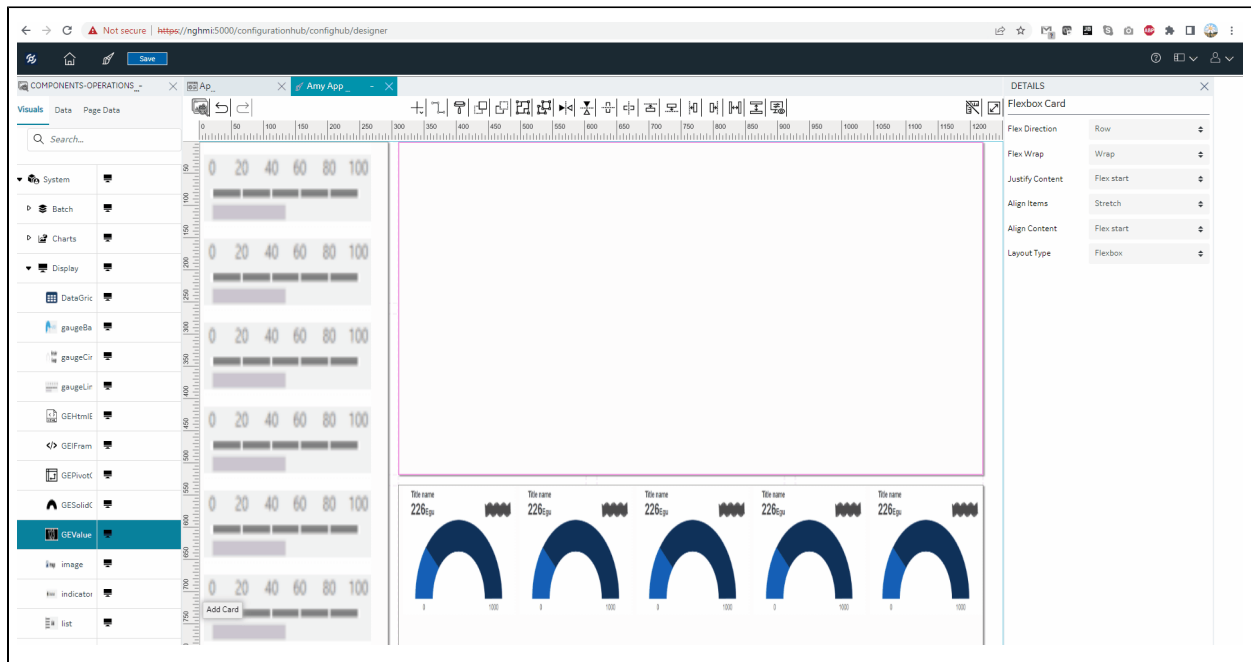
### Flex Row



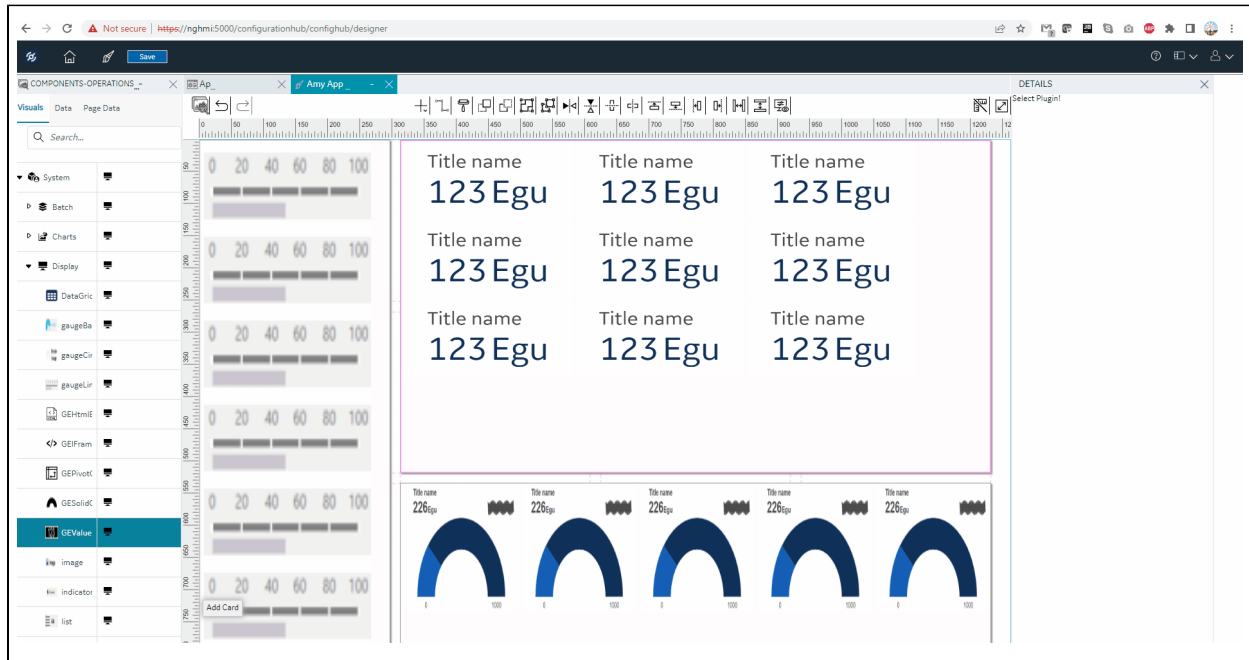
## Flex Row and Column



## Flex Wrap



## Resizing the Flexbox Layout



## Set Background Image

To add a background image:

1. Select the check box for **Background Image**.
2. Select image **Source Type** from these options:
  - **File**: Browse your local system and choose an image file to upload.
  - **URL**: Enter a URL address of the image you want to add as a background.
3. The following settings allow you to control the appearance of the background image.

Fit	<p>Determines how a background image is scaled to fit within its layout.</p> <ul style="list-style-type: none"> <li>◦ <i>Auto</i>: Displays the image at its original size.</li> <li>◦ <i>Cover</i>: Scales the image to cover the entire layout area while maintaining its aspect ratio. The image may get cropped.</li> <li>◦ <i>Contain</i>: Scales the image proportionally to fit within the layout area without the need for cropping.</li> </ul>
Repeat	<p>Determines if/how a background image should be repeated to fill the layout.</p>

	<ul style="list-style-type: none"> <li>◦ <i>None</i>: Image is not repeated. It is displayed only once covering the available area.</li> <li>◦ <i>Repeat</i>: Image is repeated both horizontally and vertically (grid-like pattern) to fill the layout area.</li> <li>◦ <i>Repeat X</i>: Image is repeated only horizontally along the x-axis.</li> <li>◦ <i>Repeat Y</i>: Image is repeated only vertically along the y-axis.</li> <li>◦ <i>Space</i>: Image is repeated only as much as possible without cropping, and the space between the repeats are distributed evenly.</li> <li>◦ <i>Round</i>: Image is repeated only as much as possible without cropping, and the repeats are resized to fill the available space.</li> </ul>
Horizontal	<p>Determines how a background image is positioned horizontally within its layout.</p> <ul style="list-style-type: none"> <li>◦ <i>Left</i>: Image is aligned to the left side.</li> <li>◦ <i>Center</i>: Image is horizontally centered.</li> <li>◦ <i>Right</i>: Image is aligned to the right side.</li> </ul>
Vertical	<ul style="list-style-type: none"> <li>◦ <i>Top</i>: Image is aligned to the top.</li> <li>◦ <i>Center</i>: Image is vertically centered.</li> <li>◦ <i>Bottom</i>: Image is aligned to the bottom.</li> </ul>

## Coordinate Card

This layout offers an absolute layout design structure.

You can drag and drop plug-in objects to an absolute position on the card. The end application reflects the same as in the coordinate card page design.

Field Name	Description
Columns	The card occupies the specified number of columns on the <a href="#">page grid (on page 239)</a> .
Rows	The card occupies the specified number of rows on the <a href="#">page grid (on page 239)</a> .
Position X	Applies to the horizontal placement of the card on the page. When the value is 0, the card is placed on the left-most side of the page. As you increase the value, the card moves away from the left side of the page.



Field Name	Description
Position Y	Applies to the vertical placement of the card on the page. When the value is 0, the card is placed at the top of the page. As you increase the value, the card moves away from the top of the page.
Layout Type	<p>Choose from the following card layouts before starting to design your pages:</p> <ul style="list-style-type: none"> <li>• <b>Coordinate</b>: Objects dropped on this layout stay where they are on the page.</li> <li>• <b>Flexbox</b>: Objects dropped on this layout are automatically arranged on a single line. See <a href="#">Flexbox Card (on page 240)</a>.</li> </ul>
Style	<p>Select these check boxes to format the objects:</p> <ul style="list-style-type: none"> <li>• <b>Rounded Corners</b>: Adds a rounded corner instead of a pointed corner.</li> <li>• <b>Custom Colors</b>: Adds color.</li> </ul>
Function	<p>Layout functionalities:</p> <ul style="list-style-type: none"> <li>• <b>Card</b>: This is the regular flexbox layout option without any additional functionalities.</li> <li>• <b>Interactive Map</b>: This flexbox layout includes an interactive map functionality. See <a href="#">Interactive Map (on page 252)</a>.</li> </ul>
Aspect Ratio	<p>By choosing to preserve the aspect ratio, the elements within the card do not get stretched or distorted whenever the card is resized, overall aspect ratio is maintained. The aspect ratio is applicable only to the usable area within the coordinate card.</p> <ol style="list-style-type: none"> <li>1. Select the check box for <b>Preserve Aspect Ratio</b>.</li> <li>2. <b>Width / Height Ratio of Usable Area</b>: Enter the height-to-width ratio (or aspect ratio), which is applied to the usable area. For example, if the usable area on the card has height of 10px and a width of 20px, the height-to-width ratio will be 1:2.</li> <li>3. <b>Horizontal Alignment</b>: To horizontally align items within the coordinate card, choose from options - Left, Center, or Right.</li> <li>4. <b>Vertical Alignment</b>: To vertically align the items within the coordinate card, choose from options - Top, Center, or Bottom.</li> </ol>

Field Name	Description
	<p>For plug-ins with dimensions specified in pixels (px), the dimensions do not change when the card is resized.</p> <p>For plug-ins with dimensions specified in percentage (%), the dimensions adjust proportionally when the card is resized.</p>
Background Image	See <a href="#">Set Background Image (on page 251)</a> .
Scale Line Connector	This option is set at card level. With this setting, the line connector works similar to percentage %. All the other plug-ins that are connected using line connector need to be in % when user is expecting to scale based on browser page dynamic height and width changes.
Show/Hide	Select <b>+Add Conditions</b> to create conditions to show or hide the card. See <a href="#">Apply Conditions (on page 828)</a> .
Height	<p>This value dynamically sets the height of the plug-in on a coordinate layout.</p> <p>The plug-in dimensions are determined by the layout mechanism being used (coordinate or flex layout). The height and width values are not considered from the plug-in manifest.</p>
Width	<p>This value dynamically sets the width of the plug-in on a coordinate layout.</p> <p>The plug-in dimensions are determined by the layout mechanism being used (coordinate or flex layout). The height and width values are not considered from the plug-in manifest.</p>
Unit	<p>Apply a unit of measurement for the height/width values.</p> <ul style="list-style-type: none"> <li>• Pixel (px) values reflect the exact pixel size on the screen.</li> <li>• Percent (%) values reflect percentage of the parent container's size.</li> </ul>
Rotation	Enter a numeric value to set the rotation angle of the plug-in around its center point. The value represents the number of degrees the plug-in should be rotated clockwise. For example, a rotation value of 90 would rotate the plug-in 90 degrees clockwise.
X Relative	Determines the horizontal positioning of the plug-in with respect to its original position within the coordinate layout.

Field Name	Description
	<ul style="list-style-type: none"> <li>• <code>offsetLeft</code>: The plug-in is moved horizontally towards the left, with respect to its original position.</li> <li>• <code>offsetRight</code>: The plug-in is moved horizontally towards the right, with respect to its original position.</li> </ul>
Y Relative	<p>Determines the vertical positioning of the plug-in with respect to its original position within the coordinate layout.</p> <ul style="list-style-type: none"> <li>• <code>offsetTop</code>: The plug-in is moved vertically towards the top, with respect to its original position.</li> <li>• <code>offsetBottom</code>: The plug-in is moved vertically towards the bottom, with respect to its original position.</li> </ul>
Lock Aspect	<p>When you resize a plug-in, you have the option to maintain its aspect ratio.</p> <p>When set to <code>true</code>, the aspect ratio of the plug-in is locked.</p> <p>When set to <code>false</code>, the aspect ratio of the plug-in is not locked.</p>
Offset Left	<p>Enter a numeric value to set the horizontal offset or displacement of the plug-in from the left edge of the coordinate layout. The value represents the number of units (pixels, points, etc.) the plug-in should be offset from the left edge.</p>
Offset Top	<p>Enter a numeric value to set the vertical offset or displacement of the plug-in from the top edge of the coordinate layout. The value represents the number of units the plug-in should be offset from the top edge.</p>

Scroll bars appear when the card size is smaller than the plug-in size.

## Set Background Image

To add a background image:

1. Select the check box for **Background Image**.
2. Select image **Source Type** from these options:
  - **File**: Browse your local system and choose an image file to upload.
  - **URL**: Enter a URL address of the image you want to add as a background.
3. The following settings allow you to control the appearance of the background image.

Fit	Determines how a background image is scaled to fit within its layout.
-----	---

	<ul style="list-style-type: none"> <li>◦ <i>Auto</i>: Displays the image at its original size.</li> <li>◦ <i>Cover</i>: Scales the image to cover the entire layout area while maintaining its aspect ratio. The image may get cropped.</li> <li>◦ <i>Contain</i>: Scales the image proportionally to fit within the layout area without the need for cropping.</li> </ul>
Repeat	<p>Determines if/how a background image should be repeated to fill the layout.</p> <ul style="list-style-type: none"> <li>◦ <i>None</i>: Image is not repeated. It is displayed only once covering the available area.</li> <li>◦ <i>Repeat</i>: Image is repeated both horizontally and vertically (grid-like pattern) to fill the layout area.</li> <li>◦ <i>Repeat X</i>: Image is repeated only horizontally along the x-axis.</li> <li>◦ <i>Repeat Y</i>: Image is repeated only vertically along the y-axis.</li> <li>◦ <i>Space</i>: Image is repeated only as much as possible without cropping, and the space between the repeats are distributed evenly.</li> <li>◦ <i>Round</i>: Image is repeated only as much as possible without cropping, and the repeats are resized to fill the available space.</li> </ul>
Horizontal	<p>Determines how a background image is positioned horizontally within its layout.</p> <ul style="list-style-type: none"> <li>◦ <i>Left</i>: Image is aligned to the left side.</li> <li>◦ <i>Center</i>: Image is horizontally centered.</li> <li>◦ <i>Right</i>: Image is aligned to the right side.</li> </ul>
Vertical	<ul style="list-style-type: none"> <li>◦ <i>Top</i>: Image is aligned to the top.</li> <li>◦ <i>Center</i>: Image is vertically centered.</li> <li>◦ <i>Bottom</i>: Image is aligned to the bottom.</li> </ul>

## Interactive Map

This topic describes properties for an interactive map layout.

The interactive map functionality is available in both coordinate and flexbox card layout types. For older version, see [Interactive Map \(on page 549\)](#).

1. Upload an image.
2. Double-click the image areas where you want to create a marker.
3. Select the marker you want to update.
4. On the details panel, select **+Add Marker State**, and update the properties.

5. Similarly update all markers on the image.
6. You can also delete markers on the image.

If you selected an interactive map functionality for your layouts, then configure these details:

Field Name	Description
Map Image	Select <b>Upload Image</b> to browse and select an image. The option to upload an image is also available within the interactive map card layout.
Coordinates	<p>Enter these coordinates to position the image within the card. The value should be less than or equal to 99.</p> <ul style="list-style-type: none"> <li>• <b>Top Offset:</b> The margin between the top of the card and top of the image.</li> <li>• <b>Left Side Offset:</b> The margin between the left side of the card and left side of the image.</li> </ul> <p>You can also set the coordinates by moving the image on the layout. The values in the text box are adjusted based on the set position.</p>
Marker Type	<p>You can select one of the following options:</p> <ul style="list-style-type: none"> <li>• <b>Shape</b></li> <li>• <b>Image</b></li> </ul>
Color	If you selected <b>Shape</b> as the marker type, specify a fill color.
Shape	<p>If you selected <b>Shape</b> as the marker type, select one of the following options:</p> <ul style="list-style-type: none"> <li>• Round</li> <li>• Square</li> </ul>
Marker Image	<p>If you selected <b>Image</b> as the marker type, upload an image for the marker.</p> <p>For example, if the marker identifies the position of a radiator fan, you can upload the image of a fan instead of using a predefined round or square shape for the marker.</p>
Size	Enter the size to multiply the default size of the marker shape or image size.

Field Name	Description
	For example, if you enter 2, the marker size is double the default size. By default, the value in this field is 1. The marker size can have a value greater than or equal to 100.
Label	If you want a label to appear for the marker, then enter the label name.
Label Color	Choose a color for the label text.
Data Label	<p>You can choose to pass the data to the interactive map using a query, global, formula, or enter the value manually.</p> <p>For example, suppose the interactive map plots the temperature of various components of a car. For a marker that identifies the position of a radiator fan in a car, you can map the data label with the output of the query that retrieves the temperature of the fan. When you access the application, the temperature value retrieved from the query is displayed for the radiator fan.</p>
Number Format	<ul style="list-style-type: none"> <li>• <b>Use Raw Format:</b> Select the check box to display numbers in raw format. For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.</li> <li>• <b>Number of decimals:</b> This option appears if you do not want to display numbers in raw format.</li> </ul> <p>In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.</p>
Data Label Color	Identifies the color and opacity of the data label.
Show/Hide	Select <b>+Add Conditions</b> to create conditions that show or hide the interactive map. See <a href="#">Apply Conditions (on page 828)</a> .
BEHAVIOR	<p>You can set actions to be performed when a marker is selected.</p> <ol style="list-style-type: none"> <li>1. Select <b>+Add</b>.</li> <li>2. Select from the list of available actions for the marker.</li> </ol>
Delete Marker	Select the marker you want to delete, and select the <b>Delete</b> icon.

## Repeater

A repeater layout displays a set of repeating objects.

The repeater functionality is available only in the flexbox card layout. For older version, see [Repeater \(on page 553\)](#).

If you selected a repeater functionality for your [flex layout \(on page 240\)](#), then configure these details:



**Note:**

If the graphic(s) in a Repeater plug-in is not appearing at runtime, you can either reduce your graphic's width using the [flexbox \(on page 240\) Width](#) property and/or set the **Flex Wrap** property to `Wrap`.

Field Name	Description
Repeater Source	Select a query to retrieve data, which is displayed in the repeater.
Multi Select	<p>This property is used in combination with a map or a graph plug-in. Select this check box if you want to insert a check box for multi-selection.</p> <p>In the end application, a check box appears in each row of the repeater, allowing you to select which items should appear on the map or the graph.</p>
Checked	<p>This property applies only if you enabled multi-selection check boxes.</p> <p>Select this check box if you want multi-selection check boxes selected by default.</p> <p>When you open the end application, the check box that appears in each row of the repeater remains selected by default.</p>
Load	Select this check box if you want to add rows that appear by default in the repeater.
Page Size	Enter the number of rows that should appear by default in the repeater.
Paging Style	<p>Choose from these options:</p> <ul style="list-style-type: none"> <li>• <b>Paging</b>: Each page in the repeater will contain the number of rows that you specify. You can navigate to the other pages to access the rest of the rows.</li> <li>• <b>Load More</b>: The repeater will initially contain the number of rows that you specify. A <b>Load more</b> button appears in the application, which allows you to retrieve additional rows in the same page.</li> </ul>

# Applications

## About Applications

Operations Hub provides a user-friendly interface to create application components such as database tables (called entities), queries, events, email templates, users, and so on, without the need to write code.

You can then develop applications using these components. To develop an application, you will perform the following tasks:

1. Create all the components that are required for the application.
2. Create the pages and dashboards for the application.
3. Apply themes, define the navigation details.
4. Access and test the application.
5. Provide users access to the application.



**Note:**

If you have installed only the Operations Hub add-on for Historian, you cannot create an application or components of an application. You can only access the Historian analysis application.

Suppose you want to create an application that will send an email notification if the temperature recorded by a sensor exceeds 40 degrees Celsius. In this case, you will perform the following tasks:

1. Create an email template, which will contain the text and event parameters that you want to send in the email.
2. Create an event that will be triggered when the temperature recorded by the sensor exceeds 40 degrees Celsius.
3. Add an action to the event to define the recipients and send an email using the email template that you have created.
4. Create a page to display the sensor data. You can display the data using components such as text, gauges, or historical trend charts.
5. Add an event settings component to the page to allow application users to turn the event on or off.


## Grant Access to an Application for an Individual User (Classic)

Steps for Operations Hub classic version.

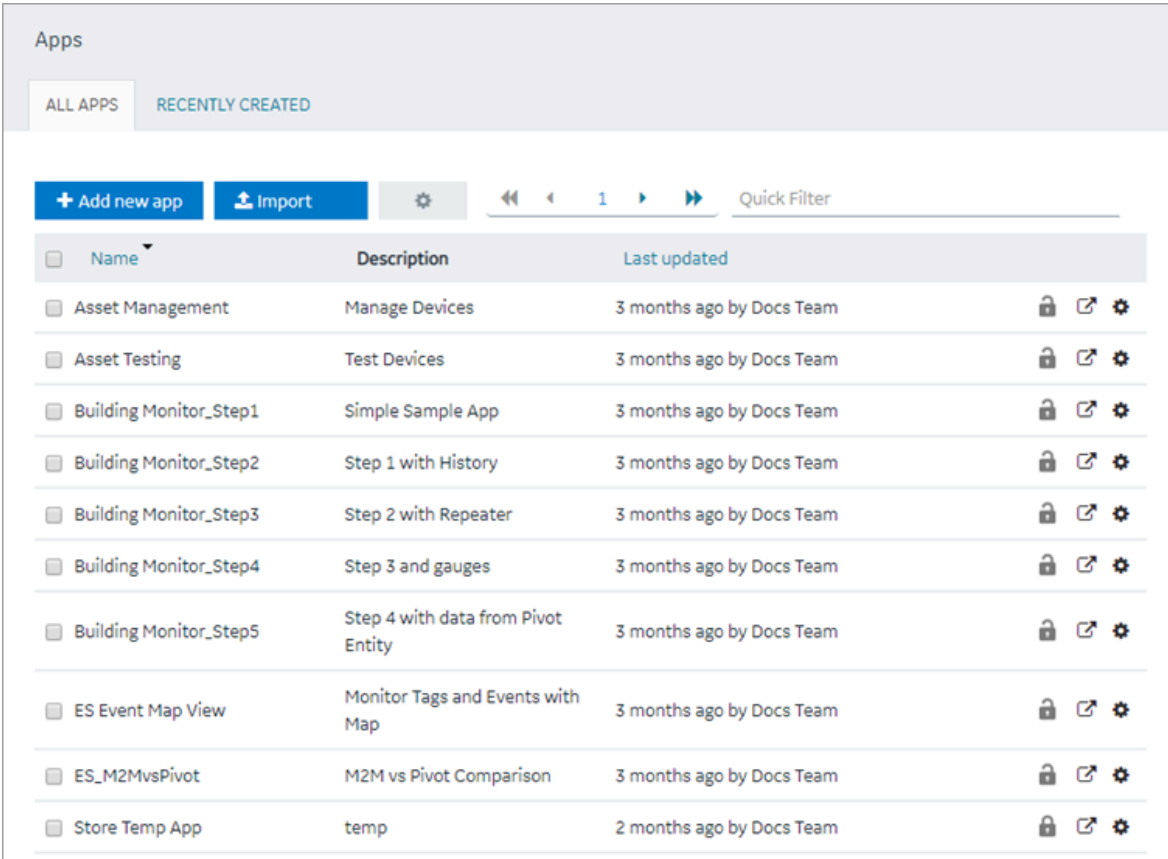
Log in to Operations Hub.



By default, all the developers can access all the applications that they have developed. Application users, however, can access only the applications to which they are granted access. You can also grant access to a role.

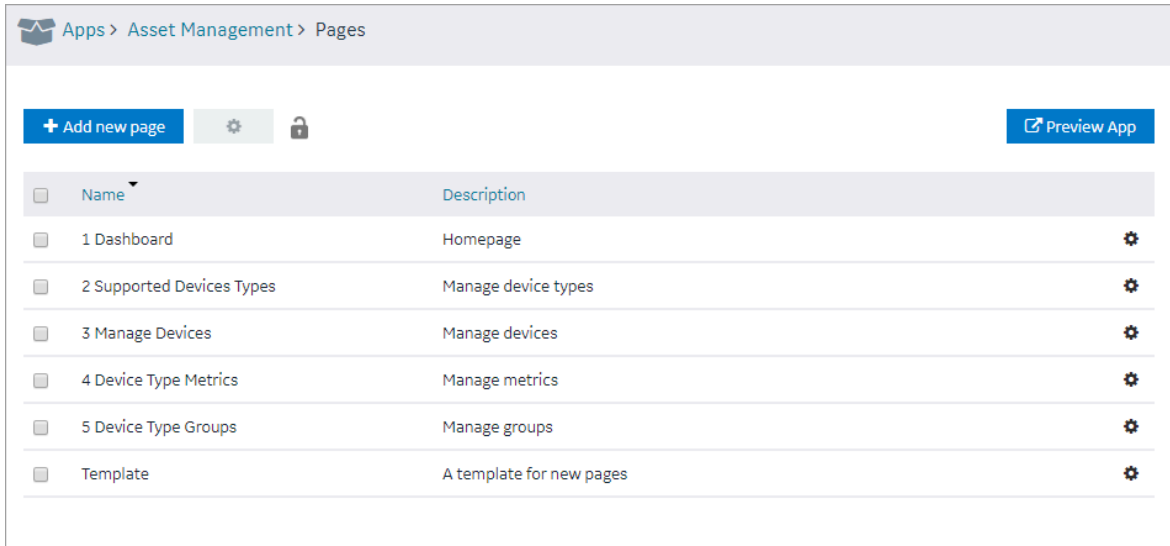
 **Note:**  
A user must be a member of the `iqp.user` group in order to be assigned to an App.

- 1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.



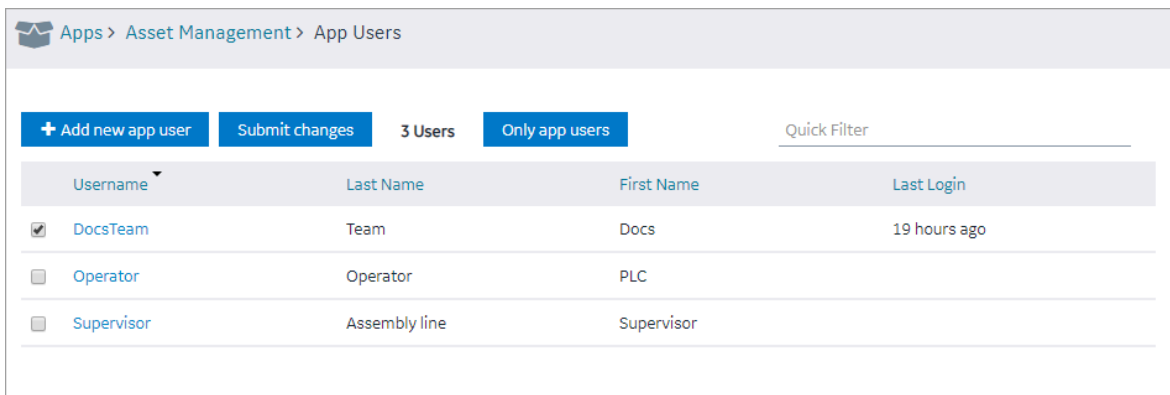
<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/>	ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/>	ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/>	Store Temp App	temp	2 months ago by Docs Team	

- 2. In the **Name** column, select the application to which you want to grant access.  
The **PAGES** workspace appears.



3. In the main navigation menu, select **APP USERS**.

The **APP USERS** workspace appears, displaying a list of application users created in the site.



4. In each row containing an application user to whom you want to grant access, select the check box, and then select **Submit changes**.

The selected users can now access the application.

## Grant Access to an Application for a Group (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

By default, all the developers can access all the applications that they have developed. Application users, however, can access only the applications to which they are granted access. You can also grant access to a role.

**Note:**

A user must be a member of the `iapp.user` group in order to be assigned to an App.

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import << < 1 > >> Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/>	ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/>	ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/>	Store Temp App	temp	2 months ago by Docs Team	

2. In the **Name** column, select the application to which you want to grant access.

The **PAGES** workspace appears.

<input type="checkbox"/>	Name	Description	
<input type="checkbox"/>	1 Dashboard	Homepage	⚙️
<input type="checkbox"/>	2 Supported Devices Types	Manage device types	⚙️
<input type="checkbox"/>	3 Manage Devices	Manage devices	⚙️
<input type="checkbox"/>	4 Device Type Metrics	Manage metrics	⚙️
<input type="checkbox"/>	5 Device Type Groups	Manage groups	⚙️
<input type="checkbox"/>	Template	A template for new pages	⚙️

3. In the main navigation menu, select **APP GROUPS**.

The **APP GROUPS** workspace appears, displaying the list of UAA groups for the UAA connected to this instance Operations Hub.

4. In each row containing an application user to whom you want to grant access, select the check box, and then select **Submit changes**.

The selected groups can now access the application.

## Access an Application (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

To access applications in the latest version of Operations Hub, refer to [Navigation Panel \(on page 214\)](#).

1. In the main navigation menu, select **APPS**.


The **APPS** workspace appears.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import ⚙️ ⏪ ⏩ 1 ⏪ ⏩ Quick Filter

Name	Description	Last updated	
Asset Management	Manage Devices	3 months ago by Docs Team	🔒 📄 ⚙️
Asset Testing	Test Devices	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	🔒 📄 ⚙️
ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	🔒 📄 ⚙️
ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	🔒 📄 ⚙️
Store Temp App	temp	2 months ago by Docs Team	🔒 📄 ⚙️

- In the row containing the application that you want to access, select .
- If you want to access the application in a web browser, select **Open**. If, however, you want to access the application on a mobile device, scan the QR code using the device.  
The application appears in a new browser tab or on your mobile device.

If upgrading to Operations Hub 2.0, please note that every application can be referenced by an URL. All hardcoded links to applications must be updated with the new URLs.

## Access a Recently Created Application (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

- In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import [Settings] << < 1 > >> Quick Filter

<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	

2. Select **RECENTLY CREATED**.

A list appears with the ten most recently created applications.

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Widget font testing 2		18 hours ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	ES Event Map View	Monitor Tags and Events with Map	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step1	Simple Sample App	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step2	Step 1 with History	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step3	Step 2 with Repeater	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step4	Step 3 and gauges	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step5	Step 4 with data from Pivot Entity	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	ES_M2MvsPivot	M2M vs Pivot Comparison	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Asset Management	Manage Devices	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Asset Testing	Test Devices	Yesterday by Docs Team	🔒 📄 ⚙️

## Access a Recently Modified Application (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.

Apps

ALL APPS RECENTLY CREATED

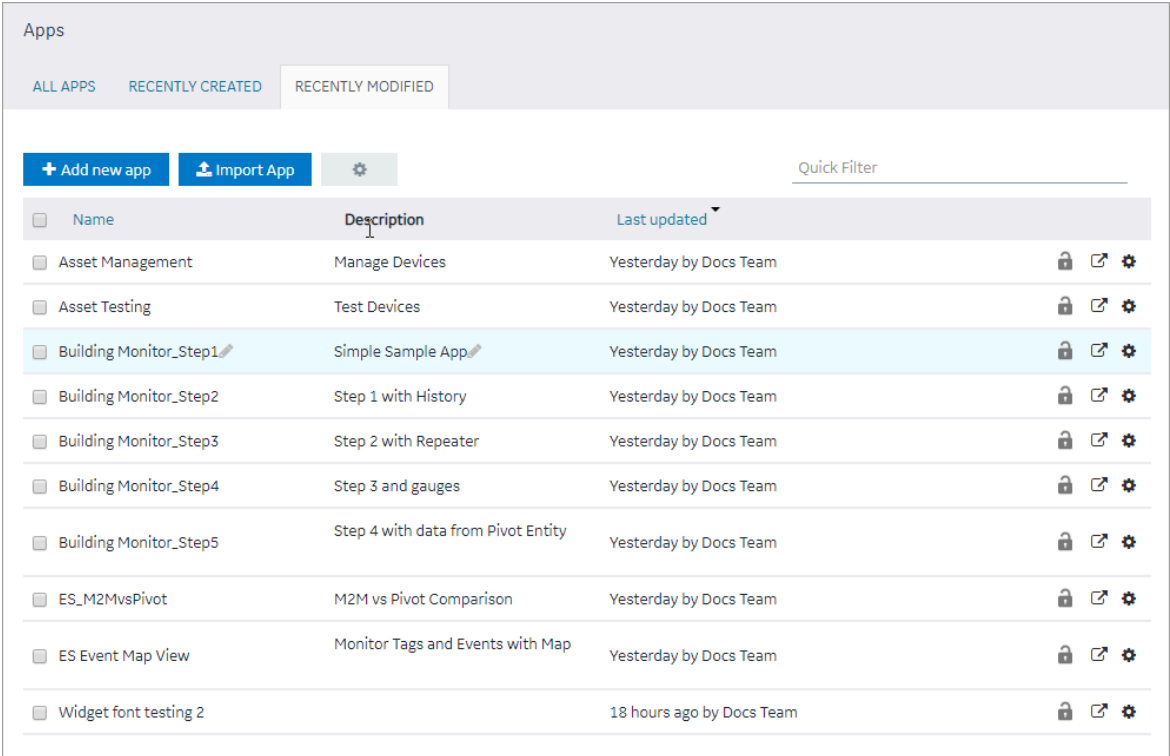
+ Add new app Import [Settings] << < 1 > >> Quick Filter

<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	

2. Select **RECENTLY MODIFIED**.



A list appears with the ten most recently modified applications.



## Create an Application

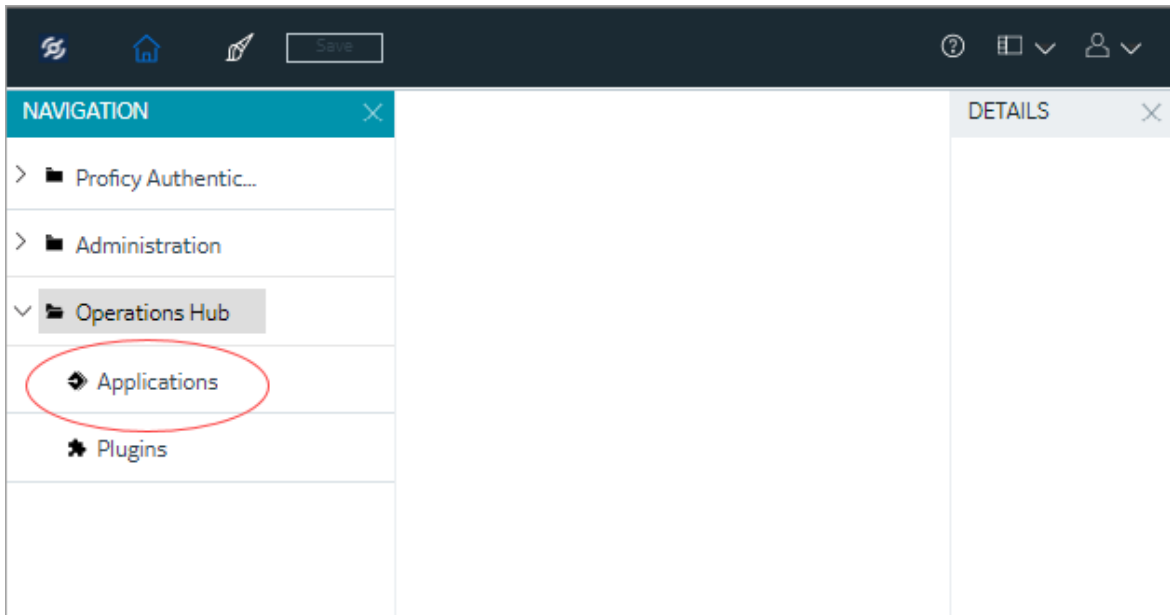
Steps to create an application in the latest version of Operations Hub.

Log in to Configuration Hub.

You can also create an application by copying an existing application. Refer to [Copy an Application \(on page 269\)](#).

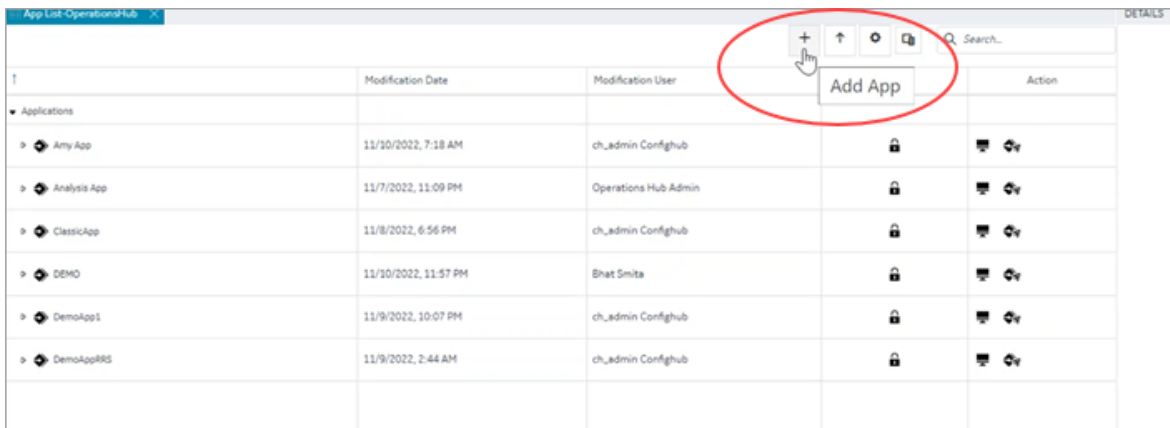
For steps to create applications in the Operations Hub classic version, refer to [Create an Application \(Classic\) \(on page 267\)](#).

1. On the navigation panel, select **Operations Hub > Applications**.



The existing list of applications appear.

2. Select **Add App**.



The **Create App** screen appears.

3. Enter the following field values:

Field Name	Field Description
APP NAME	Name of your application.  The name must contain at least one uppercase or lowercase letter.
DESCRIPTION	Brief description of your application.

Field Name	Field Description
FIRST PAGE NAME	Name of the your application's first page.
LAYOUT	Based on your application design requirements, select a layout. <ul style="list-style-type: none"> <li>◦ Grid (<a href="#">on page 239</a>)</li> <li>◦ Flexbox (<a href="#">on page 240</a>)</li> <li>◦ Coordinate (<a href="#">on page 248</a>)</li> </ul>

#### 4. Select **Add**.

The screenshot shows a 'Create App' form with the following fields and values:

- APP NAME:** SPODE1
- DESCRIPTION:** Monitoring Pumps
- FIRST PAGE NAME:** Pump01
- LAYOUT:** Grid (selected from a dropdown menu)

At the bottom right of the form, there are two buttons: a grey 'Cancel' button and a blue 'Add' button.

The application is created with a default page.

## Create an Application (Classic)

Steps to create an application in the Operations Hub classic version.

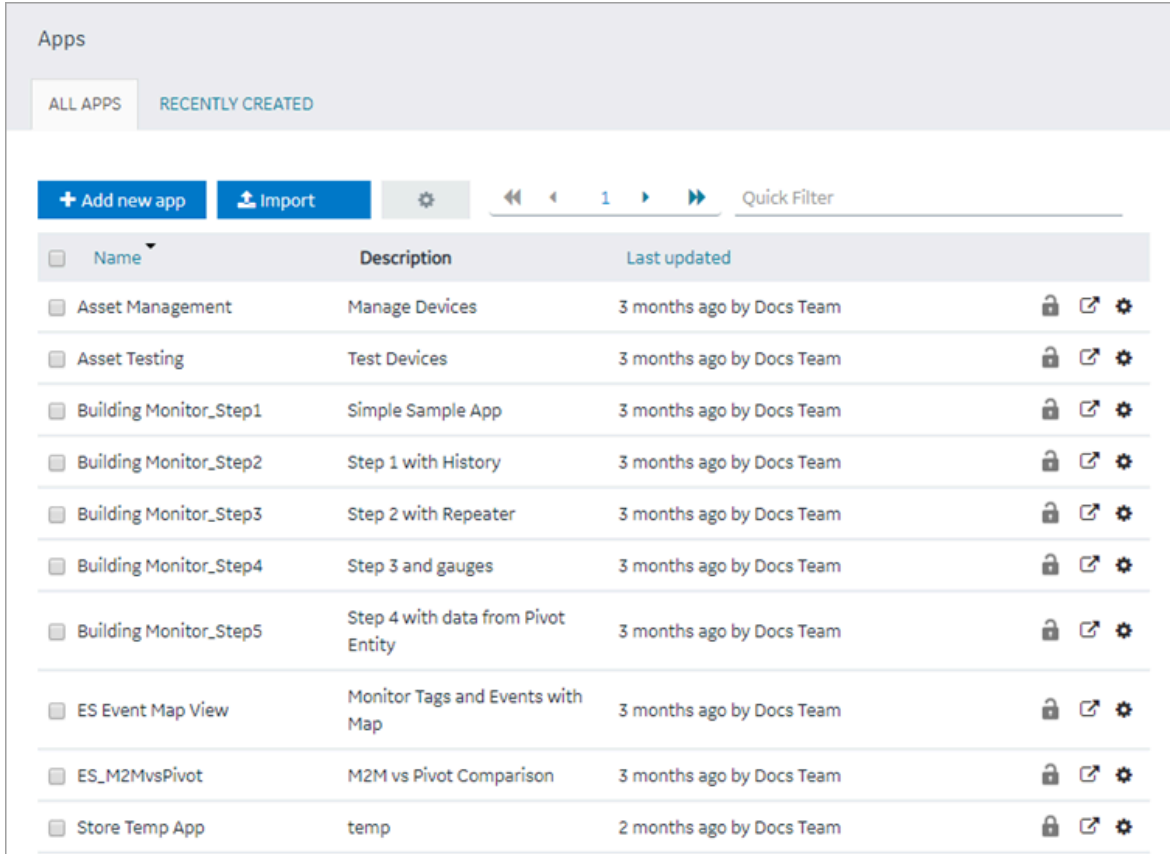
Log in to Operations Hub.

You can also create an application by copying an existing application. Refer to [Copy an Application \(on page 269\)](#).

For steps to create applications in the latest version of Operations Hub, refer to [Create an Application \(on page 265\)](#).

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.

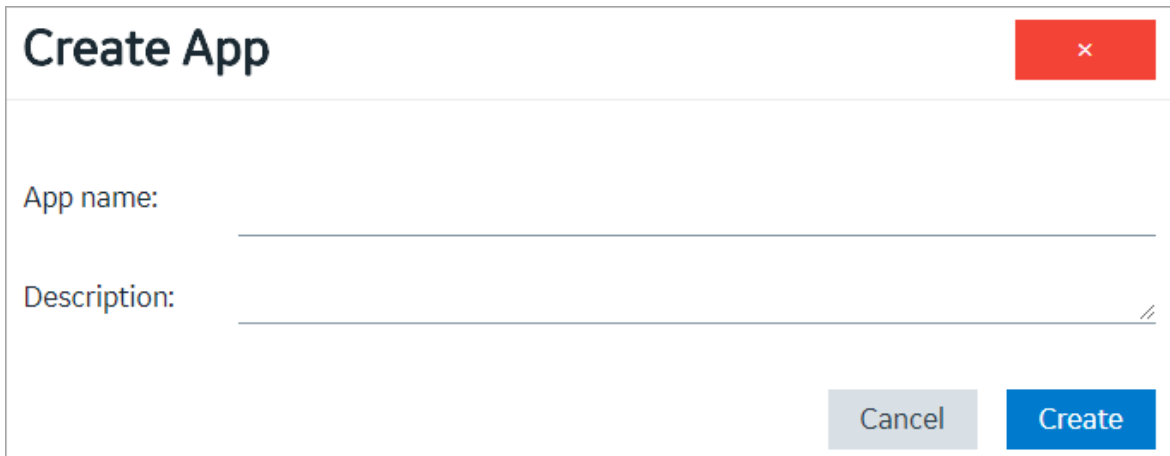


The screenshot shows the 'Apps' workspace interface. At the top, there are two tabs: 'ALL APPS' and 'RECENTLY CREATED'. Below the tabs, there are three buttons: '+ Add new app', 'Import', and a settings gear icon. To the right of these buttons is a pagination control showing '1' and navigation arrows, and a 'Quick Filter' input field. The main area contains a table with the following columns: 'Name', 'Description', and 'Last updated'. Each row in the table includes a checkbox, the app name, a description, the last update date and user, and three icons: a lock, a share icon, and a settings gear.

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/>	ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/>	ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/>	Store Temp App	temp	2 months ago by Docs Team	

2. Select **Add new app**.

The **Create App** window appears.



The screenshot shows the 'Create App' dialog box. It has a title bar with the text 'Create App' and a red close button with a white 'x' icon. Below the title bar, there are two input fields: 'App name:' followed by a text input field, and 'Description:' followed by a text area with a double-slash icon at the bottom right. At the bottom of the dialog, there are two buttons: 'Cancel' and 'Create'.

3. In the **App name** and **Description** boxes, enter values, and then select **Create**. The name must contain at least one uppercase or lowercase letter.

The application is created.

[Create a page \(on page 450\)](#).

## Copy an Application

Steps to copy an application in the latest version of Operations Hub.

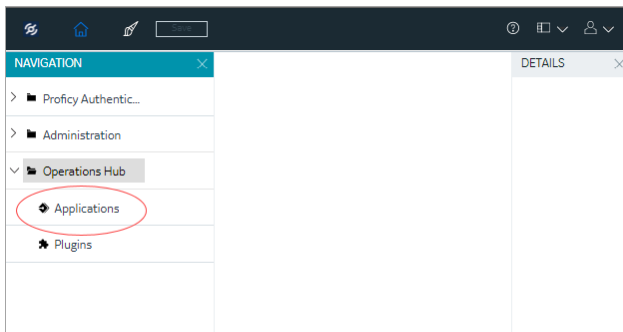
Log in to Configuration Hub.

You can also create new applications without copying one. Refer to [create an application \(on page 265\)](#).

You can copy an application only if it was created within the same site. If you want to copy an application that belongs to a different site, you must [export the application \(on page 274\)](#), and then [import \(on page 278\)](#) it.


For steps to copy applications in the Operations Hub classic version, refer to [Copy an Application \(Classic\) \(on page 272\)](#).

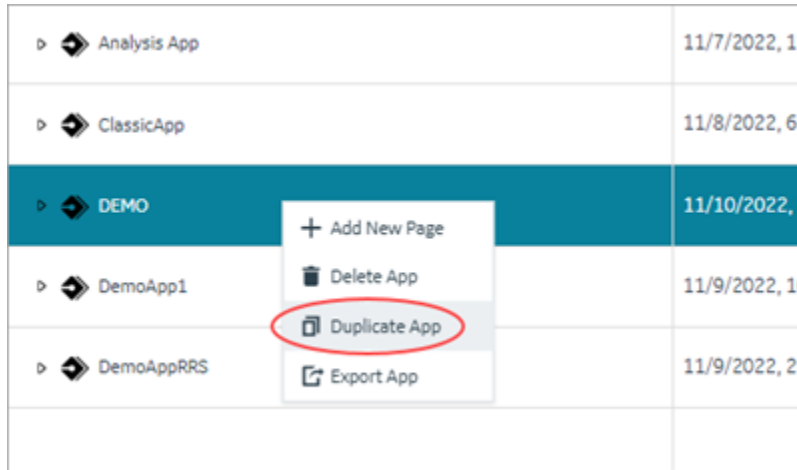
1. On the navigation panel, select **Operations Hub > Applications**.




The existing list of applications appear.

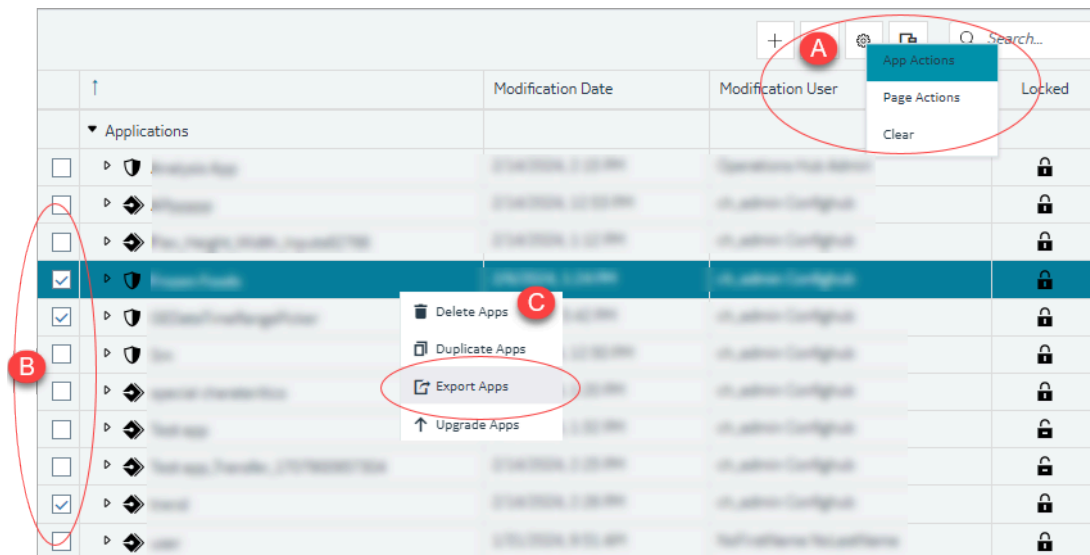
2. For the application you want to copy:

- Select  > **Duplicate App**
- Right-click and select **Duplicate App**.



You can also duplicate multiple applications at a time. To do so:

- Select , and then select **App Actions**.



A selection check box appears next to each application.

	↑	Modification Date
	Applications	
<input type="checkbox"/>	▶ Amy App	11/10/2022
<input type="checkbox"/>	▶ Analysis App	11/7/2022
<input type="checkbox"/>	▶ ClassicApp	11/8/2022
<input checked="" type="checkbox"/>	▶ DEMO	11/10/2022
<input checked="" type="checkbox"/>	▶ DemoApp1	11/9/2022
<input type="checkbox"/>	▶ DemoAppRRS	11/9/2022

b. Select the check box for all the applications you want to duplicate.



**Note:**

To select/clear a check box, you must first select the application in the list.

c. Right-click and select **Duplicate Apps**.

<input type="checkbox"/>	▶ Analysis App	11/7/2022, 1
<input type="checkbox"/>	▶ ClassicApp	11/8/2022, 6
<input checked="" type="checkbox"/>	▶ DEMO ↗	11/10/2022,
<input checked="" type="checkbox"/>	▶ DemoApp1	11/9/2022, 1
<input type="checkbox"/>	▶ DemoAppRRS	11/9/2022, 2

- Delete Apps
- Duplicate Apps
- Export Apps

A confirmation message appears.

3. Select **Ok** to confirm the duplicate action.

The **Create App** screen appears. The **APP NAME** field contains a system-generated value added to the existing application name.

4. **Optional:** Modify **APP NAME** and **DESCRIPTION**.
5. Select **Add**.

A duplicate copy of the original application along with its pages is created.

## Copy an Application (Classic)

Steps to copy an application in the Operations Hub classic version.

Log in to Operations Hub.

You can also create new applications without copying one. Refer to [create an application \(on page 265\)](#).

You can copy an application only if it was created within the same site. If you want to copy an application that belongs to a different site, you must [export the application \(on page 274\)](#), and then [import \(on page 278\)](#) it.


For steps to copy applications in the latest version of Operations Hub, refer to [Copy an Application \(on page 269\)](#).































1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.



Apps

ALL APPS RECENTLY CREATED

+ Add new app Import App  << < 1 > >> Quick Filter

<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	  
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	  
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	  
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	  
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	  
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	  
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	  
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	  
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	  
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	  


2. In the rows containing the applications that you want to copy, select the check boxes.

3. In the workspace heading, select , and then select **Duplicate apps**.

A message appears, asking you to confirm that you want to duplicate the applications.



**Tip:**

Alternatively, in the row containing each application that you want to copy, select , and then select **Duplicate app**.

4. Select **OK**.

The **Create App** window appears. The **App name** box contains the name of the application that you want to copy, along with a system-generated value. The **Description** box contains the description of the application that you want to copy.

## Create App ×

---

App name:

Description:

Cancel
Create

5. For each application that you have selected, modify values in the **App name** and **Description** boxes as needed, and then select **Create**.

The applications are copied. The **Pages** workspace for the first application that you have copied appears, displaying a list of pages copied from the original application.

## Export an Application

Steps to export an application in the latest version of Operations Hub.

Log in to Configuration Hub.

For steps to export applications in the Operations Hub classic version, refer to [Export an Application \(Classic\)](#) (on page 276).

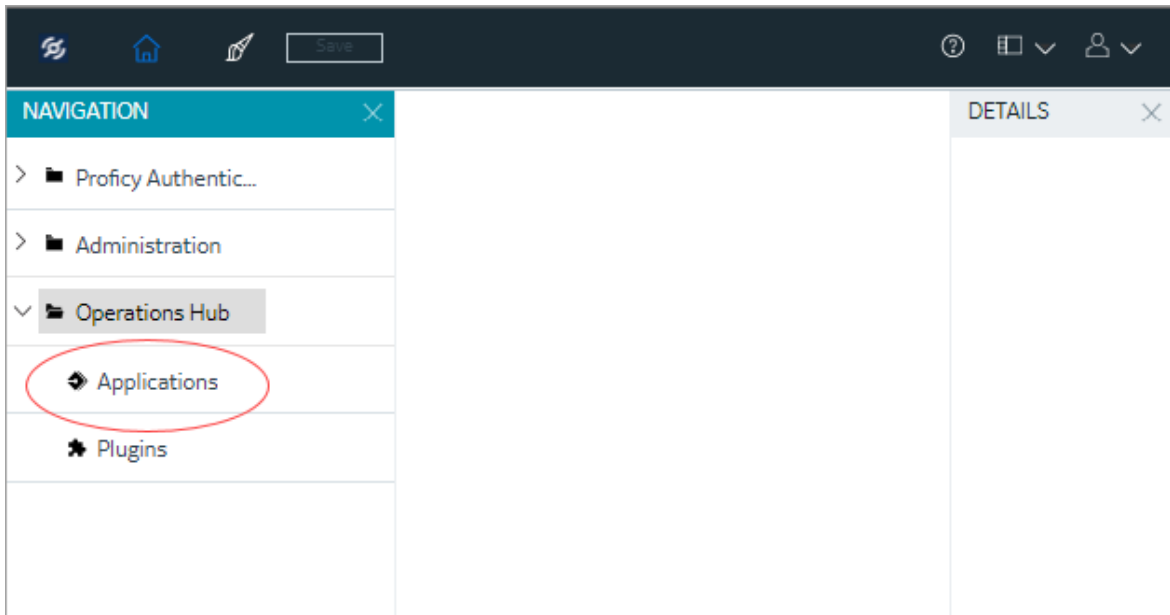
- To avoid compatibility issues, applications termed as 'legacy' are not supported for export. If you want to export a legacy application, then [make a copy of the application](#) (on page 269) and export it.
- To use or copy an application that was created on a different site, you must export the application, and then [import](#) (on page 278) it.



**Tip:**

If you want to export multiple applications that use the same entities and queries, export them together (instead of exporting them individually).


1. On the navigation panel, select **Operations Hub > Applications**.



The existing list of applications appear.

2. Select the application(s) to export.

Multiple ways to select:

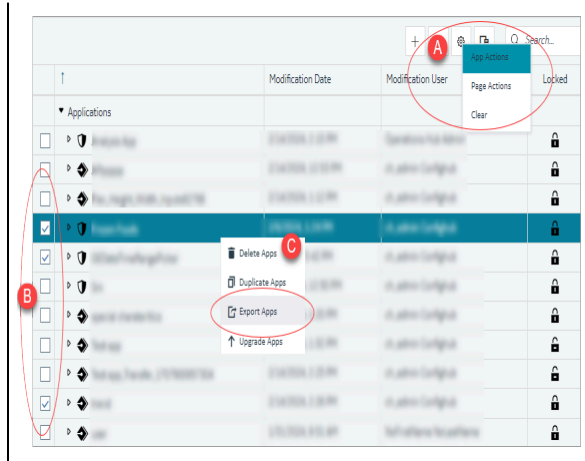
<p>For the application you want to export,</p> <p>Select  &gt; <b>Export App</b>.</p>	<p>This screenshot shows a table of applications. The 'Frozen Foods' application is selected. A context menu is open over it, and the 'Export App' option is circled in red. A red arrow points from the 'Export App' option in the context menu to the 'Export App' icon in the application's action column.</p>
<p>Right-click the application and select <b>Export App</b>.</p>	<p>This screenshot shows the same application list. A right-click context menu is open over the 'Frozen Foods' application, and the 'Export App' option is circled in red.</p>

**Select Multiple Applications to Export:**

- a. Select  > **App Actions**

A selection check box appears next to each application.

- b. Select the check box for the applications you want to export.
- c. Right-click and select **Export Apps**.



A confirmation message appears.

3. Select **Ok** to confirm the export action.

4. **Required:** In case, the application being exported contains extension queries, then the related data sources for extension queries are displayed. Choose the data source(s) you want to export along with the application.

- a. In the **Select Datasources** screen, select the compatible data sources.

- b. Select **Export**.

The exported data is saved as an application artifact (.zip file), which contains:

- a .zip file for each plug-in used in the application.
- an .xml file for the remaining components used in the application.

The file name is appended with `_IQPAppPackage` to indicate that it is an exported application artifact. For example, if the application name is 'Q4Benchmark', then the exported artifact is named `Q4Benchmark_IQPAppPackage`.

The exported file is saved to the default download location of the browser.

**Important:**

To avoid system related errors, do not modify original exported zip files and repackage them for import.

## Export an Application (Classic)

Steps to export an application in the Operations Hub classic version.

Log in to Operations Hub.

To use or copy an application that was created on a different site, you must export the application, and then [import \(on page 278\)](#) it.



**Tip:**

If you want to export multiple applications that use the same entities and queries, export them together (instead of exporting them individually).

Default applications in Operations Hub cannot be exported. If you want to export a default application, then [make a copy of the application \(on page 269\)](#) and export it.

For steps to export applications in the latest version of Operations Hub, refer to [Export an Application \(on page 274\)](#).

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.

The screenshot shows the 'Apps' workspace with the following table of applications:

Name	Description	Last updated
Asset Management	Manage Devices	3 months ago by Docs Team
Asset Testing	Test Devices	3 months ago by Docs Team
Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team
Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team
Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team
Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team
Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team
ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team
ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team
Store Temp App	temp	2 months ago by Docs Team


2. In the rows containing the applications that you want to export, select the check boxes.

3. In the workspace heading, select , and then select **Export apps**.

A message appears, indicating that the application will be saved in the default download location of the browser.



**Tip:**

Alternatively, in the row containing each application that you want to export, select , and then select **Export app**.

4. Select **OK**.

5. **Required:** In case, the application being exported contains extension queries, then the related data sources for extension queries are displayed. Choose the data source(s) you want to export along with the application.

a. In the **Select Datasources** pop-up screen, select the compatible data sources.

b. Select **Export**.

The exported data is saved as an application artifact (.zip file), which contains:

- a .zip file for each plug-in used in the application.
- an .xml file for the remaining components used in the application.

The file name is appended with `_IQAppPackage` to indicate that it is an exported application artifact. For example, if the application name is 'Q4Benchmark', then the exported artifact is named `Q4Benchmark_IQAppPackage`.

The exported file is saved to the default download location of the browser.



**Important:**

To avoid system related errors, do not modify original exported zip files and repackage them for import.

[Import the application \(on page 278\)](#).

## Import an Application

Steps to import an application in the latest version of Operations Hub.

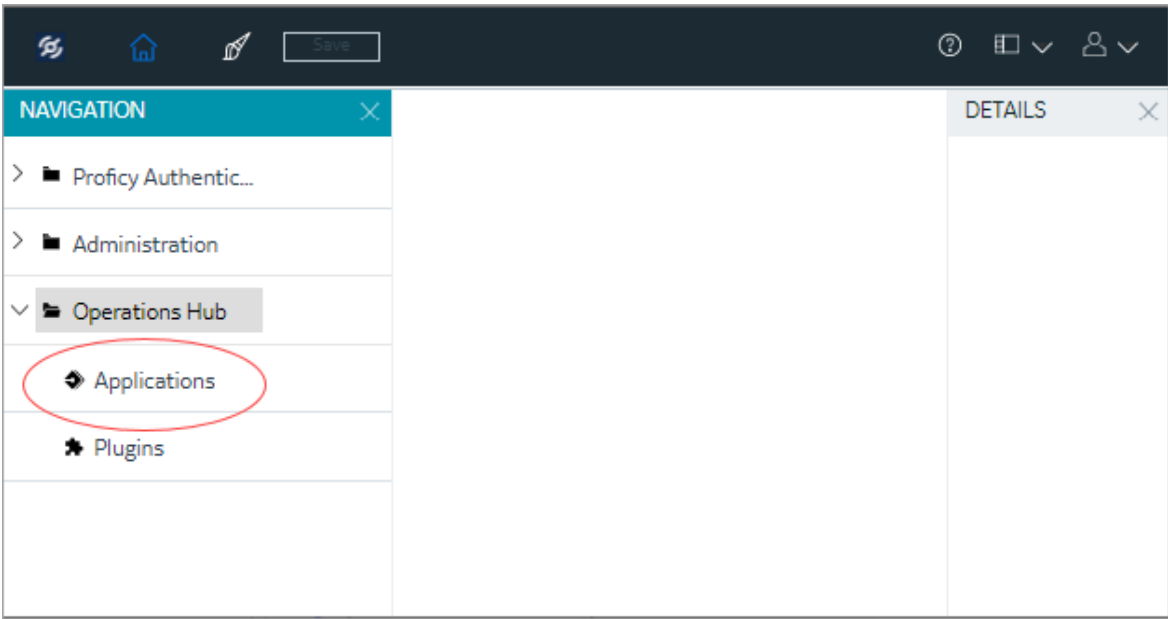
When you import an application, a copy of the application and its components (that is, plug-ins, pages, entities, queries, events, themes, and settings) is created. If an application or a component with the same name exists in the current site, then a system-generated number is appended to the name of the imported

application or component. However, if a plug-in with the same name exists, the plug-in is not imported. Instead, the plug-in that already exists in the site is used in the application.

For steps to import applications in the Operations Hub classic version, refer to [Import an Application \(Classic\) \(on page 281\)](#).

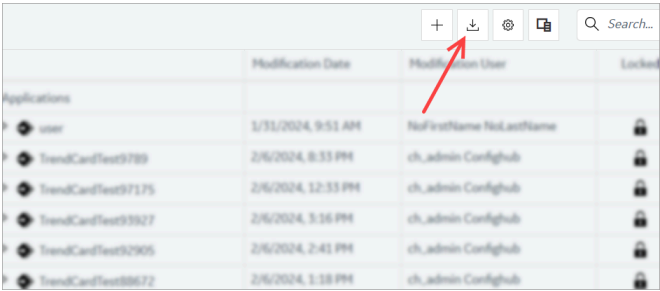
[Export the application \(on page 274\)](#) that you want to import. To avoid compatibility issues, applications termed as 'legacy' are not supported for import.

- 1. Log in to Configuration Hub.
- 2. On the navigation panel, select **Operations Hub > Applications**.



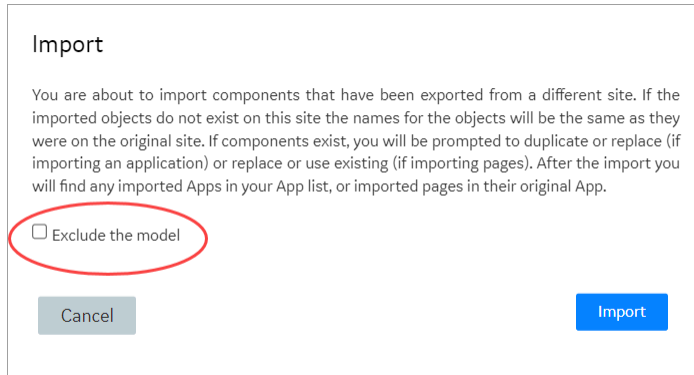
The existing list of applications appear.

- 3. On the toolbar, select the import icon.



An import confirmation message appears.

- 4. **Optional:** If you prefer not to import the data configuration associated with the App(s), then select the **Exclude the model** check box.



5. Select **Import** to navigate your local system.
6. Locate and choose the application artifact (.zip file) you want to import, then select **Open**.

**!** **Important:**  
To avoid system related errors, do not modify original exported artifact and repackage them for import.

7. If the application being imported already exists in Operations Hub with the same name, a **Confirm** screen appears to resolve the import conflict. Select one of the following:

<b>Duplicate</b>	Creates a duplicate copy of the application and imports to Operations Hub.
<b>Replace</b>	Deletes the existing application in Operations Hub and replaces with the one from the import file.  It is possible that some conflicting items (query, data source, entity, theme, etc.) detected during application import may have the same name but a different configuration.

If duplicate data source records are found, you may be asked to confirm before importing the file to Operations Hub. Refer to [Handling Duplicate OPC UA Data Sources \(on page 282\)](#).

8. If the system detects that the imported application has widgets/plugin eligible for upgrades, then they are automatically updated to their latest versions. See [Configure Plug-in Upgrades \(on page 284\)](#).

A copy of the selected application is created. The **Pages** workspace appears, displaying a list of pages copied from the original application.



## Import an Application (Classic)

Steps to import an application in the Operations Hub classic version.

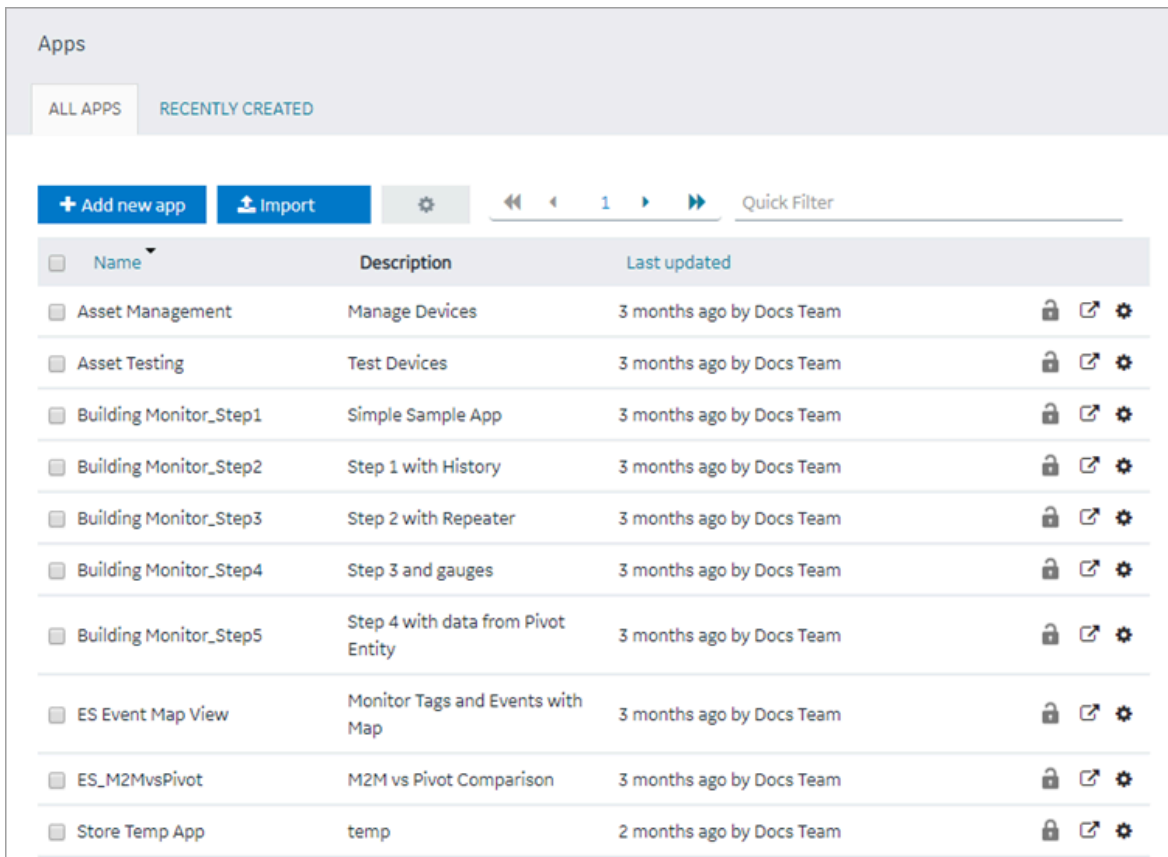
When you import an application, a copy of the application and its components (that is, plug-ins, pages, entities, queries, events, themes, and settings) is created. If an application or a component with the same name exists in the current site, then a system-generated number is appended to the name of the imported application or component. However, if a plug-in with the same name exists, the plug-in is not imported. Instead, the plug-in that already exists in the site is used in the application.

For steps to import applications in the latest version of Operations Hub, refer to [Import an Application \(on page 278\)](#).

[Export the application \(on page 274\)](#) that you want to import. Default applications are excluded from the import operation.

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.



The screenshot displays the 'Apps' workspace. At the top, there are tabs for 'ALL APPS' and 'RECENTLY CREATED'. Below the tabs, there are buttons for '+ Add new app', 'Import', and a settings gear icon. A pagination control shows '1' and navigation arrows. A 'Quick Filter' input field is also present. The main content is a table with the following data:

Name	Description	Last updated	
Asset Management	Manage Devices	3 months ago by Docs Team	🔒 📄 ⚙️
Asset Testing	Test Devices	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	🔒 📄 ⚙️
Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	🔒 📄 ⚙️
ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	🔒 📄 ⚙️
ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	🔒 📄 ⚙️
Store Temp App	temp	2 months ago by Docs Team	🔒 📄 ⚙️

2. Select **Import App**.

A message appears, indicating that if there is already an application or a component with the same name, the imported application or component will contain a new name.

3. Proceed to import the application.
4. Navigate to the application artifact (.zip file) that you want to import, then select **Open**.



**Important:**

To avoid system related errors, do not modify original exported zip files and repackage them for import.

5. If the application being imported already exists in Operations Hub with the same name, a **Confirm** screen appears to resolve the import conflict. Select one of the following:

<b>Duplicate</b>	Creates a duplicate copy of the application and imports to Operations Hub.
<b>Replace</b>	Deletes the existing application in Operations Hub and replaces with the one from the import file.  It is possible that some conflicting items (query, data source, entity, theme, etc.) detected during application import may have the same name but a different configuration.

If duplicate data source records are found, you may be asked to confirm before importing the file to Operations Hub. Refer to [Handling Duplicate OPC UA Data Sources \(on page 282\)](#).


6. If the system detects that the imported application has widgets/plugin-in eligible for upgrades, then they are automatically updated to their latest versions. See [Configure Plug-in Upgrades \(on page 284\)](#).

A copy of the selected application is created. The **Pages** workspace appears, displaying a list of pages copied from the original application.

## Handling Duplicate OPC UA Data Sources

OPC UA data sources are identified as duplicates if they contain identical server endpoint values.

If duplicate OPC UA data sources are detected during application import, select one of the following:

Option	Description
<b>Use Existing</b>	Maintains the data source record that currently exists in Operations Hub. Does not import the duplicate from the file.
<b>Replace</b>	<p>Deletes the data source record that currently exists in Operations Hub. Imports the duplicate from the file to replace the deleted record.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> This option is enabled only for duplicate data source records sharing the same name and endpoint connection value (URI). Details such as security policy, authentication, etc. may vary in these records.</p> </div>

**Duplicate Apps in Operations Hub:** During import conflict, if you opt for duplicating the application, the relevant data sources are also duplicated.

To resolve any OPC UA data source server endpoint (URI) conflict when duplicating apps:

- Select **Use Existing** to avoid deleting the existing OPC UA record in Operations Hub. This record will not be imported from the file.
- Select **Replace**, to replace the existing OPC UA record in Operations Hub with the record from the import file.

The data source records that do not have a conflict get duplicated.

**Replace Apps in Operations Hub:** During import conflict, if you opt for replacing the application, Operations Hub data source records having the same name as the imported records, are deleted before being replaced with the imported ones.



**Note:**

Any OPC UA data source record in Operations Hub that shares the same name with a record from the import file will get replaced in this scenario. Such records are not considered to be duplicates.

To resolve any OPC UA data source server endpoint (URI) conflict when replacing apps:

- Select **Use Existing** to avoid deleting the existing OPC UA record in Operations Hub. This record will not be imported from the file.
- Select **Replace**, to replace the existing OPC UA record in Operations Hub with the record from the import file.

The data source records that do not have a conflict get replaced.



**Note:**

Duplicate OPC UA data sources that existed in older versions are not removed after upgrading to 2.1 or later. It is recommended to manually delete such duplicate records, or modify them to use a unique server endpoint connection.


## Configure Plug-in Upgrades

A pre-requisite for successful custom plug-in upgrade in Operations Hub.

Plug-in developers can choose to write a specification, or use any transformation mechanism to get an EXE, JAR, or BAT file.

1. Prepare a data transformation specification for plug-in upgrade using any of these methods:

Transformation File Type	Description
Jolt	<p>Open-source JSON-to-JSON transformation library written in Java.</p> <p>For more information, refer to <a href="https://github.com/bazaarvoice/jolt#Documentation">https://github.com/bazaarvoice/jolt#Documentation</a></p> <p>For Jolt spec, you can use <a href="http://jolt-demo.appspot.com/">http://jolt-demo.appspot.com/</a> as a playground to test your transformation.</p>
JAR	<p>Java output using JSON transformation library such as <a href="https://mvnrepository.com/artifact/net.minidev/json-smart/2.4.7">https://mvnrepository.com/artifact/net.minidev/json-smart/2.4.7</a>.</p> <p>For JAR, the plug-in upgrade infrastructure looks for the class to load. For example, <code>public class GEBreadcrumb_3_0_0to3_0_1</code> wherein,</p>

Transformation File Type	Description
	<ul style="list-style-type: none"> <li>◦ <code>GEBreadcrumb</code> is the plug-in name</li> <li>◦ <code>3_0_0</code> is the breadcrumb plug-in old version. The dot is replaced with an underscore.</li> <li>◦ <code>3_0_1</code> is the breadcrumb plug-in new version. The dot is replaced with an underscore.</li> </ul> <p>A transform instance is created for the class by invoking its static transform method: <code>public static String transform(String inputJSON)</code></p>
EXE	<p>Windows® executable file. Create a transformation project with your choice of library (C++, Node, Python, etc.), which prints the transformed output json to console.</p> <p>For this executable,</p> <ul style="list-style-type: none"> <li>◦ 'FromVersion' schema input json is passed as command line argument</li> <li>◦ 'ToVersion' response JSON is read from its console output produced by the executable</li> </ul> <p>The executable file receives the plug-in information in a base64 encoded format. The program first decodes the encoded information, applies the necessary transformation to the plug-in, and subsequently encodes the modified data. Once the transformation process is completed, the program sends the updated plug-in information back to its source.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b></p> <p>Support for EXE files within the cloud-based Operations Hub has been deprecated. It is recommended to opt for alternative methods such as using JAR or the Jolt framework for conducting plug-in upgrades in the cloud.</p> </div>

**Note:**

Naming convention for the transformation file is `<PluginName>-<FromVersion>-<ToVersion>-spec.json`. For example `GETrendCard-3.0.1-3.0.2-spec.json | jar | exe | bat`.

2. Log in to the machine where Operations Hub is installed.
3. Place the plug-in transformation files in this location folder `..\ProgramData\GE\Operations Hub\iqp-config\plugin-transform-spec.`

When Operations Hub administrator imports applications with old plug-ins, they are successfully upgraded to their latest versions.

- The transformation engine looks for an incremental path of intermediary transformation that can migrate a plug-in from a specific version to a desired version. For instance, `GETrendCard-3.0.1-3.0.2-spec.json` `GETrendCard-3.0.2-3.0.4-spec.json` `GETrendCard-3.0.4-3.0.5-spec.json` are used consecutively to upgrade plug-ins.
- If incremental upgrades were not performed between Operations Hub versions, then the plug-in version may not remain subsequent for upgrade. For example, consider:
  - Operations Hub 1.7 has 3.0.1 version of GETrendCard
  - Operation Hub 2.5 has 3.0.5 version of GETrendcard

The `GETrendCard-3.0.1-3.0.5-spec.json` file may not be available for upgrading plug-ins. In such cases, plug-in upgrades are not performed in Operations Hub.

## Delete an Application

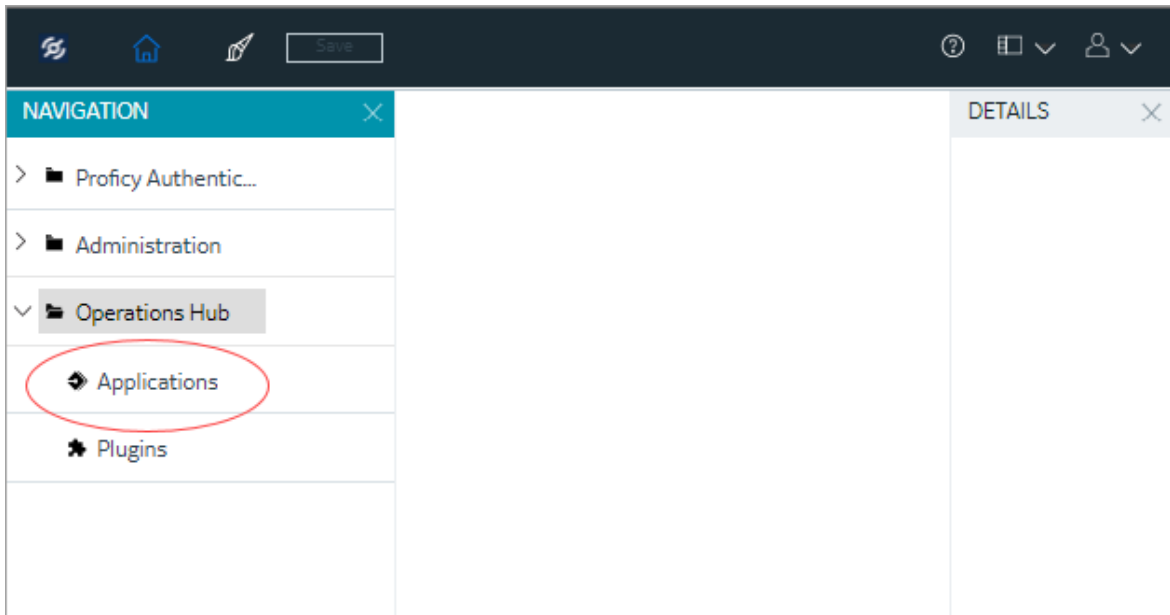
Steps to delete an application in the latest version of Operations Hub.

Log in to Configuration Hub.

- When you delete an application, only the application is deleted from Operations Hub. The components used by the application are not deleted.
- You cannot delete an application if it is locked.
- You cannot delete the default applications in Operations Hub.

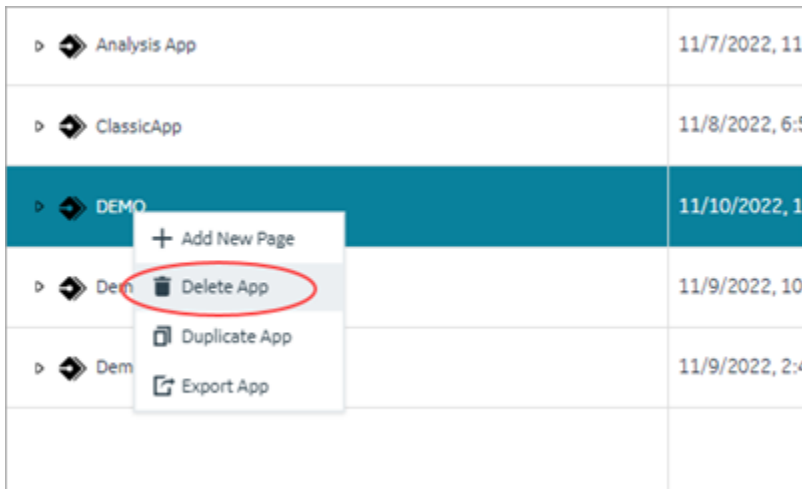
For steps to delete applications in the Operations Hub classic version, refer to [Delete an Application \(Classic\)](#) (on page 289).

1. On the navigation panel, select **Operations Hub > Applications**.




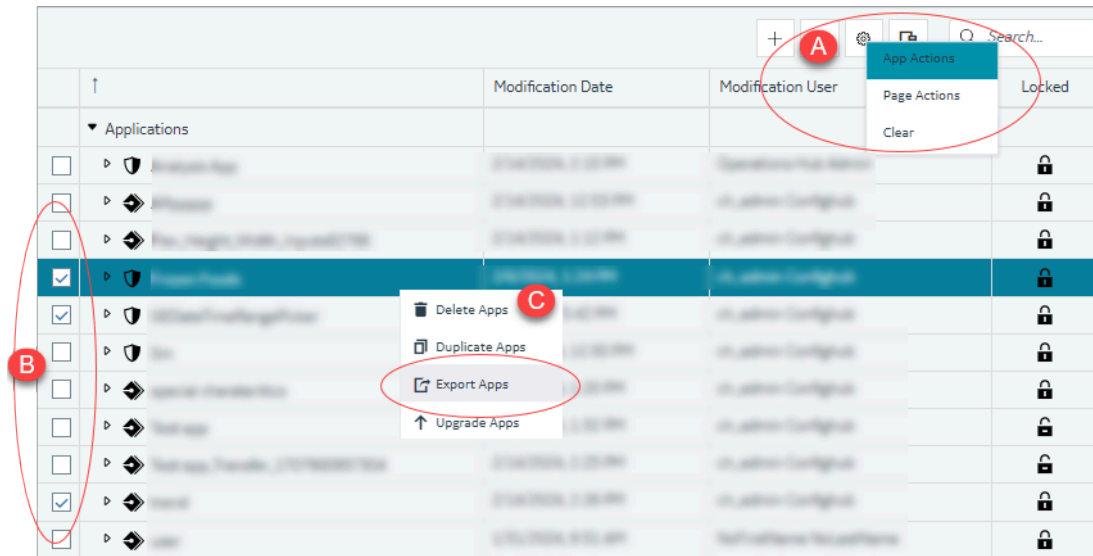
The existing list of applications appear.

2. Right-click the application you want to delete, and select **Delete App**.

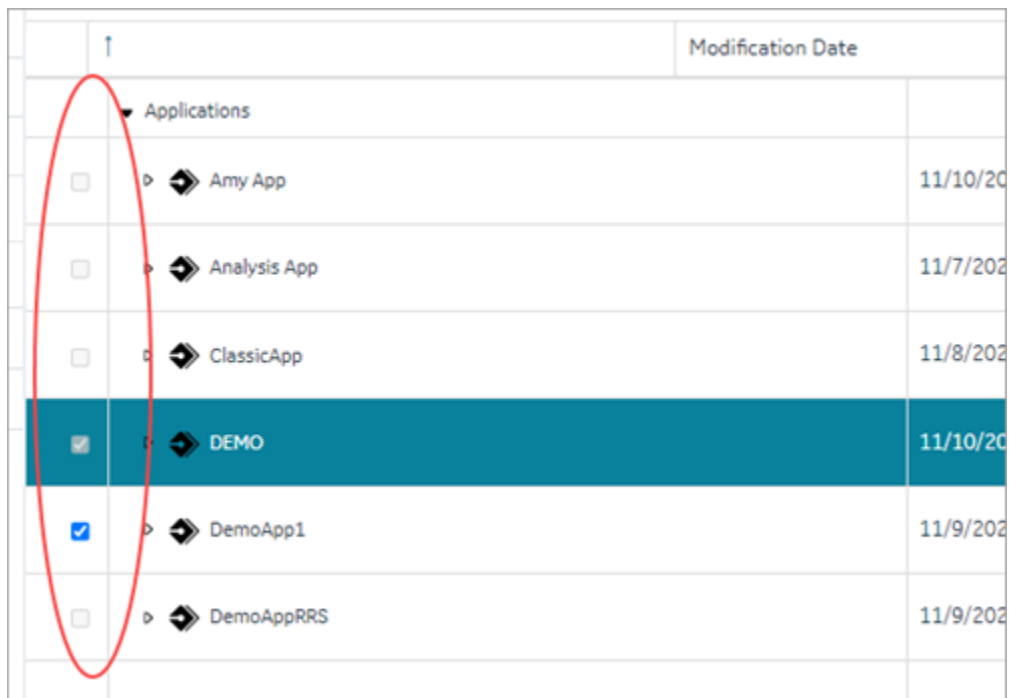


You can also delete multiple applications at a time. To do so:

a. Select , and then select **App Actions**.



A selection check box appears next to each application.



b. Select the check box for all the applications you want to delete.












**Note:**

To select/clear a check box, you must first select the application in the list.



c. Right-click and select **Delete Apps**.

<input type="checkbox"/>	▶  Analysis App	11/7/2022, 1
<input type="checkbox"/>	▶  ClassicApp	11/8/2022, 6
<input checked="" type="checkbox"/>	▶  DEMO 	11/10/2022,
<input checked="" type="checkbox"/>	▶  DemoApp1	11/9/2022, 1
<input type="checkbox"/>	▶  DemoAppRRS	11/9/2022, 2

-  Delete Apps
-  Duplicate Apps
-  Export Apps

A confirmation message appears.

3. Select **Ok** to confirm the delete action.

The application along with its pages is deleted.

## Delete an Application (Classic)

Steps to delete an application in the Operations Hub classic version.

Log in to Operations Hub.

- When you delete an application, only the application is deleted from Operations Hub. The components used by the application are not deleted.
- You cannot delete an application if it is locked.
- You cannot delete the default applications in Operations Hub.

For steps to delete applications in the latest version of Operations Hub, refer to [Delete an Application \(on page 286\)](#).

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import [Settings] << < 1 > >> Quick Filter

<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	

- In each row containing an application that you want to delete, select the check box.
- In the workspace heading, select , and then select **Delete apps**.  
A message appears, asking you to confirm that you want to delete the applications.



**Tip:**

Alternatively, in the row containing each application that you want to delete, select , and then select **Delete app**.

- Select **OK**.  
The applications are deleted.

## Upgrade an Application (Classic)

Steps to upgrade an application in Operations Hub classic version.

See also [Configure Plug-in Upgrades \(on page 284\)](#).

As a best-practice, always upgrade your applications after upgrading to a SIM version. This allows the existing plug-ins in applications to work properly.

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.


<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Asset Management	Manage Devices	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Asset Testing	Test Devices	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Store Temp App	temp	2 months ago by Docs Team	🔒 📄 ⚙️

2. In each row containing an application that you want to upgrade, select the check box.

3. In the workspace heading, select , and then select **Upgrade apps**.

A message appears to confirm whether to check if the selected applications require plug-in upgrades.

 **Tip:**

Alternatively, in the row containing each application that you want to upgrade, select , and then select **Upgrade app**.

4. Select **OK** to analyze and update the application plug-ins, if necessary.

A message appears to confirm the upgrade.

5. **Optional:** Select **Show Details** in the message to review a summary of application plug-in upgrades.

## Entities

### About Entities

An entity is a database table, which you can use to store data.

You can create queries to retrieve and manage data stored in entities. You can create events to trigger actions when data in an entity is changed. The following list provides a few examples on using entities:

- Enhance data that is used in an asset monitoring application
- Create applications related to customer relationship management
- Manage the workflow of an event-handling or a parts-ordering application
- Sort data retrieved from a maintenance or an issue-reporting application
- Store contact details of employees

Operations Hub provides a few baseline entities that you can use to manage your assets or collect machine data. You cannot modify or delete these entities; you can use them in your application directly. For baseline entities, the **LAST UPDATED** column is blank in the **ENTITIES** workspace.


When you create an entity, you must perform the following steps:


1. Define the entity structure. To do so, [add fields \(on page 301\)](#) and specify their data types (for example, Boolean, Number, String, and so on).
2. Add rows, and specify field values. To do so, [enter values manually \(on page 302\)](#) or [import data from a Microsoft Excel workbook \(on page 304\)](#).


### Pivot Entity

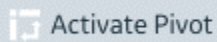
A pivot entity is used to automatically collect data from multiple sensors that belong to selected devices and groups of devices. You can use a pivot entity in a query, and plot it as a trend graph in your application.

For a pivot entity, one of the following icons appears in the **ENTITIES** workspace:

-  : Indicates that the pivot entity is receiving data. If you want to stop collecting data in the pivot entity, you must deactivate the pivot entity. To do so, access the pivot entity, and then select

 Deactivate Pivot

-  : Indicates that the pivot entity is not receiving data. If you want to start collecting data in the pivot entity, you must activate the pivot entity. To do so, access the pivot entity, and then select

 Activate Pivot



#### Important:

If you add or remove a device from a device type or group that is used in a pivot entity, you must deactivate the pivot entity, and then reactivate it for the changes to be applied.

Suppose 50 sensors are connected to a device type and 100 devices of that type send data to your application. Suppose you want to monitor the data from only five of the sensors and only 10 of the devices, which belong to a device group named EV group. You can create a pivot entity to collect data from only the selected sensors and the selected devices that belong to the EV group. This makes it easier to plot trend graphs or create tables with multiple sensor values in your application and improves performance when retrieving the data.

## Relationship Between Entities

If you want to retrieve data from two or more entities in a single query, you must create a relationship (or a join) between them. When you create a relationship between entities, the two entities are joined by an inner join in SQL. The entity from which you create a relationship is called the source entity. The entity to which you create a relationship is called the target entity.

A single entity can be used both as a source entity and a target entity. A single entity can be used as a source entity in multiple relationships. A relationship can be bidirectional (that is, if there is a relationship from entity 1 to entity 2, you can also create a relationship from entity 2 to entity 1).

After you create a relationship, when you create a query, if you select the source entity in the **Entity** box, you can retrieve data from fields in both the source and target entities. If, however, you select the target entity, you can retrieve data only from the target entity.



#### Important:

You cannot use a baseline entity or a pivot entity as a source entity; you can only use it as a target entity.

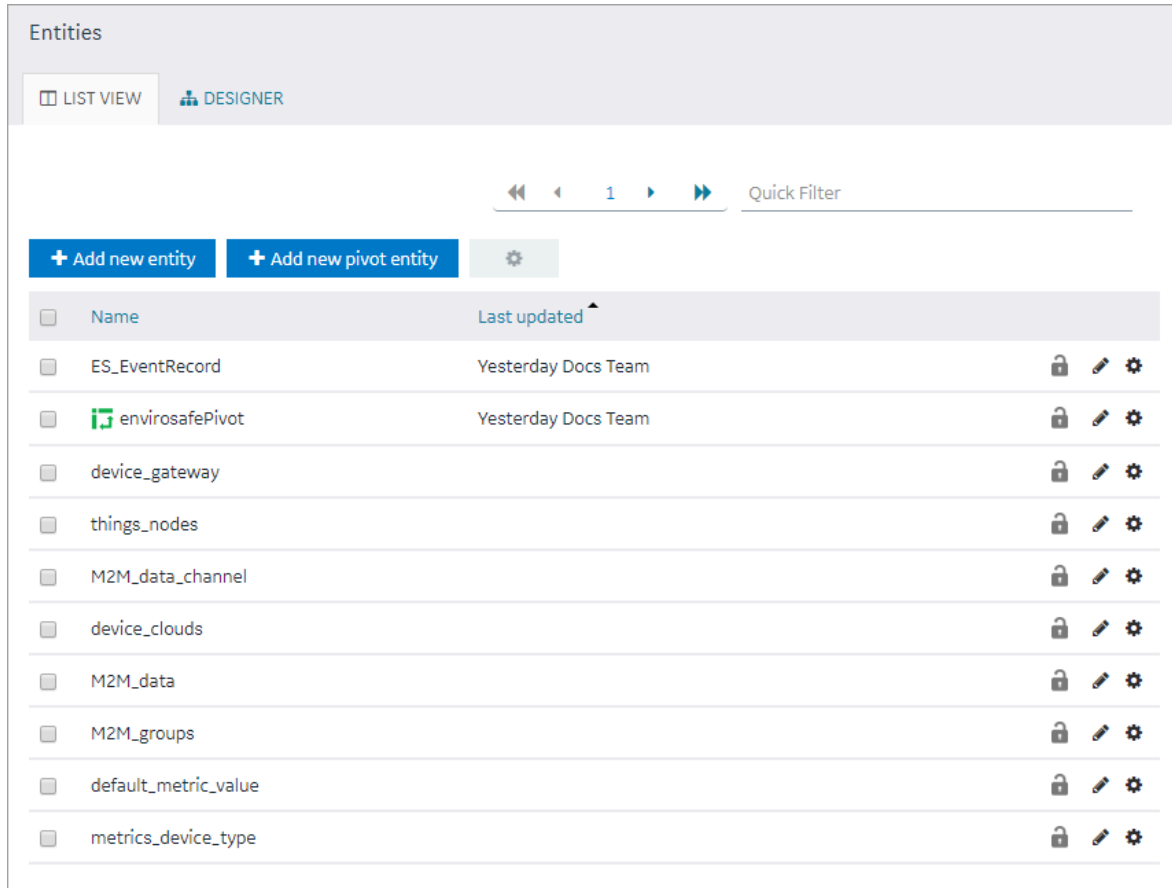
## Access an Entity (Classic)

Steps to access an entity in the Operations Hub classic version.

Log in to Operations Hub.

1. In the main navigation menu, select **ENTITIES**.

The **ENTITIES** workspace appears.



The screenshot displays the 'Entities' workspace. At the top, there are tabs for 'LIST VIEW' and 'DESIGNER'. Below the tabs, there are navigation controls including a 'Quick Filter' input field and a page indicator showing '1'. There are two main action buttons: '+ Add new entity' and '+ Add new pivot entity', along with a settings gear icon. The main area contains a table of entities:

<input type="checkbox"/>	Name	Last updated	
<input type="checkbox"/>	ES_EventRecord	Yesterday Docs Team	
<input type="checkbox"/>	envirosafePivot	Yesterday Docs Team	
<input type="checkbox"/>	device_gateway		
<input type="checkbox"/>	things_nodes		
<input type="checkbox"/>	M2M_data_channel		
<input type="checkbox"/>	device_clouds		
<input type="checkbox"/>	M2M_data		
<input type="checkbox"/>	M2M_groups		
<input type="checkbox"/>	default_metric_value		
<input type="checkbox"/>	metrics_device_type		

2. In the row containing the entity that you want to access, in the **Name** column, select the link.

The entity appears, displaying a list of fields in the entity.

Entities > ES\_EventRecord

[+ Add row](#) [Import Excel](#) [Save Changes](#)

RecordID ▲	EventType	Time	DeviceID	Sensor	Value	Status	Owner
------------	-----------	------	----------	--------	-------	--------	-------

[Edit Entity Structure](#)

**i** **Tip:**  
You can modify values in the available fields, and then select **Save** or **Save and Exit** to save your changes.

### Create an Entity (Classic)

This topic describes how to create an entity in the Operations Hub classic version.

Log in to Operations Hub.

You can also create an entity by [copying an entity \(on page 300\)](#).

1. In the main navigation menu, select **ENTITIES**.  
The **ENTITIES** workspace appears.

The screenshot shows the 'Entities' interface in 'DESIGNER' mode. At the top, there are tabs for 'LIST VIEW' and 'DESIGNER'. Below the tabs is a navigation bar with a 'Quick Filter' input field and a page indicator showing '1'. There are two main buttons: '+ Add new entity' and '+ Add new pivot entity', along with a settings gear icon. The main area contains a table of entities with columns for 'Name' and 'Last updated'. Each row includes a checkbox, the entity name, the last updated date, and three action icons: a lock, an edit pencil, and a settings gear.

<input type="checkbox"/>	Name	Last updated			
<input type="checkbox"/>	ES_EventRecord	Yesterday Docs Team			
<input type="checkbox"/>	envirosafePivot	Yesterday Docs Team			
<input type="checkbox"/>	device_gateway				
<input type="checkbox"/>	things_nodes				
<input type="checkbox"/>	M2M_data_channel				
<input type="checkbox"/>	device_clouds				
<input type="checkbox"/>	M2M_data				
<input type="checkbox"/>	M2M_groups				
<input type="checkbox"/>	default_metric_value				
<input type="checkbox"/>	metrics_device_type				

2. Select **Add new entity**.

The **Create Entity** window appears.

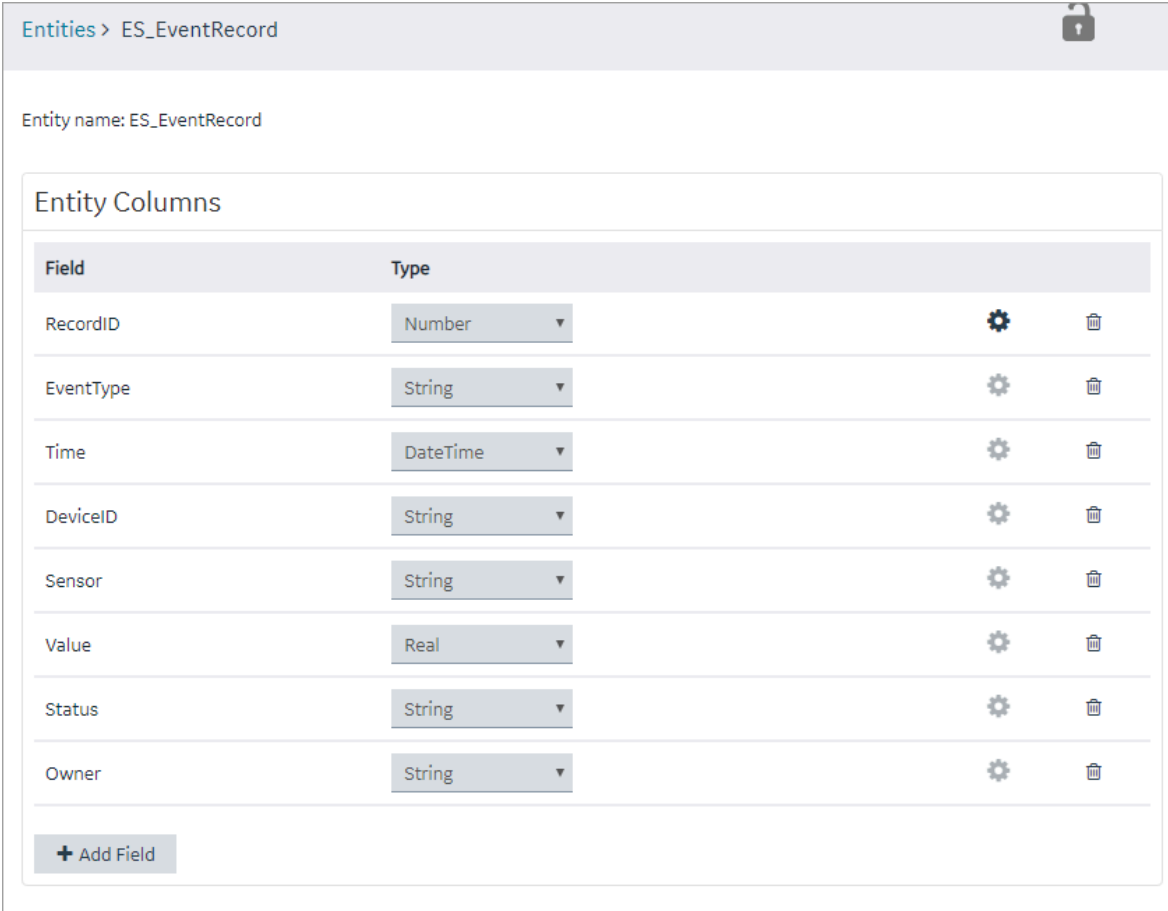
The 'Create Entity' dialog box has a title bar with a close button (red square with 'x'). Below the title bar is a text input field labeled 'Entity name:'. At the bottom of the dialog are two buttons: 'Create' (blue) and 'Cancel' (grey).


3. In the **Entity name** box, enter a name, and then select **Create**.

4. Select **Edit Entity Structure**.

A list of fields in the entity appears.





- 5. Select **Add Field**.  
A field is created in the entity. By default, the name of the field is Field\_1 and the type is String.
- 6. Next to the field name, select , and then modify the name of the field. The name must contain at least one uppercase or lowercase letter.
- 7. In the drop-down list box in the **Type** column, modify the type of the field if needed.
- 8. Select **Save** or **Save and Exit**.  
The entity is created.

[Add a row \(on page 302\)](#) or, if needed, [import data in to the entity \(on page 304\)](#).

### Create a Pivot Entity (Classic)

Steps to create a pivot entity in the Operations Hub classic version.

Register the device details and metrics that you want to use in the pivot entity using baseline entities.

1. Register the device types and metrics using the `supported_device_gateway` and the `metrics_device_type` entities, respectively.
2. Register the device groups for the device type using the `M2M_groups` entity. The group must belong to a device type that you want to use in the pivot entity.
3. Register the devices in a group that you created for their device type.

1. In the main navigation menu, select **ENTITIES**.

The **ENTITIES** workspace appears.

<input type="checkbox"/>	Name	Last updated	
<input type="checkbox"/>	ES_EventRecord	Yesterday Docs Team	
<input type="checkbox"/>	envirosafePivot	Yesterday Docs Team	
<input type="checkbox"/>	device_gateway		
<input type="checkbox"/>	things_nodes		
<input type="checkbox"/>	M2M_data_channel		
<input type="checkbox"/>	device_clouds		
<input type="checkbox"/>	M2M_data		
<input type="checkbox"/>	M2M_groups		
<input type="checkbox"/>	default_metric_value		
<input type="checkbox"/>	metrics_device_type		


2. Select **Add new pivot entity**.

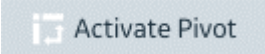
The **Create Pivot Entity** window appears.

3. In the **Pivot entity name** box, enter a name, and then select **Create**. The name must contain at least one uppercase or lowercase letter.

The pivot entity is created. By default, a few fields such as `timestamp`, `device_id`, `instance_name`, and other fields are added to the pivot entity. You cannot modify or delete them. You can, however, add more fields for the metrics that you want to record in the pivot entity.

4. If you want to collect data from a specific device type:
  - a. In the **Get Data By** box, select **Device type**.  
A drop-down list box appears next to the **Device type** box, displaying a list of device types that you have registered using the `supported_device_gateway` entity.
  - b. Select the device type from which you want to collect data in the pivot entity.
5. If you want to collect data from a specific device group:
  - a. In the **Get Data By** box, select **Device group**.  
A drop-down list box appears next to the **Device group** box, displaying a list of device groups that you have registered using the `M2M_groups` entity.
  - b. Select the device group from which you want to send data to the pivot entity.
6. [Create a field \(on page 301\)](#) for each metric that you want to record (for example, pressure, temperature, and other metrics). The field name must match the metric name that you have registered using the `metrics_device_type` entity and the metric name that the device uses to send data. This name is case-sensitive.
7. As needed, create additional fields in the pivot entity, and then select **Save** or **Save And Exit**.  
The changes made to the pivot entity are saved.

In the **ENTITIES** workspace,  appears in the row containing the pivot entity that you have created.

Select  to start collecting data in the pivot entity.

## Copy an Entity (Classic)

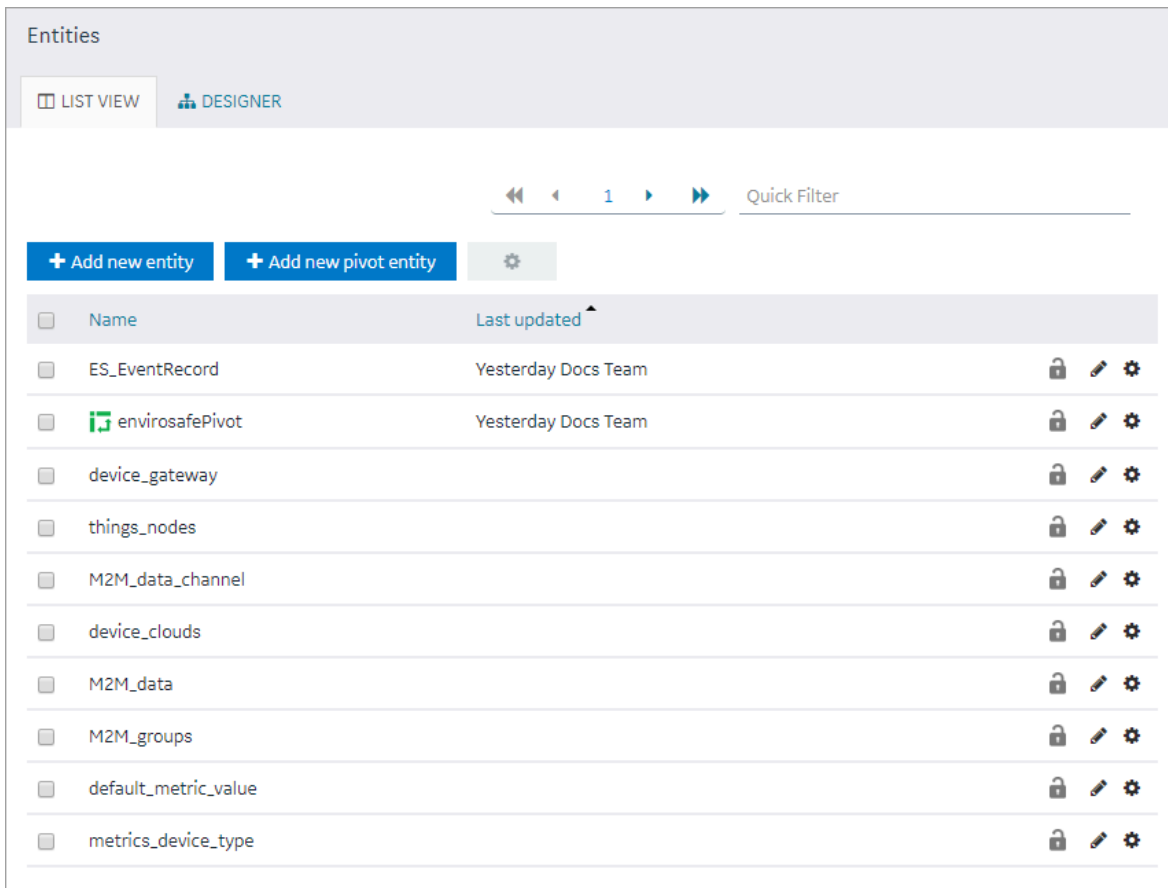
This topic describes how to copy an entity.

Log in to Operations Hub.


You can also [create a new entity \(on page 295\)](#) without copying an existing entity.

1. In the main navigation menu, select **ENTITIES**.

The **ENTITIES** workspace appears.



The screenshot displays the 'Entities' workspace. At the top, there are tabs for 'LIST VIEW' and 'DESIGNER'. Below the tabs, there are navigation arrows and a 'Quick Filter' input field. A toolbar contains three buttons: '+ Add new entity', '+ Add new pivot entity', and a settings gear icon. The main area is a table with the following columns: 'Name' and 'Last updated'. The table lists ten entities, each with a checkbox, a lock icon, an edit icon, and a settings icon.

<input type="checkbox"/>	Name	Last updated			
<input type="checkbox"/>	ES_EventRecord	Yesterday Docs Team	🔒	✎	⚙️
<input type="checkbox"/>	 envirosafePivot	Yesterday Docs Team	🔒	✎	⚙️
<input type="checkbox"/>	device_gateway		🔒	✎	⚙️
<input type="checkbox"/>	things_nodes		🔒	✎	⚙️
<input type="checkbox"/>	M2M_data_channel		🔒	✎	⚙️
<input type="checkbox"/>	device_clouds		🔒	✎	⚙️
<input type="checkbox"/>	M2M_data		🔒	✎	⚙️
<input type="checkbox"/>	M2M_groups		🔒	✎	⚙️
<input type="checkbox"/>	default_metric_value		🔒	✎	⚙️
<input type="checkbox"/>	metrics_device_type		🔒	✎	⚙️

2. Select the entity that you want to copy.
3. Select **Edit Entity Structure**.
4. As needed, add or remove fields.



### Tip:

You can also modify the type of a field by selecting a value in the **TYPE** column.

5. Select **Save As New**.

The **Please enter new name** window appears, displaying the name of the entity that you have selected, appended with a system-generated value.

- As needed, modify the name of the entity, and then select **OK**.

The selected entity is copied.

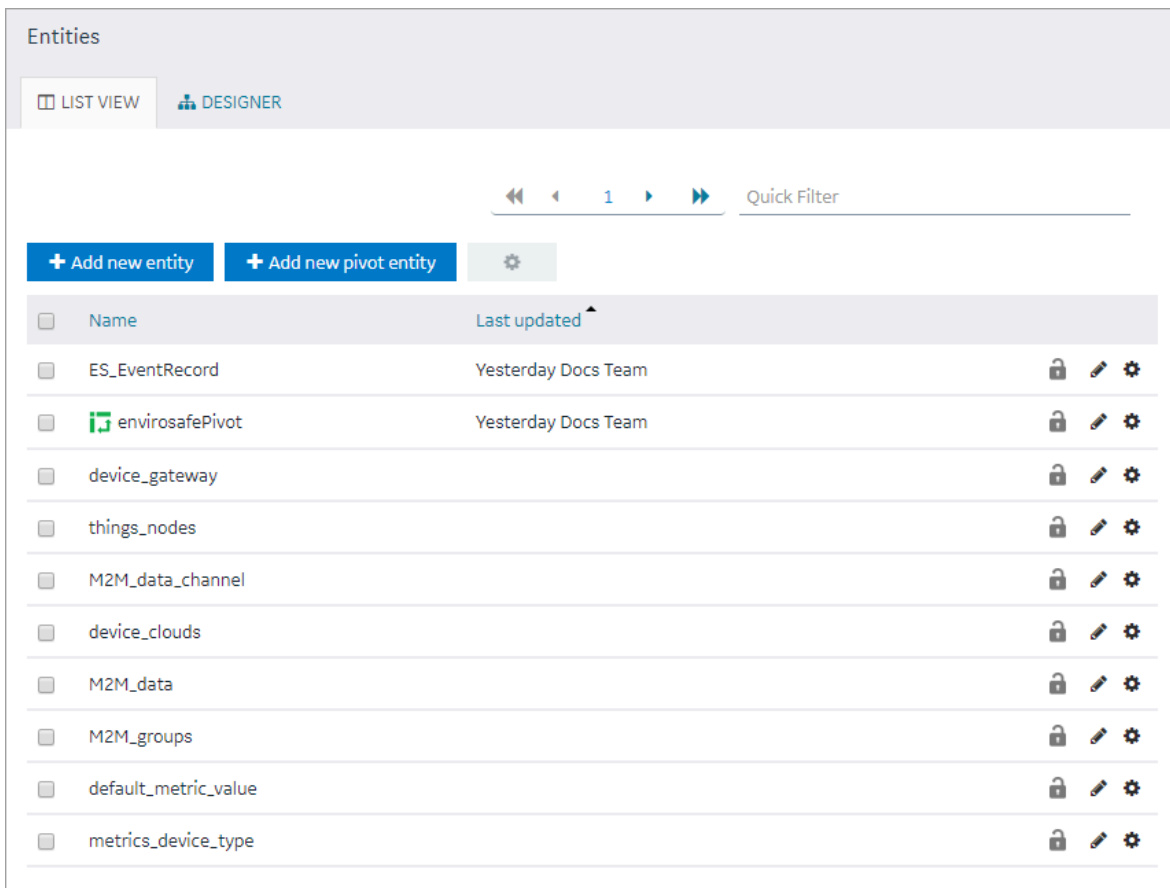
## Create a Field in an Entity (Classic)

Steps to create entity field in the Operations Hub classic version.

Log in to Operations Hub.

- In the main navigation menu, select **ENTITIES**.

The **ENTITIES** workspace appears.




- Select the entity in which you want to create a field.

A list of fields in the entity appears, along with the data in each field.

















- Select **Edit Entity Structure**.

A list of fields in the entity appears.

Entities > ES\_EventRecord 

Entity name: ES\_EventRecord


### Entity Columns

Field	Type		
RecordID	Number		
EventType	String		
Time	DateTime		
DeviceID	String		
Sensor	String		
Value	Real		
Status	String		
Owner	String		

[+ Add Field](#)

#### 4. Select **Add Field**.

A field is created in the entity. By default, the name of the field is Field\_1 and the type is String.

- Next to the field name, select , and then modify the name of the field. The name must contain at least one uppercase or lowercase letter.
- In the drop-down list box in the **Type** column, modify the type of the field if needed.
- Select **Save** or **Save and Exit**.  
The field is created in the entity.

[Add a row \(on page 302\)](#) or [import data in to the entity \(on page 304\)](#).

## Add a Row to an Entity (Classic)

Steps to add entity row in the Operations Hub classic version.

As needed, [add fields to the entity \(on page 301\)](#).

This topic describes how to add a row and enter data manually in an entity. You can also [import data \(on page 304\)](#) from a Microsoft Excel workbook. You cannot, however, add data to baseline entities or pivot entities manually. You can only insert data into these entities using an insert query in an application.

1. In the main navigation menu, select **ENTITIES**.

The **ENTITIES** workspace appears.

The screenshot shows the 'Entities' workspace. At the top, there are tabs for 'LIST VIEW' and 'DESIGNER'. Below the tabs, there are navigation arrows and a 'Quick Filter' input field. Two buttons are visible: '+ Add new entity' and '+ Add new pivot entity'. Below these buttons is a table with the following columns: 'Name' and 'Last updated'. The table contains the following rows:

<input type="checkbox"/>	Name	Last updated			
<input type="checkbox"/>	ES_EventRecord	Yesterday Docs Team			
<input type="checkbox"/>	envirosafePivot	Yesterday Docs Team			
<input type="checkbox"/>	device_gateway				
<input type="checkbox"/>	things_nodes				
<input type="checkbox"/>	M2M_data_channel				
<input type="checkbox"/>	device_clouds				
<input type="checkbox"/>	M2M_data				
<input type="checkbox"/>	M2M_groups				
<input type="checkbox"/>	default_metric_value				
<input type="checkbox"/>	metrics_device_type				

2. Select the entity in which you want to add a row.

3. Select **Add row**.

A blank row appears in the table.



**Tip:**

You can add multiple rows together by selecting **Add row** multiple times.


4. Enter values in the blank row, and then select **Save Changes**.

The values that you have entered in the row are saved.



**Tip:**

If you have entered values in multiple rows, but want to save values only for a single row,

select  in the row.

## Import Data in to an Entity (Classic)

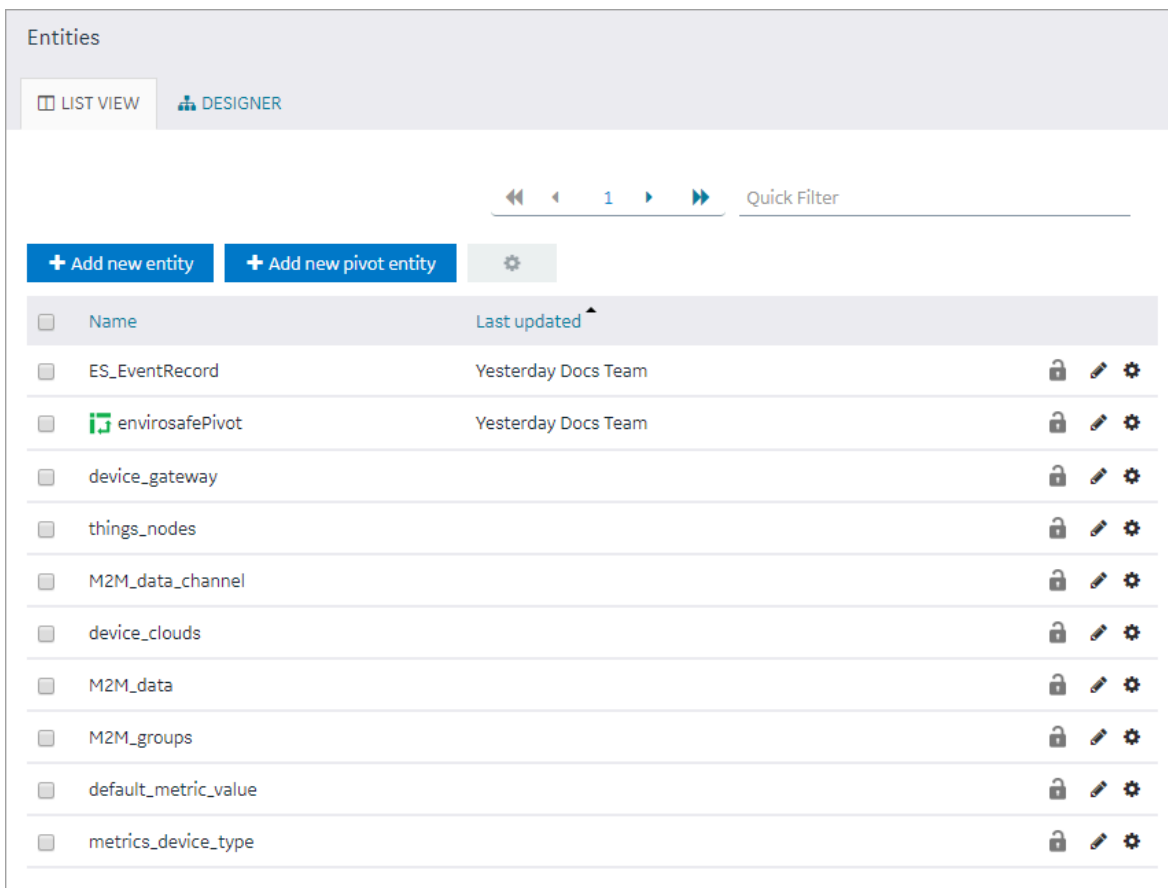
This topic describes how to import data in to an entity from a Microsoft Excel workbook.

Log in to Operations Hub.

You can also [add a row manually in the entity \(on page 302\)](#).

1. In the main navigation menu, select **ENTITIES**.

The **ENTITIES** workspace appears.



The screenshot displays the 'Entities' workspace. At the top, there are tabs for 'LIST VIEW' and 'DESIGNER'. Below the tabs, there are navigation arrows and a 'Quick Filter' input field. Two buttons are visible: '+ Add new entity' and '+ Add new pivot entity', along with a settings gear icon. The main area contains a table with the following data:

<input type="checkbox"/>	Name	Last updated			
<input type="checkbox"/>	ES_EventRecord	Yesterday Docs Team			
<input type="checkbox"/>	envirosafePivot	Yesterday Docs Team			
<input type="checkbox"/>	device_gateway				
<input type="checkbox"/>	things_nodes				
<input type="checkbox"/>	M2M_data_channel				
<input type="checkbox"/>	device_clouds				
<input type="checkbox"/>	M2M_data				
<input type="checkbox"/>	M2M_groups				
<input type="checkbox"/>	default_metric_value				
<input type="checkbox"/>	metrics_device_type				

2. Select the entity in to which you want to import data.



3. Select **Import Excel**, navigate to and select the workbook that you want to import, and then select **Open**.

The **Set Column Mapping** window appears.

**Set Column Mapping** [Close]

Select Data > Specify Column Mappings

**Spreadsheet Data**

Use Header Row Names

Import data from row \_\_\_ to row \_\_\_

**Entity Data**

Append to existing data

Overwrite existing data

Cancel Next

4. If you want to use the names in one of the rows of the workbook as field names:
  - a. Select **Use Header Row Names**.  
The **Header Row Number** box appears.
  - b. Enter the row number in the workbook that you want to specify as the header row. By default, this box contains the value 1, which indicates that the first row is used as the header row.
5. In the **Import data from row** and **to row** boxes, enter the first and the last row numbers in the workbook that you want to import. For example, if you want to import data from rows 3 through 6, enter 3 and 6 respectively. By default, the **Import data from row** box contains the row number that is immediately next to the header row that you have specified.
6. If the entity already contains data and you want to add to it, select **Append to existing data**. If, however, you want to delete existing data before importing, select **Overwrite existing data**.
7. Select **Next**.

A list of fields in the entity appears. Next to each field, a text box appears in the **Column Name in Spreadsheet** column.

8. For each field, specify the column name in the header row in the workbook that you want to map, and then select **Import**.

A message appears, stating that the process is irreversible and asking you to confirm that you want to import data.

9. Select **OK**.

A message appears, indicating that the data has been imported successfully.

10. Select **OK**.

The data is imported.

## Create a Relationship Between Entities (Classic)

Steps to create an entity relationship in the Operations Hub classic version.

Log in to Operations Hub.

You cannot use a baseline entity or a pivot entity as a source entity. You can, however, use it as a target entity.

1. In the main navigation menu, select **ENTITIES**.

The **ENTITIES** workspace appears.

Entities

LIST VIEW DESIGNER

Quick Filter

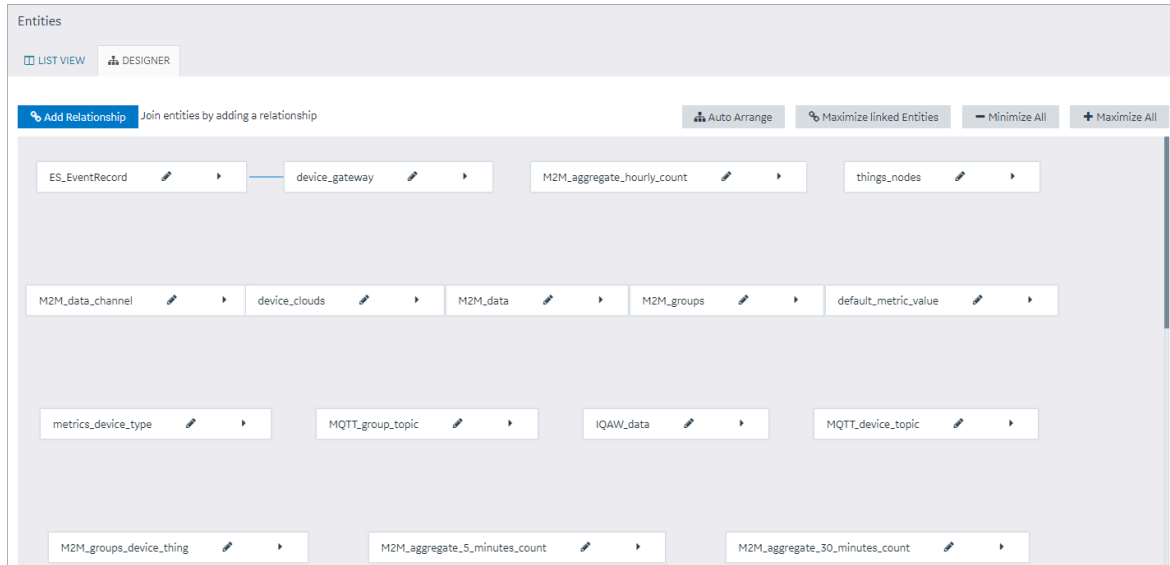
+ Add new entity + Add new pivot entity

<input type="checkbox"/>	Name	Last updated	
<input type="checkbox"/>	ES_EventRecord	Yesterday Docs Team	
<input type="checkbox"/>	envirosafePivot	Yesterday Docs Team	
<input type="checkbox"/>	device_gateway		
<input type="checkbox"/>	things_nodes		
<input type="checkbox"/>	M2M_data_channel		
<input type="checkbox"/>	device_clouds		
<input type="checkbox"/>	M2M_data		
<input type="checkbox"/>	M2M_groups		
<input type="checkbox"/>	default_metric_value		
<input type="checkbox"/>	metrics_device_type		


2. **Optional:** Select the check boxes of the entities for which you want to create a relationship.

3. Select **DESIGNER**.

The **DESIGNER** section appears, displaying all the entities created in the site. If, however, you have selected entities in the previous step, only the selected entities appear. If a relationship exists between two entities, a line connecting them appears.

**Tip:**

You can arrange the entities in an order, minimize all entities, maximize all entities, or maximize only the entities in a relationship by selecting **Auto Arrange**, **Minimize All**, **Maximize All**, or **Maximize linked Entities** respectively.

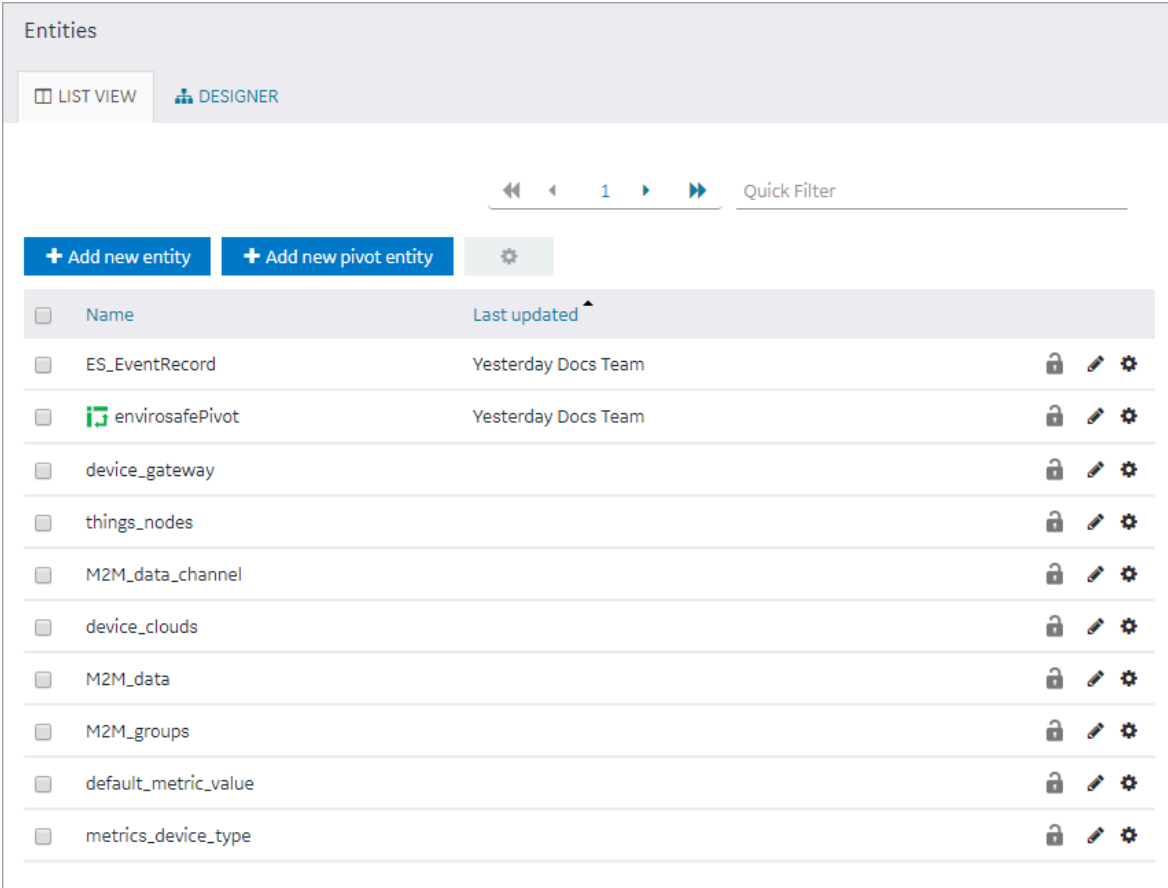
- Next to each entity for which you want to create a relationship, select  .  
A list of fields in each entity appears.
- Select **Add Relationship**, and then select a field from the source entity and then the target entity.  
A relationship is created between the entities. A line connecting both the entities appears.

## Delete a Relationship (Classic)

Steps to delete an entity relationship in the Operations Hub classic version.

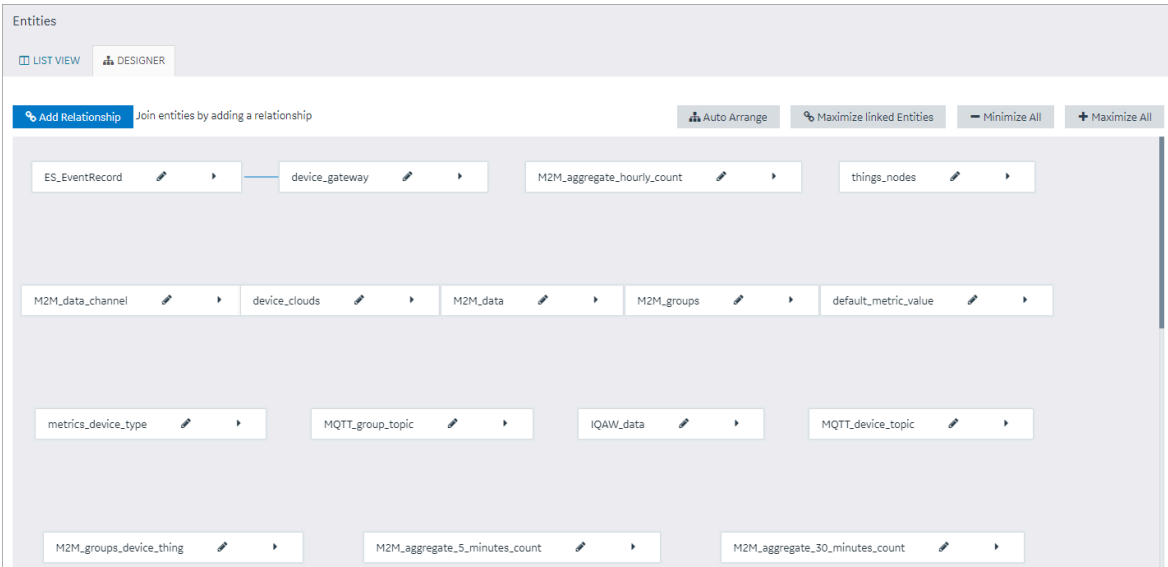
Log in to Operations Hub.


- In the main navigation menu, select **ENTITIES**.  
The **ENTITIES** workspace appears.



2. Select **DESIGNER**.

The **DESIGNER** section appears, displaying all the entities created in the site. If a relationship exists between two entities, a line connecting them appears.



- On the line connecting the two entities whose relationship you want to delete, select . A message appears, asking you to confirm that you want to delete the relationship.
- Select **OK**. The relationship is deleted.

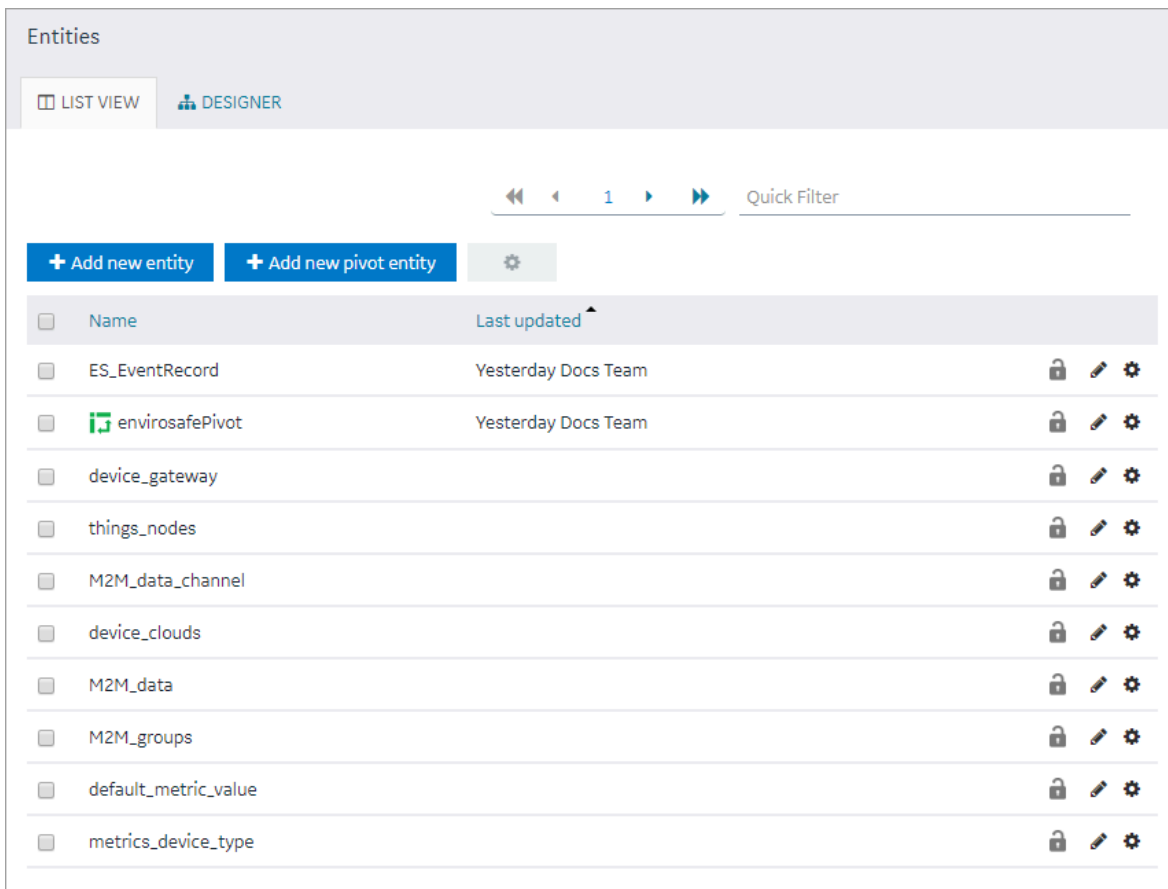
## Delete a Row from an Entity

Steps to delete entity row in the Operations Hub classic version

Log in to Operations Hub.


You cannot delete a row manually from a baseline entity or a pivot entity; you can delete rows only using a query in an application.

- In the main navigation menu, select **ENTITIES**. The **ENTITIES** workspace appears.



The screenshot shows the 'Entities' workspace with a 'LIST VIEW' tab selected. The interface includes a 'Quick Filter' search bar and two buttons: '+ Add new entity' and '+ Add new pivot entity'. Below these are two columns: 'Name' and 'Last updated'. The 'envirosafePivot' entity is highlighted in green. The table lists various entities, each with a checkbox, a lock icon, an edit icon, and a settings icon.

<input type="checkbox"/>	Name	Last updated			
<input type="checkbox"/>	ES_EventRecord	Yesterday Docs Team			
<input type="checkbox"/>	envirosafePivot	Yesterday Docs Team			
<input type="checkbox"/>	device_gateway				
<input type="checkbox"/>	things_nodes				
<input type="checkbox"/>	M2M_data_channel				
<input type="checkbox"/>	device_clouds				
<input type="checkbox"/>	M2M_data				
<input type="checkbox"/>	M2M_groups				
<input type="checkbox"/>	default_metric_value				
<input type="checkbox"/>	metrics_device_type				

- Select the entity from which you want to delete a row.
- In the row that you want to delete, select .

A message appears, asking you to confirm that you want to delete the row.

4. Select **OK**.

The row is deleted.

## Delete a Field (Classic)

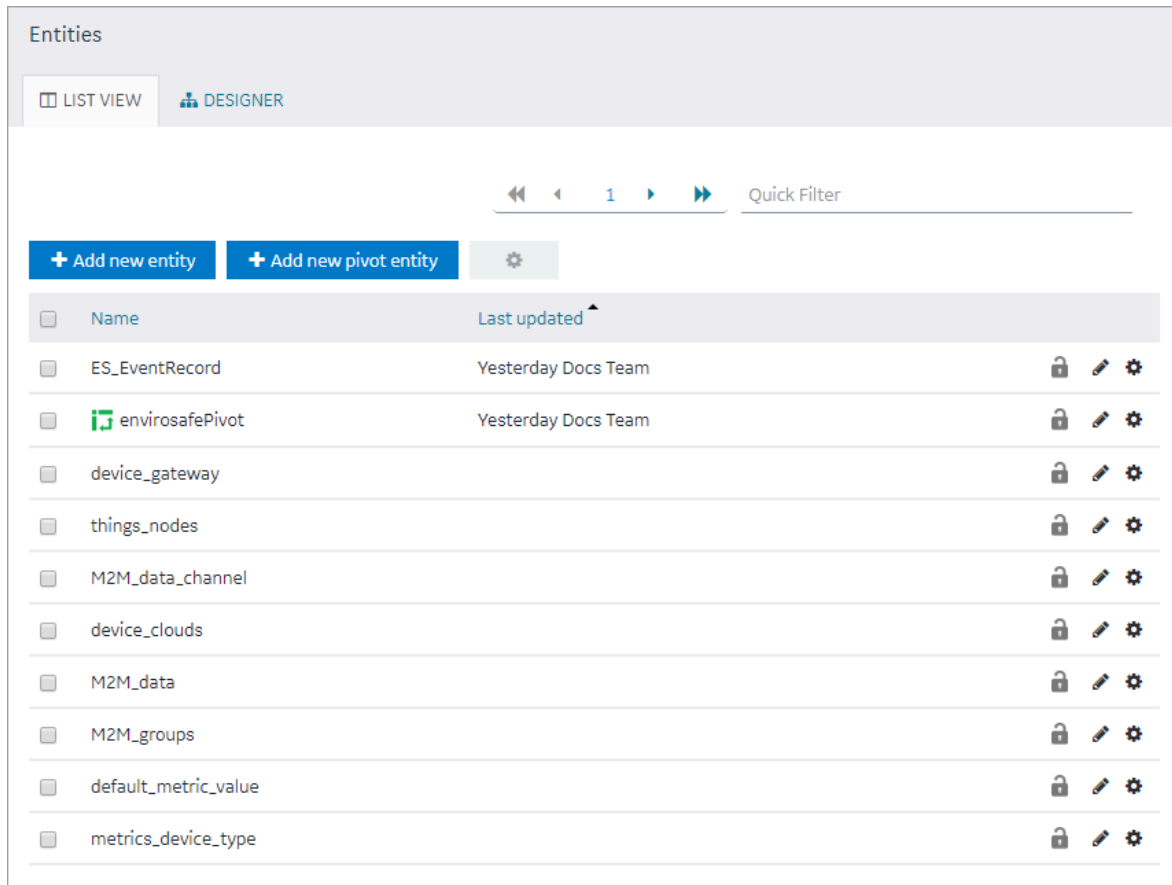
Steps to delete entity field in the Operations Hub classic version

Log in to Operations Hub.

An entity must contain at least one field. Therefore, if an entity contains only one field, you cannot delete it.

1. In the main navigation menu, select **ENTITIES**.


The **ENTITIES** workspace appears.



2. Select the entity from which you want to delete a field.

















3. Select **Edit Entity Structure**.

A list of fields in the entity appears.


Entities > ES\_EventRecord 

Entity name: ES\_EventRecord

### Entity Columns

Field	Type		
RecordID	Number		
EventType	String		
Time	DateTime		
DeviceID	String		
Sensor	String		
Value	Real		
Status	String		
Owner	String		

[+ Add Field](#)

- In the row containing the field that you want to delete, select  .  
The field is deleted.

## Delete an Entity (Classic)

This topic describes how to delete an entity in the Operations Hub classic version.

Log in to Operations Hub.

You cannot delete a baseline entity, an entity that is locked, or an entity that is used in a query.



### Note:

In order to unlock an entity, you need to select the entity, click Edit Entity Structure, and then click the lock icon (in the upper right corner) of the Edit Entity Structure page. After you complete that task, you can go to entity list page to delete it.



1. In the main navigation menu, select **ENTITIES**.

The **ENTITIES** workspace appears.


<input type="checkbox"/>	Name	Last updated			
<input type="checkbox"/>	ES_EventRecord	Yesterday Docs Team			
<input type="checkbox"/>	envirosafePivot	Yesterday Docs Team			
<input type="checkbox"/>	device_gateway				
<input type="checkbox"/>	things_nodes				
<input type="checkbox"/>	M2M_data_channel				
<input type="checkbox"/>	device_clouds				
<input type="checkbox"/>	M2M_data				
<input type="checkbox"/>	M2M_groups				
<input type="checkbox"/>	default_metric_value				
<input type="checkbox"/>	metrics_device_type				

2. In the rows containing the entities that you want to delete, select the check boxes.

3. In the workspace heading, select , and then select **Delete entities**.

A message appears, asking you to confirm that you want to delete the entities.

 **Tip:**

Alternatively, in the row containing each entity that you want to delete, select , and then select **Delete entity**.

4. Select **OK**.

The entities are deleted.

# Queries

## About Queries

Using Operations Hub, you can create queries to access and manage data stored in Operations Hub, as well as data stored externally.

You can create the following types of queries:

- Entity
- SQL
- REST
- Extension

**Entity Queries:** Used to view and modify data stored in Operations Hub entities. Refer to the following topics:

- [Create Get Query \(Classic\) \(on page 317\)](#)
- [Create Update Query \(Classic\) \(on page 323\)](#)
- [Create Insert Query \(Classic\) \(on page 327\)](#)
- [Create Delete Query \(Classic\) \(on page 329\)](#)

**SQL Queries:** Used to view and modify data stored in an external SQL database by executing existing stored procedures for that database. See [Create SQL Query \(Classic\) \(on page 332\)](#).

**REST Queries:** Used to view and modify data stored in external sources by accessing their exposed REST APIs, such as Historian. See [Create REST Query \(Classic\) \(on page 336\)](#).

**Extension Queries:** Can be used with Historian, OPC UA, and data from asset models. See [Create Extension Query \(Classic\) \(on page 342\)](#).

On installing Operations Hub, you get a list of out-of-the-box (OOTB) extension queries. These are system queries and cannot be unlocked, modified, or deleted. You can [duplicate such queries \(on page 348\)](#) to modify and use them.

To access the list of OOTB extension queries, select **QUERIES** in the main navigation menu.

Queries				
Quick Filter				
<input type="checkbox"/> Name	Type	Description	Origin	Permissions
<input type="checkbox"/> Current Value	Extension		System	All Groups
<input type="checkbox"/> Historical By Count	Extension		System	All Groups
<input type="checkbox"/> Historical By Interval	Extension		System	All Groups
<input type="checkbox"/> Historian Write Comment	Extension		System	All Groups
<input type="checkbox"/> Historian Read Comment	Extension		System	All Groups
<input type="checkbox"/> OPC UA Write	Extension		System	All Groups
<input type="checkbox"/> Historical By Interval-Calculated Mode	Extension		System	All Groups

Current Value	Use this query to retrieve the current values against Proficy Historian, Proficy iFIX, Proficy CIMPLICITY, and OPC UA data sources.
Historian Read Comment	Use this query to read comments from a Proficy Historian data source.
Historian Write Comment	Use this query to write comments to a Proficy Historian data source.
Historical By Count	Use this query to retrieve historical values (by count) against a Proficy Historian data source.
Historical By Interval	Use this query to retrieve historical values (by interval) against a Proficy Historian data source.
Historical By Interval-Calculated Mode	Use this query to retrieve historical values (calculated mode) against a Proficy Historian data source.
OPC UA Write	Use this query to perform write operations to Proficy iFIX and Proficy CIMPLICITY data sources.
OPC UA Write with Auth	Use this query to perform OPC UA write operations with authentication.

To troubleshoot errors returned for OOTB queries, refer to [Error Codes \(on page 877\)](#).

## Grant Group Access to Execute a Query (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears, including a column summarizing the current query permissions. By default, newly created queries display “All users”, indicating all users have the ability to execute the query.
2. In the **Permissions** column, select the query to which you want to grant query execution permissions.  
The Query Permissions dialog box appears.
3. In the **Query Permissions** dialog box, if you want to grant query execution permissions to select groups only, select the **Selected Group** option.
4. In the groups field, select the group or groups you would like to grant query execution permissions to and then select **Submit changes**.  
The selected groups can now execute the query.



**Note:**

It is possible to create a circular reference by nesting a parent group into its child. If there are circular references, the child groups will not display in the permissions dialog box.

## Access a Query (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

To access queries in the latest version of Operations Hub, refer to [Data Tab \(on page 224\)](#).

1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.

Queries							
Quick Filter						+ Add new query	⚙️
<input type="checkbox"/> Name	Type	Description	Origin	Permissions	Last updated		
<input type="checkbox"/> TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin	🔒	✏️ ⚙️
<input type="checkbox"/> EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin	🔒	✏️ ⚙️
<input type="checkbox"/> GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin	🔒	✏️ ⚙️
<input type="checkbox"/> Current Value	Extension		System	All Groups	6 days ago	🔒	✏️ ⚙️
<input type="checkbox"/> Historical By Count	Extension		System	All Groups	6 days ago	🔒	✏️ ⚙️
<input type="checkbox"/> Historical By Interval	Extension		System	All Groups	6 days ago	🔒	✏️ ⚙️

- In the row containing the query that you want to access, in the **Name** column, select the link.  
The query appears, displaying a list of fields in the query.

**Tip:**

You can modify values in the available fields, and then select **Save** or **Save and Exit** to save your changes.

## Create Get Query (Classic)

This topic describes how to create a Get query.

Log in to Operations Hub.

You can also [copy an existing get query \(on page 348\)](#).

- In the main navigation menu, select **QUERIES**.

The **QUERIES** workspace appears.

Queries							
Quick Filter						<a href="#">+ Add new query</a>	
<input type="checkbox"/>	Name	Type	Description	Origin	Permissions	Last updated	
<input type="checkbox"/>	TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin	
<input type="checkbox"/>	EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin	
<input type="checkbox"/>	GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin	
<input type="checkbox"/>	Current Value	Extension		System	All Groups	6 days ago	
<input type="checkbox"/>	Historical By Count	Extension		System	All Groups	6 days ago	
<input type="checkbox"/>	Historical By Interval	Extension		System	All Groups	6 days ago	

- Select **+Add new query**.

The **Create Query** screen appears.

### Create Query ×

Query name:

Create
Cancel

- Enter a **Query name**, and select **Create**.

The name must contain at least one uppercase or lowercase letter.

The available options for creating the query appear.

4. Enter a **Description** for the query.
5. Select **Get** as **Query Type**.
6. From the **Entity** box, select an entity from which you want to get results.


The **Output Data**, **Conditions**, **Role Conditions**, and **Advanced** sections appear.

7. Under **Output Data** section, select **+Add field**.  
The **FIELD**, **FUNCTION**, and **ACCESS** boxes appear.

**i** **Tip:**  
If you want to get values from all the fields in the query, select **+Add all fields**.

8. Enter or select values as specified in the following table.

Field Name	Description
FIELD	Select the field whose values you want to get using the query.

Field Name	Description
	 <b>Tip:</b> If the entity that you have specified in the <b>Entity</b> box is a source entity in a relationship, you can select from fields in the source and target entities.
FUNCTION	Specify whether you want to get the maximum, minimum, average, sum, or count of the values in the field. By default, the value in this box is <b>None</b> , which indicates that the exact values will appear in the query results.
ACCESS	If you want to provide access to the data in the field only to users assigned to specific roles, select <b>Permitted roles</b> . By default, this box contains the value <b>All users</b> , which indicates that all users, regardless of the roles assigned to them, can access the query results. In the <b>PERMITTED ROLES</b> box that appears, navigate through the hierarchy of roles, and then select the roles assigned to users who can access the data in this field.

9. In the **Conditions** section, select **+Add**, and then enter or select values as specified in the following table.

Field Name	Description
Required or Optional	Select one of the following values: <ul style="list-style-type: none"> <li>◦ <b>Required:</b> Select this value if the field must always contain a value. For example, suppose you are creating a query to display account details based on the account number. If you select <b>Required</b>, when you run the query, if you have not specified an account number, no records appear.</li> <li>◦ <b>Optional:</b> Select this value if the field need not contain a value. For example, suppose you are creating a query to display account details based on the account number. If you select <b>Optional</b>, when you run the query, if you have not specified an account number, all the records appear.</li> </ul>
Field	Select the entity field based on which you want to create a condition.

Field Name	Description
Operator	Select the conditional operator that you want to use to compare the value in the selected field.
Compare with	<p>Select one of the following values:</p> <ul style="list-style-type: none"> <li>◦ <b>Input field:</b> Select this value if you want to allow application users to specify a value that you want to compare with the entity field value. After you select this value, enter a name for the input field in the text box that appears. For example, suppose you want to create a query to display a list of devices in a specific site, and you want to allow the user to specify the site name. In this case: <ul style="list-style-type: none"> <li>a. Select <b>Input field</b>, and then enter Site Name.</li> <li>b. Modify the page in the application that contains the query to include an input component that allows the user to enter or select the site name.</li> <li>c. Map the input component in the page with the input in the <b>Page Data</b> section.</li> </ul> <p>When the user enters a value in the <b>Site Name</b> field in the application, the query results are filtered accordingly.</p> </li> <li>◦ <b>Fixed Value:</b> Select this value if you want to specify the value that you want to compare with the entity field value. After you select this value, enter a value in the text box that appears. For example, if you want to get data received from a device if the temperature exceeds 40 degrees Celsius: <ul style="list-style-type: none"> <li>▪ In the <b>Field</b> box, select the field that stores temperature.</li> <li>▪ In the <b>Operator</b> box, select &gt;.</li> <li>▪ Select <b>Fixed Value</b>, and then enter 40 in the text box.</li> </ul> </li> <li>◦ <b>Query:</b> Select this value to specify a query whose output you want to compare with the field values in the specified entity. After you select this value, a drop-down list box appears in which you can select a query. For example, if there is a query</li> </ul>



Field Name	Description
	that returns the maximum temperature recorded by a device, you can create a query to get a list of devices that record a temperature higher than the maximum temperature.

10. In the **Role Conditions** section, select **Add role condition**, and then enter or select values as specified in the following table.

Field Name	Description
Apply conditions to	<p>Select one of the following values:</p> <ul style="list-style-type: none"> <li>◦ <b>Specific Roles:</b> Select this value if you want to apply the condition only to users assigned to specific roles. After you select this value, navigate through the hierarchy of roles, and select the roles.</li> <li>◦ <b>All roles:</b> Select this value if you want to apply the condition to all or most users. After you select this value, the <b>Exclude</b> check box appears. Select this check box if you do not want to apply the condition to users assigned to specific roles. After you select this check box, navigate through the hierarchy of roles, and select the roles.</li> </ul> <p>For example, suppose the query returns sales data, and you want to apply the following conditions on who can access the query results:</p> <ul style="list-style-type: none"> <li>▪ Users can access only the data that is related to their region.</li> <li>▪ Regional officers can access data related to all regions.</li> </ul> <p>In this case, select the <b>Exclude</b> check box, and then select the Regional Officer role.</p>
Row visibility	<p>Select one of the following values:</p> <ul style="list-style-type: none"> <li>◦ <b>Filter rows:</b> Select this value if you want to filter rows based on a condition, and then specify the condition in the <b>Entity field</b> and <b>In user's role tree</b> boxes. For example, if the query returns sales data, and you want users to access only the data that is related to their region, then:</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>▪ In the <b>Entity field</b> box, select the entity field that stores the sales region data.</li> <li>▪ In the <b>In user's role tree</b> box, select the category that stores the region roles.</li> <li>◦ <b>Show all rows</b>: Select this value if you want users belonging to specific roles to access all the field values.</li> </ul>
Entity field	<p>This field appears only if the value in <b>Row visibility</b> is <b>Filter rows</b>.</p> <p>Select the entity field that contains the value that you want to compare with the value in <b>In user's role tree</b>.</p>
In user's role tree	<p>Select the group or category of users that will be used to filter data. This box appears only if the value in the <b>Row visibility</b> box is <b>Filter rows</b>.</p>

11. In the **Advanced** section, enter or select values as specified in the following table:

Field Name	Description
Distinct	Select this check box if you do not want the query results to display duplicate field values. For example, suppose a query returns a list of countries that users belong to, and you want to view only the list of countries, you can select this check box so that each country appears only once.
Order By	Select <b>Add</b> , and then select the entity field and the order in which the field values should be arranged in the query results.
Group By	Select <b>Add</b> , and then select the entity field that you want to use to group the query results.

If the query results contain a list of users and the country that each user belongs to, and if you want to group the users based on their country and sort them alphabetically, perform the following steps:

- a. From **Order By**, select the entity field that stores the user name, and then select **Asc**.
- b. From **Group By**, select the entity field that stores the country.

12. Select **Save** or **Save And Exit**.

The query is created.

## Create Update Query (Classic)

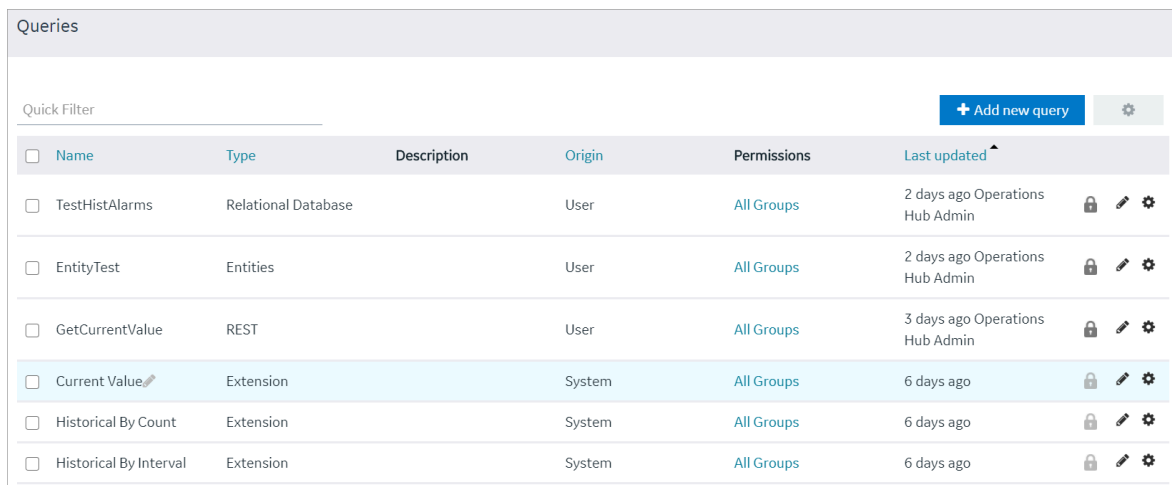
This topic describes how to create an Update query.

Log in to Operations Hub.

You can also [copy an existing update query \(on page 348\)](#).

1. In the main navigation menu, select **QUERIES**.

The **QUERIES** workspace appears.

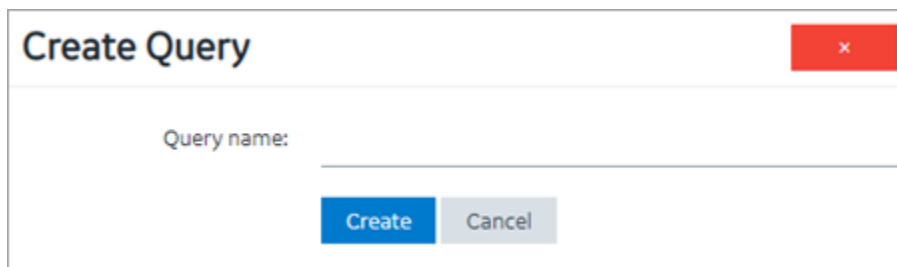


The screenshot shows the 'Queries' workspace with a 'Quick Filter' input and an '+ Add new query' button. Below is a table listing several queries:

<input type="checkbox"/>	Name	Type	Description	Origin	Permissions	Last updated			
<input type="checkbox"/>	TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin	🔒	✏️	⚙️
<input type="checkbox"/>	EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin	🔒	✏️	⚙️
<input type="checkbox"/>	GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin	🔒	✏️	⚙️
<input type="checkbox"/>	Current Value	Extension		System	All Groups	6 days ago	🔒	✏️	⚙️
<input type="checkbox"/>	Historical By Count	Extension		System	All Groups	6 days ago	🔒	✏️	⚙️
<input type="checkbox"/>	Historical By Interval	Extension		System	All Groups	6 days ago	🔒	✏️	⚙️

2. Select **Add new query**.

The **Create Query** window appears.



The screenshot shows the 'Create Query' dialog box with a red close button in the top right corner. It contains a text input field labeled 'Query name:' and two buttons at the bottom: 'Create' and 'Cancel'.

3. In the **Query name** box, enter a name, and then select **Create**. The name must contain at least one uppercase or lowercase letter.

The available options for creating the query appear.

4. In the **Description** box, enter a value.
5. In the **Query Type** box, select **Update**.
6. In the **Entity** box, select an entity from which you want to update results.

The **Conditions** and **Set Data** sections appear.

Queries > DeviceList

Description: \_\_\_\_\_

Query Type:

- Get
- Update
- Insert
- Delete

Entity: device\_clouds

---

Conditions

+ Add

---

Set Data


device\_clouds -> cloud\_id Source: Input field Input Name : \_\_\_\_\_ 🗑️

+ Add + Add all fields

Cancel Save Save As New Save And Exit

7. In the **Conditions** section, select **Add**, and then enter or select values as specified in the following table.

Field Name	Description
Entity Field	<p>Select one of the following values:</p> <ul style="list-style-type: none"> <li>◦ <b>Required:</b> Select this value if the field must always contain a value. For example, suppose you are creating a query to update account details based on the account number. If you select <b>Required</b>, when the query is run from an application, if an account number is not specified, then a message appears, stating that the field is required.</li> <li>◦ <b>Optional:</b> Select this value if the field need not contain a value. For example, suppose you are creating a query to update account details based on the account number. If you select <b>Optional</b>, when the query is run from an application, if an ac-</li> </ul>

Field Name	Description
	<p>count number is not specified, then all the fields will be updated. Therefore, use caution when selecting this value.</p> <div style="border: 1px solid orange; border-radius: 10px; padding: 10px; background-color: #fff9c4;"> <p> <b>Important:</b> Exercise extreme caution while selecting <b>Optional</b>. If used incorrectly, it can corrupt the data.</p> </div>
Field	Select the entity field based on which you want to create a condition.
Operator	Select the operator that you want to use to compare the value in the text box if <b>Input Field</b> is selected.
Compare with	<p>Select one of the following values:</p> <ul style="list-style-type: none"> <li>◦ <b>Input field:</b> Select this value if you want to allow application users to specify a value that you want to compare with the entity field value. After you select this value, enter a name for the input field in the text box that appears. For example, suppose you want to create a query to update all devices in a specific site, and you want to allow the user to specify the site name. In this case: <ul style="list-style-type: none"> <li>a. Select <b>Input Type</b>, and then enter Site Name.</li> <li>b. Modify the page in the application that contains the query to include the query to add an input control that allows the user to specify or select the <b>Site Name</b> field. Using the drag-and-drop method, map the <b>Site Name</b> field in the query with the site name control.</li> </ul> <p style="margin-left: 40px;">When the user enters or selects a value in the <b>Site Name</b> field in the application, and runs the query, all the devices with the selected site name are updated.</p> </li> <li>◦ <b>Fixed Value:</b> Select this value if you want to specify the value that you want to compare with the entity field value. After you select this value, enter a value in the text box that appears. For example, if you want to update the status of all devices if the temperature exceeds 40 degrees Celsius:</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>▪ In the <b>Field</b> box, select the field that stores temperature.</li> <li>▪ In the <b>Operator</b> box, select &gt;.</li> <li>▪ Select <b>Fixed Value</b>, and then enter 40 in the text box.</li> </ul> <ul style="list-style-type: none"> <li>◦ <b>Query</b>: Select this value to specify a query whose output you want to compare with the field values in the specified entity. After you select this value, a drop-down list box appears in which you can select a query. For example, if you want the query to update the status of devices when the temperature recorded by them exceeds a specified maximum temperature, you must create a query to get the maximum temperature, and select that query in this field.</li> </ul>

8. In the **Set Data** section, select **Add**, and then enter or select values as described in the following table.

Field Name	Description
Entity field	Select the entity field whose values you want to update using the query.
Value	Select one of the following values: <ul style="list-style-type: none"> <li>◦ <b>Input field</b>: Select this value if you want to update values specified by application users, and then enter a name in the <b>Input Data Name</b> box. Add an input control for the field in the application, and map it to the input field in the query.</li> <li>◦ <b>Fixed value</b>: Select this value if you want to insert a fixed value, and then enter the value in the <b>Name</b> box.</li> </ul>
Input Data Name	This field appears only if you select <b>Input field</b> in the <b>Value</b> box. Enter the name of the field that you will add in the application. Application users can then provide the value by accessing the application.
Name	This field appears only if you select <b>Fixed value</b> in the <b>Value</b> box. Enter the value that you want to update using the query.

9. Select **Save** or **Save And Exit**.

The query is created.

## Create Insert Query (Classic)

This topic describes how to create an Insert query.

Log in to Operations Hub.

You can also [copy an existing insert query \(on page 348\)](#).

1. In the main navigation menu, select **QUERIES**.

The **QUERIES** workspace appears.

<input type="checkbox"/>	Name	Type	Description	Origin	Permissions	Last updated			
<input type="checkbox"/>	TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin	🔒	✏️	⚙️
<input type="checkbox"/>	EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin	🔒	✏️	⚙️
<input type="checkbox"/>	GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin	🔒	✏️	⚙️
<input type="checkbox"/>	Current Value	Extension		System	All Groups	6 days ago	🔒	✏️	⚙️
<input type="checkbox"/>	Historical By Count	Extension		System	All Groups	6 days ago	🔒	✏️	⚙️
<input type="checkbox"/>	Historical By Interval	Extension		System	All Groups	6 days ago	🔒	✏️	⚙️

2. Select **Add new query**.

The **Create Query** window appears.

3. In the **Query name** box, enter a name, and then select **Create**. The name must contain at least one uppercase or lowercase letter.

The available options for creating the query appear.

4. In the **Description** box, enter a value.
5. In the **Query Type** box, select **Insert**.
6. In the **Entity** box, select an entity in which you want to insert results.

The **Set Data** section appears.

Queries > DeviceList

Description: \_\_\_\_\_

Query Type:

Get

Update

Insert

Delete

Entity: device\_clouds

Set Data

7. In the **Set Data** section, select **Add**, and then enter or select values as described in the following table.

Field Name	Description
Entity field	Select the entity field whose values you want to insert using the query.
Value	Select one of the following values: <ul style="list-style-type: none"> <li>◦ <b>Input field</b>: Select this value if you want to insert values specified by application users, and then enter a name in the <b>Input Data Name</b> box. Add an input control for the field in the application and map it to the input field in the query.</li> <li>◦ <b>Fixed value</b>: Select this value if you want to insert a fixed value, and then enter the value in the <b>Name</b> box.</li> </ul>
Input Data Name	This field appears only if you select <b>Input field</b> in the <b>Value</b> box. Enter the name of the field that you will add in the application. Application users can then provide the value by accessing the application.
Name	This field appears only if you select <b>Fixed value</b> in the <b>Value</b> box. Enter the value that you want to insert using the query.



8. Select **Save** or **Save And Exit**.

The query is created.

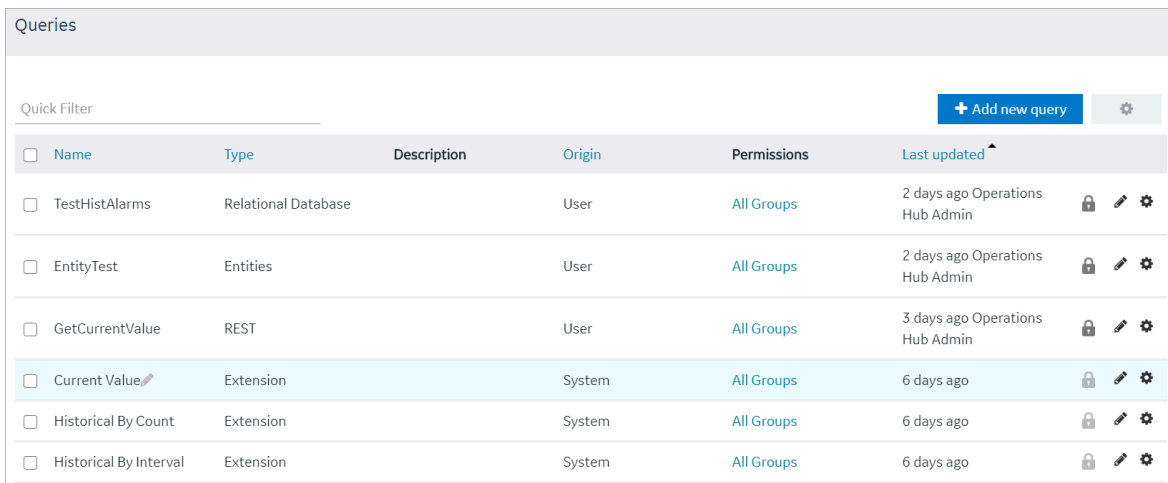
## Create Delete Query (Classic)

This topic describes how to create a Delete query.

Log in to Operations Hub.

1. In the main navigation menu, select **QUERIES**.

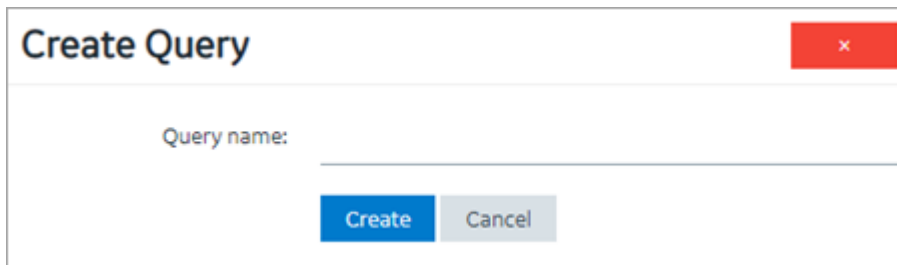
The **QUERIES** workspace appears.



<input type="checkbox"/>	Name	Type	Description	Origin	Permissions	Last updated	
<input type="checkbox"/>	TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin	🔒 ✎ ⚙️
<input type="checkbox"/>	EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin	🔒 ✎ ⚙️
<input type="checkbox"/>	GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin	🔒 ✎ ⚙️
<input type="checkbox"/>	Current Value	Extension		System	All Groups	6 days ago	🔒 ✎ ⚙️
<input type="checkbox"/>	Historical By Count	Extension		System	All Groups	6 days ago	🔒 ✎ ⚙️
<input type="checkbox"/>	Historical By Interval	Extension		System	All Groups	6 days ago	🔒 ✎ ⚙️

2. Select **Add new query**.

The **Create Query** window



appears.

3. In the **Query name** box, enter a name, and then select **Create**. The name must contain at least one uppercase or lowercase letter.

The available options for creating the query appear.

4. In the **Description** box, enter a value.

5. In the **Query Type** box, select **Delete**.

6. In the **Entity** box, select an entity from which you want to delete results.

The **Conditions** section appears.

Queries > DeviceList

Description: \_\_\_\_\_

Query Type:

- Get
- Update
- Insert
- Delete

Entity: device\_clouds

Conditions


---

+ Add

Cancel
Save
Save As New
Save And Exit

7. In the **Conditions** section, select **Add**, and then enter or select values as specified in the following table.

Field Name	Description
Required or Optional	<p>Select one of the following values:</p> <ul style="list-style-type: none"> <li>◦ <b>Required:</b> Select this value if the field must always contain a value. For example, suppose you are creating a query to delete account details based on the account number. If you select <b>Required</b>, when the query is run from an application, if an account number is not specified, a message appears, stating that the field is required.</li> <li>◦ <b>Optional:</b> Select this value if the field need not contain a value. For example, suppose you are creating a query to delete account details based on the account number. If you select <b>Optional</b>, when the query is run from an application, if an ac-</li> </ul>

Field Name	Description
	<p>count number is not specified, the all the records are deleted.</p> <div style="border: 1px solid orange; border-radius: 10px; padding: 10px;"><p> <b>Important:</b> Exercise extreme caution while selecting <b>Optional</b> for a delete query. If the user does not specify a value, all the data in the entity will be deleted.</p></div>
Field	Select the entity field based on which you want to create a condition.
Operator	Select the operator that you want to use to compare the value in the text box if Input field is selected.
Compare with	<p>Select one of the following values:</p> <ul style="list-style-type: none"><li>◦ <b>Input field:</b> Select this value if you want to allow application users to specify a value that you want to compare with the entity field value. After you select this value, enter a name for the input field in the text box that appears. For example, suppose you want to create a query to delete devices in a specific site, and you want to allow the user to specify the site name. In this case:<ol style="list-style-type: none"><li>a. Select <b>Input Type</b>, and then enter Site Name.</li><li>b. Modify the page in the application that contains the query to add an input control that allows users to specify the site name. Using the drag-and-drop method, map the input control in the query with the <b>Site Name</b> field.</li></ol><p style="margin-left: 40px;">When the user enters a value in the <b>Site Name</b> field in the application, and runs the query, all the devices with the specified site name are deleted.</p></li><li>◦ <b>Fixed Value:</b> Select this value if you want to specify the value that you want to compare with the entity field value. After you select this value, enter a value in the text box that appears. For example, if you want to delete data received from a device if the temperature exceeds 40 degrees Celsius:</li></ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>▪ In the <b>Field</b> box, select the field that stores temperature.</li> <li>▪ In the <b>Operator</b> box, select &gt;.</li> <li>▪ Select <b>Fixed Value</b>, and then enter 40 in the text box.</li> <li>◦ <b>Query</b>: Select this value to specify a query whose output you want to compare with the field values in the specified entity. After you select this value, a drop-down list box appears in which you can select a query. For example, if there is a query that returns the maximum temperature recorded by a device, you can create a query to delete all the devices that record a temperature higher than the maximum temperature.</li> </ul>

8. Select **Save** or **Save And Exit**.

The query is created.

## Create SQL Query (Classic)

This topic describes how to create a SQL query.

In order to proceed you must have a working SQL database, and the selected database must have stored procedures. You must also have created a data source for the relational database in Operations Hub.

To use a relational database in an Operations Hub application, you must:

- [Create a Data Source \(Classic\) \(on page 421\)](#) with a Relational Database type and provide the details of the external database.
- Create a SQL Query, and specify the expected inputs and outputs of a Stored Procedure. (Described in this topic in the following steps.)
- Map the query in the page designer to use the query to fetch the data from the external database. See [Use the Relational Database Query in the Designer \(on page 120\)](#).

1. In the main navigation menu, select **QUERIES**.

The **QUERIES** workspace appears.

Queries							
Quick Filter						<a href="#">+ Add new query</a>	
<input type="checkbox"/> Name	Type	Description	Origin	Permissions	Last updated		
<input type="checkbox"/> TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin		
<input type="checkbox"/> EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin		
<input type="checkbox"/> GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin		
<input type="checkbox"/> Current Value	Extension		System	All Groups	6 days ago		
<input type="checkbox"/> Historical By Count	Extension		System	All Groups	6 days ago		
<input type="checkbox"/> Historical By Interval	Extension		System	All Groups	6 days ago		

2. Select **Add new query**.

The **Create Query** window appears.

3. In the **Name** field, enter a name, and then select **Create**. The name must contain at least one uppercase or lowercase letter.

The available options for creating the query appear.

4. In the **Description** field, enter a description for the query.

5. In the **Type** field, select **Relational Database**.

6. In the **Data Source** field, select the name of the data source from the list.

7. In the **Query Type** field, observe that the field defaults to 'Stored Procedure' when you select 'Relational Database' as the Type.

8. In the **Schema** field, select the database schema that you want to use. All the database schemas will be loaded for the selected data source. The default selection is *dbo*.

9. In the **Stored Procedure** field, select the Stored Procedure that you want to use from the selected schema.

After you select all the required fields, the list of input parameters will be loaded if there are any, for the selected stored procedure.

**Input Parameters:** The value for the input parameters can be configured either while creating the query or while consuming the query in the page builder.

To assign the value for an input parameter while creating the query, select the type drop-down in the input parameter list. It has two options:

- **Fixed Value:** If this option is selected, the value given will be taken as the input to the Stored Procedure. The input parameter will not be shown in the page builder page.
- **Input Field:** If this option is selected, the value given will be taken as the default input to the Stored Procedure. The input parameter will be shown in the page builder page and if there is any input provided to while execution, the default value will be overridden.

Specify the triggering/non-triggering options for the input parameters. See [Triggering/Non-triggering SQL Queries \(on page 335\)](#).

After the default values for input parameters are provided, select the **Execute** button under the Test category. You will then be presented with the various fields in Result Sets and Output Parameters sent out of the Stored Procedure.

**Note:**

Currently we do not support dynamic responses from the Stored Procedures. This means while building the query, the fields that appear after selecting **Execute**, should match the fields returned by the stored procedure while using the application.

10. By default, the **Convert Datetime** check box is checked. It implies that the datetime values are affected in the following manner:
  - the datetime values retrieved from the SQL database are shifted from UTC to the browser's local time
  - datetime values from the Operations Hub Server have a 'Z' appended to indicate that they are in UTC
  - for input parameters sent to the Operations Hub Server, datetime values are time-shifted from the local time to UTC.
  - the datetime conversion behavior can also change based on the options available in the [DatePicker \(on page 578\)](#) plug-in and System datetime globals.

If **Convert Datetime** is unchecked, the datetime values retrieved from the database will not be time-shifted. Operations Hub will not append the 'Z' to indicate UTC, and the values will be displayed as they are in the SQL Server. For input parameters, the datetime values will not be time-shifted. This behavior can also change based on the options available in the [DatePicker \(on page 578\)](#) plug-in and System datetime globals.

11. Select **Save** or **Save And Exit**.

The query is created.

## Triggering/Non-triggering SQL Queries

This topic describes the SQL triggering and non-triggering functionality.

This feature is exclusive to:

- Operations Hub Classic version, accessible under Query definition and Page designer.
- Specifically designed for input plug-ins (excluding widgets).

When creating SQL queries in Operations Hub, you have the option to specify whether the SQL query should be triggered or not when a change occurs in its input value. You can also specify if the value is mandatory or optional to trigger a query. By default, the options are set to `Triggering` and `Optional` for all SQL queries. This is also the default behavior of Operations Hub page designer **PAGE DATA** tab > **Query** option > **Auto submit on input change**.

When you use the query in page designer, you can choose to modify the triggering/non-triggering settings. The page designer settings take precedence over the settings in query definition. Once the query is added to a page, any changes to the settings in query definition is not carried over to page designer.

Key	Datatype	Type	Default or Test Value	Non Triggering or Triggering	Optional or Mandatory
dept_details	NVARCHAR	Input Field		Triggering	Optional
dept_id	INTEGER	Input Field		Triggering	Optional
emp_name	NVARCHAR	Input Field		Triggering	Optional

### Non-triggering

If the input parameter is set to `Non Triggering`, then at runtime any change to the input does not trigger the query.

### Triggering

If the input parameter is set to `Triggering`, then at runtime any change to the input will trigger the query provided all the mandatory fields are set.

### Optional

If the input parameter is set to `Optional`, then the input need not have any value for the query to trigger.

### Mandatory

If the input parameter is set to `Mandatory`, then the input should contain a value for the query to trigger.

## Create REST Query (Classic)

This topic describes how to create a REST query.

- Log in to Operations Hub.
- [Create the data source \(on page 421\)](#) that you want to use in the query.
- [Create an entity \(on page 295\)](#) to specify the query response. The entity fields that you want to map with the query output parameters must contain the same names as the parameters.
- It is recommended that you add the environment variable `no_proxy` to System variables.

Additionally, include references to `localhost` and nodes that are targets of REST queries in System variables. Be aware that the environment variables are case-sensitive: the case of the environment variables for the data source target in Operations Hub should match the case used by the Historian Server. [See troubleshooting note \(on page 341\)](#).



**Note:**

REST query will run even when system variable has no port number. A bad port leads to an error.

1. In classic Operations Hub navigation menu, select **QUERIES**.

The **QUERIES** workspace appears.


2. Select **Add new query**.

The **New Query** window appears.

3. Provide these details:

Field Name	Description
Name	Enter a name for the new REST query. The name must contain at least one uppercase or lowercase letter.
Type	Select <b>REST</b> . Additional options for creating the REST query appear.
Description	Briefly describe the purpose of the query.
Entity	Select the entity that will specify the query response fields.  <div> </div> <p><b>Note:</b> When using a Historian data source, the Entity field will auto-populate with the entity associated with the Available API selected.</p>



Field Name	Description
Method	<p>Select the method of operation you want to perform on the database using this query. Supported methods are:</p> <ul style="list-style-type: none"> <li>◦ <b>GET</b>: This method is used to retrieve data.</li> <li>◦ <b>PUT</b>: This method is used to update existing data.</li> <li>◦ <b>POST</b>: This method is used to add data.</li> <li>◦ <b>DELETE</b>: This method is used to remove data.</li> </ul>
Raw Response	<p>Select this check box if you want to get either the entire JSON response or XML response mapped to a single entity field. You can then access the response by referencing that entity field while designing an application. If you clear this check box, individual components of the response are mapped to individual entity fields.</p>
Data Source	<p>Select the data source that you want to use for the query.</p>
Available API	<p>Select the API that you want to use in the query. This box contains a list of APIs that are available in the data source that you have selected.</p> <p>The list of available APIs will be filtered based on the method selected.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> Pre-existing APIs are available only for Historian data sources. For more information see <a href="#">Historian API help</a>.</p> </div>
Base URL, Query URL	<p>The <b>Base URL</b> and <b>Query URL</b> fields are populated with the base portion (that is, the host name or IP address of the data source server) and the remaining portion of the URL. The values in these boxes together identify the complete URL endpoint. The <b>Base URL</b> box is always disabled. The <b>Query URL</b> box is disabled if you select an API for a Historian data source. If, however, you are using a custom data source, you can enter a value in the <b>Query URL</b> box.</p>

Next, you need to create parameters as needed for the API you are querying. Each parameter will require a default or test value if you wish to run the query with the Execute button.

#### 4. Specify **Path Parameters**.

Identify the parameters in the path of the endpoint. These appear before the query string if query parameters are present.

**Example:** For the endpoint `https://jsonplaceholder.typicode.com/users/1/posts`, the parameter between `users` and `posts`, which is the user ID, is the path parameter. The value for this parameter is 1.

#### 5. Specify **Query Parameters**.

Identify the parameters in the path of the endpoint that appear after the question mark (?).

**Example:** For the endpoint `https://jsonplaceholder.typicode.com/posts?userId=1`, `userId` is the query parameter. The value for this parameter is 1.

#### 6. Specify **Header Parameters**.

Identify the parameters that you want to include in the request header. Typically, these parameters are related to authorization.

#### 7. Specify **Body Parameters**.

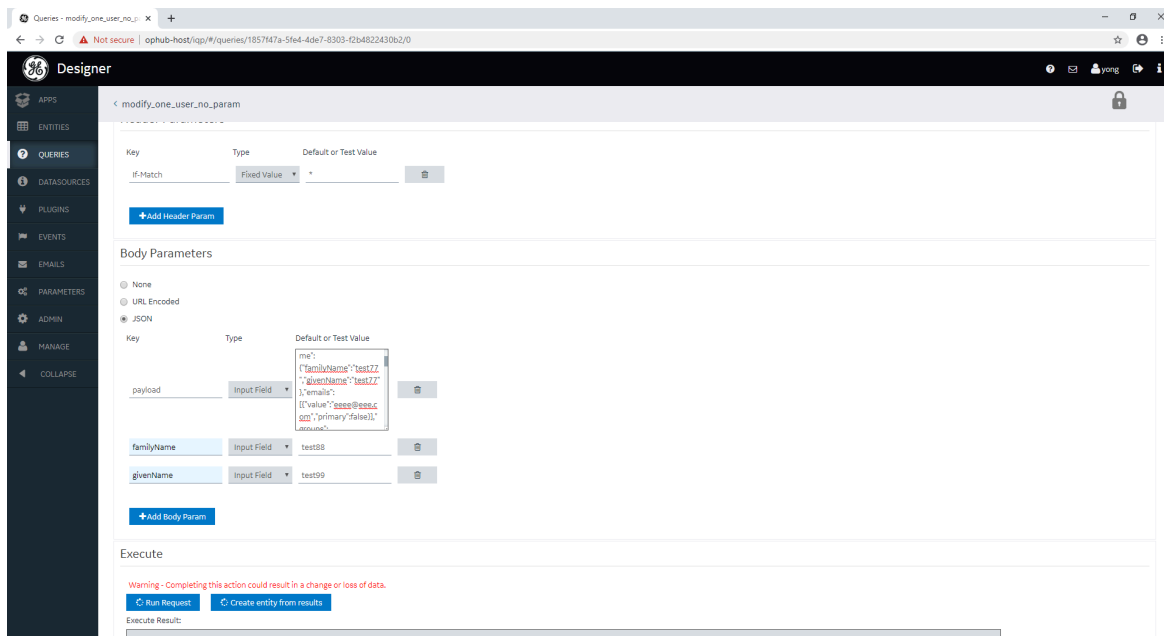
This section appears when you select the `POST` method (refer to step 3 in this topic).

Identify the parameters in the body of the request. Typically these will be required for PUT and POST methods, although they are sometimes required for DELETE as well.

Body parameters can be supplied in Operations Hub as a URL encoded format, raw JSON, or raw XML. In case JSON or XML is selected, the first parameter should be used to supply the full JSON body. Subsequent parameters can be used for dynamic substitution into that JSON body.

- **JSON:** If selected, the subsequent parameters should be JSON keys found in the body. The corresponding JSON values will be substituted.
- **XML:** If selected, the subsequent parameters should be strings found in the body. These strings will be substituted. You can also supply curly braces to delineate the parameters from text within the body. For example, `{{STRING_TO_SUBSTITUTE}}`

Additionally, you have the option to preview the substitution for XML.



Be aware that the following Historian REST queries require the multi-select input to be enabled on the EndApp page for output data to be displayed:

- Get > Raw Data
- Get > Calculated Data
- Get > Interpolated Data
- Post > Raw Data
- Post > Calculated Data
- Post > Interpolated Data

8. In the **Execute** section, select **Run Request**.


The query output fields, as well as the query appear in the **Results** box.

**!** **Important:**

Provide sample values leading to a successful response in order to properly test the REST endpoint. We strongly recommend using values you know will return a representative set of data; otherwise, an error occurs or the response may not return the field data that you need. For example: for Historian data queries, if the set of requested tags is different from the returned set of data (that is, if one or more tags does not have data), the call will fail. The user should modify the inputs to include only the tags for which they are confident there will be data in the response. For PUT/POST/DELETE, this action is not a test but an actual request which can change your data.

9. If required, select **Create entity from results** from Results. This will create an entity with the appropriate output fields generated from the previous Run Request.
10. Under the **Output Data** section, you can include one or more output data fields to your REST query. Following output fields are available to use:

Output Data Field	Description
TagName	This field represents the tag name you want to query in the database.
Timestamp	This field represents the timestamp associated with each data point.
Value	This field represents the actual data value associated with the specified tag at a given timestamp.
Quality	This field represents the quality of the data at a specific timestamp.
DataAttributes	<p>This field represents data attributes associated with the data point.</p> <p>Historian is now enhanced to store up to 128-bit quality types, which are stored in data attributes. These attributes are extended qualities that you can store more than the regular qualities and sub qualities such as good and bad. In addition to regular qualities, the HAB collector collects extended qualities such as replaced, suspect, garbage, old, and so on. You can use these attributes using REST APIs as well as Configuration Hub.</p>

Select  next to the output data field you do not want to include in your query.

11. Save the REST query.

<b>Save</b>	Saves the data.
<b>Save and Exit</b>	Saves the data and exits the screen.

The REST query is created.

**Note:**

While Operations Hub handles many response formats, there are some responses which it has difficulty mapping to output fields. In particular, embedded lists may be returned as strings rather than lists of objects.

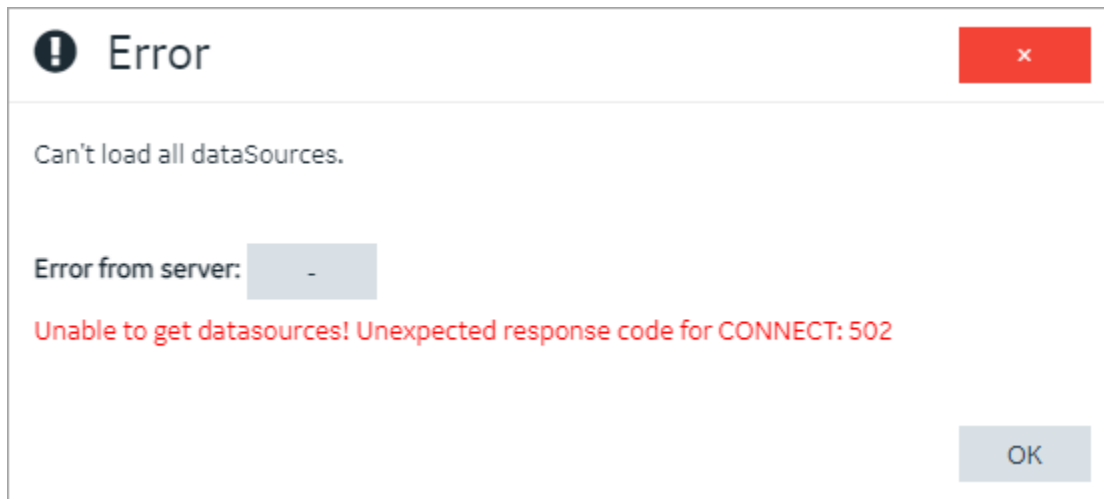
**Important:**

When you have a large number of users (greater than 100) and each using an end app with multiple REST requests, coupled with a slow REST response, you can get into a situation where the server is waiting for a long time for the previous responses to return, and is therefore unable to process new requests. To avoid this situation, reduce the number of REST calls in your App. Alternatively, you may adjust the Operations Hub timeout setting in the `settings.conf` file in the following folder: `C:\ProgramData\GE\Operations Hub\iqp-config\IQP\app`. Use the following command so that the slower REST requests do not hold up the Operations Hub server. You can change the seconds value to increase the timeout setting further:

```
#REST client timeout (seconds)
rest_timeout=30
```

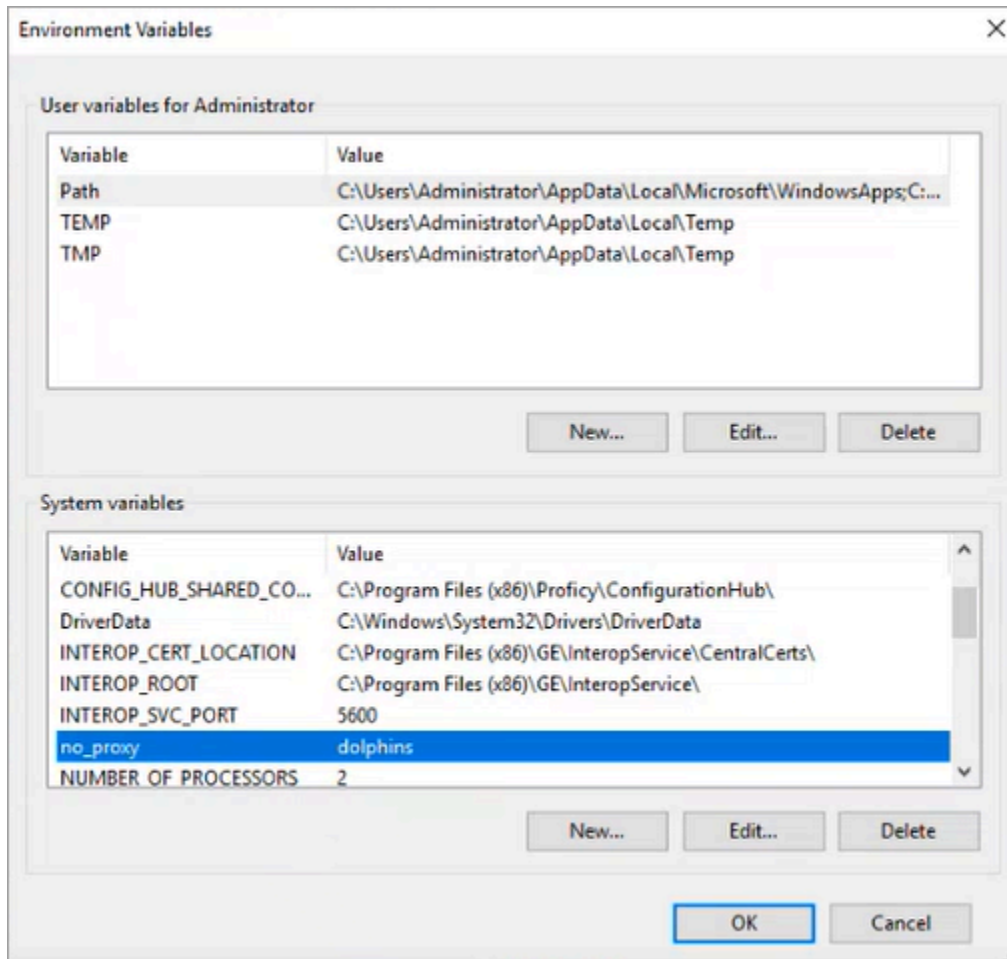
**Troubleshooting: 502 Error when Using REST Query with 'No Proxy' and 'Localhost'**

Some users may encounter a 502 error when attempting to use a REST query after adding `no_proxy` and `localhost` settings. This issue may not affect all users.



If you encounter this error, check your `no_proxy` settings and ensure that the host name you are using is correctly configured.

1. Open Control Panel and navigate to **System and Security > System > Advanced system settings > Environment Variables**.
2. Look for the `no_proxy` variable under System variables section.



To resolve this issue, add the actual name of the host. For example, if `localhost` causes trouble, try using the actual computer name (e.g., Joe's PC). Restart the services after making these changes. Note that while some users may encounter this issue, others may not experience any trouble with using `localhost`.

## Create Extension Query (Classic)

This topic describes how to create an Extension query.

Log in to Operations Hub.

Extension type queries work with multiple data sources.

1. In classic Operations Hub navigation menu, select **QUERIES**.

The **QUERIES** workspace appears.

2. Select **Add new query**.

The **New Query** window appears.

3. Provide these details:


Field Name	Description
Name	Enter a name for the new extension query. The name must contain at least one uppercase or lowercase letter.
Type	Select <b>Extension</b> .  Additional options for creating the extension query appear.
Description	Briefly describe the purpose of the query.
Method	Select the type of extension query you want to create from these options: <ul style="list-style-type: none"> <li>◦ Read</li> <li>◦ OPC UA Write</li> <li>◦ Historian Add Comment</li> </ul> <p>The sections <b>Query Parameters</b> and <b>Output Data</b> appear based on the method selected for the query.</p>

4. Specify **Query Parameters**.

Refer to [Extension Query Parameters \(on page 344\)](#).

- a. Choose from:

- **Fixed Value:** If this option is selected, the provided value is considered as a fixed value for the field. Fixed value fields are not shown in the application page builder.
- **Input Field:** If this option is selected, the provided value appears as a default value for the field in the page builder. Any value provided before executing the query overrides the default value.


- b. Select  next to the parameters you do not want to include in your query.

To retrieve deleted query parameters and output data, select **+Add All Query Params** and **+Add All Outputs** respectively.

5. Under the **Output Data** section, you can include one or more output data fields to your extension query.

Following output fields are available to use:

Output Data Field	Description
Timestamp	This field represents the timestamp associated with each data point.
Name	This field represents the tag name you want to query in the database.
Value	This field represents the actual data value associated with the specified tag at a given timestamp.
Quality	This field represents the quality of the data at a specific timestamp.
Data Attributes	<p>This field represents data attributes associated with the data point.</p> <p>Historian is now enhanced to store up to 128-bit quality types, which are stored in data attributes. These attributes are extended qualities that you can store more than the regular qualities and sub qualities such as good and bad. In addition to regular qualities, the HAB collector collects extended qualities such as replaced, suspect, garbage, old, and so on. You can use these attributes using REST APIs as well as Configuration Hub.</p>

Select  next to the output data field you do not want to include in your query.

6. Save the extension query.

The extension query is created. The newly created query appears in the application page builder under **PAGE DATA > Query > Entities**.


Go to the application page builder to apply and execute the query.

## Extension Query Parameters

Use these parameters in your extension query.

Parameter	Description
Tag Source	Specify a tag source.



Parameter	Description
Tag	Allows to browse and select a tag.
Authentication	<p>Select how to authenticate when you submit a query:</p> <ul style="list-style-type: none"> <li>• <code>Logon User Token</code>: Uses the user login token for authentication.</li> <li>• <code>Provide in Query Parameters</code>: Uses <b>User Name</b> and <b>Password</b> input fields for authentication.</li> <li>• <code>Use Data Source Credentials</code>: Uses the write credentials configured in the data source for authentication.</li> <li>• <code>Anonymous</code>: No authentication.</li> </ul>
Tag Display Format	Select a display format for the tag name.
Sampling Mode	Select a sampling mode for retrieving data.
Calculated Mode	If the sampling mode is <code>Calculated</code> , specify the calculation mode.
Start Time	Select the calendar icon to set a start time.
Duration	Enter the duration.
End Time	Select the calendar icon to set an end time.
Sampling Time	Enter the sampling time.
Sampling Count	Enter the sampling count.
Sampling Direction	<p>Direction of sampling, whether forward or backward.</p> <div style="border: 1px solid #00a0c0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> This parameter is used only when the sampling mode is <code>RawByNumber</code>. You must also specify the sampling count for this parameter.</p> </div>
Show Comments	Select/Clear the check box to show/hide comments.
Sort By	<p>Defines how a Data Distributor extension query result-set should be sorted. You must enter the syntax, which is a comma-separated list of Data Distributor extension query fields. The result set is sorted by the fields specified in the list, in the given order.</p> <p>Examples:</p>

Parameter	Description
	<ul style="list-style-type: none"> <li>• <code>timestamp,name</code> means to sort by timestamp first, then by name.</li> <li>• <code>name,timestamp</code> means to sort by name first, and then by timestamp.</li> </ul> <p>Each field in the syntax can optionally have a suffix of a plus + or minus - symbol to indicate the sorting order for that field.</p> <p>For example, <code>timestamp-,name+</code> means to sort by timestamp first in a descending order, then by name in an ascending order.</p> <p>The default sorting order for timestamp is descending, and rest of the fields are ascending.</p> <p>Each field in the syntax can be denoted either by its full output field name, or a built-in one letter identifier. For example,</p> <ul style="list-style-type: none"> <li>• <code>t</code> for timestamp</li> <li>• <code>n</code> for tag name</li> <li>• <code>v</code> for value</li> <li>• <code>q</code> for quality</li> </ul> <p>If you do not enter a syntax, or left this field blank, then the behavior is to sort by timestamp descending.</p> <p>Currently, for auto sync queries, the sorting order only applies to the initial result set and not any subsequent new rows to the result set.</p>

## Update Preloaded REST Queries after Import (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

REST queries from the previous version of Operations Hub are supported. The upgrade process imports these queries to the latest version of the preloaded API. The queries will work with no need for interaction. The display fields need to be manually updated, however. The following steps describe how to update your display fields for a REST query using the Historian GET request.

1. In the main navigation menu, select **QUERIES**.

The **QUERIES** workspace appears.

<input type="checkbox"/> Name	Type	Description	Origin	Permissions	Last updated	
<input type="checkbox"/> TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin	
<input type="checkbox"/> EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin	
<input type="checkbox"/> GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin	
<input type="checkbox"/> Current Value	Extension		System	All Groups	6 days ago	
<input type="checkbox"/> Historical By Count	Extension		System	All Groups	6 days ago	
<input type="checkbox"/> Historical By Interval	Extension		System	All Groups	6 days ago	

- 2. In the row containing the query you want to access, in the **Name** column, select the link. The query appears, displaying a list of fields in the query.
- 3. In the API Name field, select the appropriate API from the drop-down list (the list will already be populated). Use the following tables as a guide on the renamed APIs.

v1.5 API Name	v1.6 API Name
1.5	1.6
Get Tag Properties	Tag Properties
Get Tags	Tags
Get Tags List	Tag List
Get Raw Data	Raw Data
Get Interpolated Data	Interpolated Data
Get Current Value	Current Value
Get Calculated Value	Calculated Value
Get Sampled Data	Sampled Data
Get Trend Data	Trend Data

- 4. Select **Save** or **Save and Exit** to resave the query. The query display field is updated.

### Update Entity Display Fields After an Import (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

Entities defined in the previous version of Operations Hub are supported, and imported to the latest version. They will work with no need for interaction. The display fields need to be manually updated, however. The following steps describe how to update your display fields for entities.

1. In the main navigation menu, select **QUERIES**.

The **QUERIES** workspace appears.

<input type="checkbox"/>	Name	Type	Description	Origin	Permissions	Last updated	
<input type="checkbox"/>	TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin	🔒 ✎ ⚙️
<input type="checkbox"/>	EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin	🔒 ✎ ⚙️
<input type="checkbox"/>	GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin	🔒 ✎ ⚙️
<input type="checkbox"/>	Current Value	Extension		System	All Groups	6 days ago	🔒 ✎ ⚙️
<input type="checkbox"/>	Historical By Count	Extension		System	All Groups	6 days ago	🔒 ✎ ⚙️
<input type="checkbox"/>	Historical By Interval	Extension		System	All Groups	6 days ago	🔒 ✎ ⚙️

2. In the row containing the query you want to access, in the **Name** column, select the link.  
The query appears, displaying a list of fields in the query.
3. In the Entity Name field, select the appropriate Entity from the drop-down list (the list will already be populated). Use the following tables as a guide on the renamed Entities.

v1.5 Entity Name	v1.6 Entity Name
1.5	1.6
historian_gettagproperties	historian_tagproperties

4. Select **Save** or **Save and Exit** to save your changes.

The entity display field is updated.

## Copy a Query (Classic)


Creates a duplicate copy of an existing query.

Log in to Operations Hub.

You can also [create a new query \(on page 317\)](#).

- 1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.

<input type="checkbox"/>	Name	Type	Description	Origin	Permissions	Last updated				
<input type="checkbox"/>	TestHistAlarms	Relational Database		User	All Groups	2 days ago	Operations Hub Admin			
<input type="checkbox"/>	EntityTest	Entities		User	All Groups	2 days ago	Operations Hub Admin			
<input type="checkbox"/>	GetCurrentValue	REST		User	All Groups	3 days ago	Operations Hub Admin			
<input type="checkbox"/>	Current Value	Extension		System	All Groups	6 days ago				
<input type="checkbox"/>	Historical By Count	Extension		System	All Groups	6 days ago				
<input type="checkbox"/>	Historical By Interval	Extension		System	All Groups	6 days ago				

- 2. In the row containing the query that you want to copy, select , then select **Duplicate query**.  
The **Please enter new name** screen appears, displaying the name of the query that you have selected, appended with a system-generated value.
- 3. As needed, modify the name of the query, and select **OK**.  
The name must contain at least one uppercase or lowercase letter.  
The selected query is copied.

### Delete a Query (Classic)

This topic describes how to delete a query.

Log in to Operations Hub.

- You cannot delete a query if it is locked or used in an application.
- You cannot delete a preconfigured query that came with the system installation.

- 1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.

Queries							
Quick Filter						<a href="#">+ Add new query</a>	
<input type="checkbox"/> Name	Type	Description	Origin	Permissions	Last updated		
<input type="checkbox"/> TestHistAlarms	Relational Database		User	All Groups	2 days ago Operations Hub Admin		
<input type="checkbox"/> EntityTest	Entities		User	All Groups	2 days ago Operations Hub Admin		
<input type="checkbox"/> GetCurrentValue	REST		User	All Groups	3 days ago Operations Hub Admin		
<input type="checkbox"/> Current Value	Extension		System	All Groups	6 days ago		
<input type="checkbox"/> Historical By Count	Extension		System	All Groups	6 days ago		
<input type="checkbox"/> Historical By Interval	Extension		System	All Groups	6 days ago		

2. In the rows containing the queries that you want to delete, select the check boxes.

3. In the workspace heading, select , and then select **Delete queries**.

A message appears, asking you to confirm that you want to delete the selected queries.



**Tip:**

Alternatively, in the row containing the query that you want to delete, select , and then select **Delete query**.

4. Select **Delete**.

The queries are deleted.

## Plug-ins

### About Plug-ins

A plug-in is a widget that you can configure to work with the components of an application (such as entities and queries), and then use it in an application. You can thus add additional functionality to Operations Hub.

Using Operations Hub, you can embed plug-ins in an application. You can use plug-ins stored on your local machine or imported from a different site.



**Note:**

When configuring input targets for plugins, ensure that no other binding exists for the target query input. To remove a binding from the query input, select the unlink icon next to the binding.

To create a custom plug-in, refer to [Custom Plug-in Structure \(on page 356\)](#)

## Pump Temperature Plug-in

Suppose there is a plug-in that shows the trend graph of the highest temperature recorded in a pump.

Suppose you want to create an application that monitors the energy efficiency of the pump. In addition to the other parameters that you want to display in the application, you can use the plug-in to show the highest temperature recorded in the pump (instead of creating a trend graph from scratch).

## Access a Plug-in (Classic)










This topic describes how to access custom plug-ins.

Log in to Operations Hub.

To access custom plug-ins in the latest version of Operations Hub, refer to [Navigation Panel \(on page 214\)](#).


In the main navigation menu, select **PLUGINS**.

The **PLUGINS** workspace appears, displaying a list of plug-ins that are imported.

Plugins Management			
<a href="#">+ Import</a>			
Name	Category	Version	
Boilerplate	Visualization		  
LiquidGauge	Visualization	1.0.0	  
Neon Gauge	Visualization	0.0.2	  



### Tip:

You can access the information related to a plug-in by selecting  in the corresponding row.

## Import a Plug-in (Classic)

This topic describes how to import custom plug-ins.

Log in to Operations Hub.

Follow these steps to import each custom plug-in to Operations Hub. Plug-ins also get imported when they are used in an application that you import to Operations Hub.



**Note:**

In case you imported a newer version of an existing plugin, you need to revisit the application pages (designer) wherever the old version was in use.

1. Delete the old plugin version from the container. All plugin configuration settings are lost when you delete the old version.
2. Add the new plugin version to replace the deleted one. Reconfigure the settings for the new version.

You can also use a third party client (for example, Postman) to import plug-ins. Send a post request to `https://enter your machine name/site/ajax/plugin`

1. In the main navigation menu, select **PLUGINS**.

The **PLUGINS** workspace appears.

Plugins Management			
<a href="#">+ Import</a>			
Name	Category	Version	
Boilerplate	Visualization		<a href="#">i</a> <a href="#">🗑</a> <a href="#">📄</a>
LiquidGauge	Visualization	1.0.0	<a href="#">i</a> <a href="#">🗑</a> <a href="#">📄</a>
Neon Gauge	Visualization	0.0.2	<a href="#">i</a> <a href="#">🗑</a> <a href="#">📄</a>

2. Select **Import**.
  3. Navigate to and select the plug-in that you want to import, and then select **Open**.
- The plug-in is imported.



**Note:**

If the plug-in name contains special characters, then the plug-in is not imported. You must fix the plug-in name to import it to Operations Hub. However, existing plug-ins containing special characters in their name are allowed in Operations Hub as long as they are not deleted.

In the page designer of an application, the imported plug-in appears in the **CUSTOM** section.

[Use the plug-in in an application \(on page 353\).](#)

## Use a Plug-in in an Application (Classic)

Steps for Operations Hub classic version.

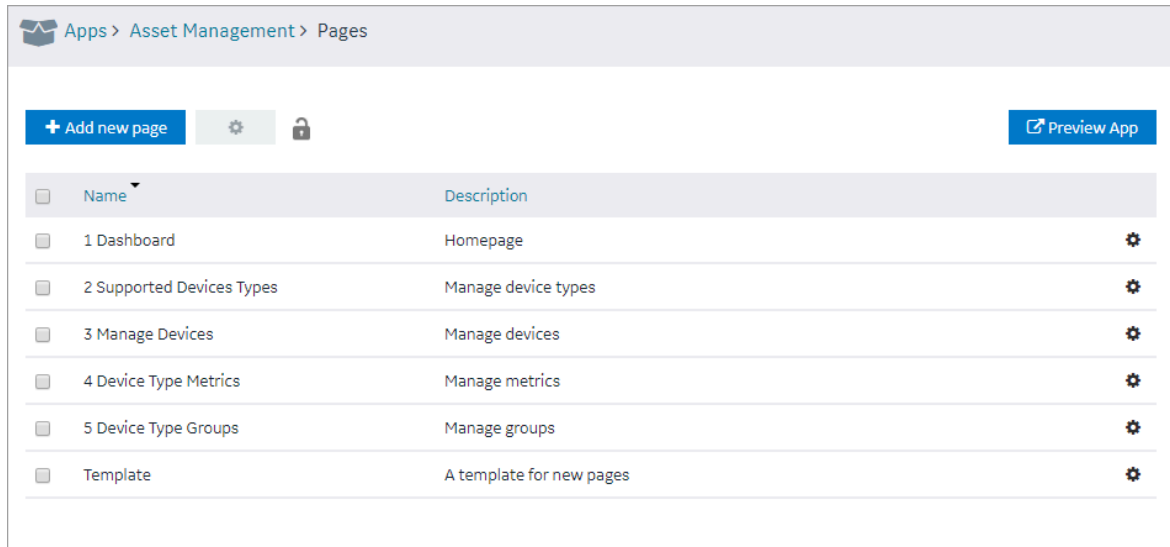
[Import the plug-in \(on page 351\)](#) that you want to use in an application.

1. In the main navigation menu, select **APPS**.

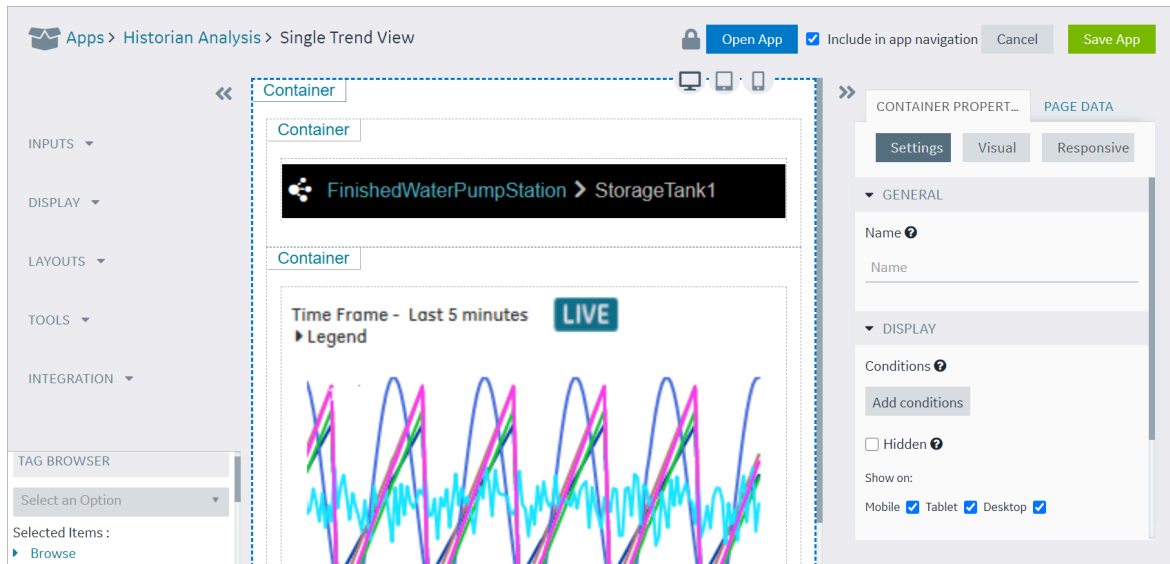
The **APPS** workspace appears.

Name	Description	Last updated
Asset Management	Manage Devices	3 months ago by Docs Team
Asset Testing	Test Devices	3 months ago by Docs Team
Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team
Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team
Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team
Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team
Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team
ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team
ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team
Store Temp App	temp	2 months ago by Docs Team

- In the **Name** column, select the application in which you want to use the plug-in.  
The **PAGES** workspace appears, displaying a list of pages created in the application.



- In the **Name** column, select the page in which you want to include the plug-in.  
The page designer appears, displaying the elements in each container in the page. The plug-ins that are available in the site appear in the **CUSTOM** section.



- From the list of plug-ins in the **CUSTOM** section, drag the plug-in to the container in which you want to include the plug-in.
- Select **Save App**.  
The plug-in is used in the application.

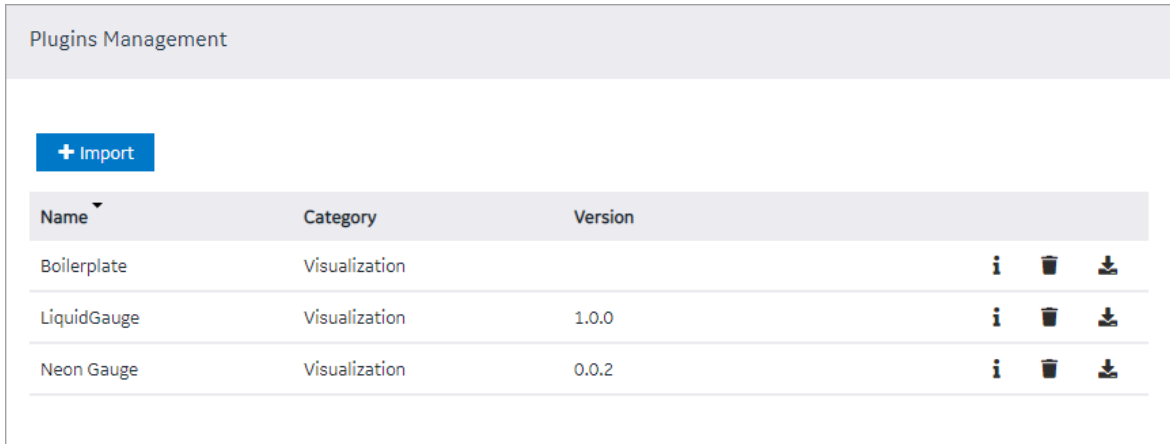
## Download a Plug-in (Classic)

This topic describes how to download a plug-in.

Log in to Operations Hub.


1. In the main navigation menu, select **PLUGINS**.

The **PLUGINS** workspace appears.



The screenshot shows the 'Plugins Management' interface. At the top left, there is a '+ Import' button. Below it is a table with three columns: 'Name', 'Category', and 'Version'. The table lists three plugins: 'Boilerplate', 'LiquidGauge', and 'Neon Gauge', all under the 'Visualization' category. Each row has three action icons: an information icon (i), a delete icon (trash), and a download icon (downward arrow).

Name	Category	Version			
Boilerplate	Visualization		i	🗑️	↓
LiquidGauge	Visualization	1.0.0	i	🗑️	↓
Neon Gauge	Visualization	0.0.2	i	🗑️	↓

2. In the row containing the plug-in that you want to download, select .

The plug-in is downloaded as a .zip file.

## Delete a Plug-in (Classic)


This topic describes how to delete a plug-in.

Log in to Operations Hub.

1. In the main navigation menu, select **PLUGINS**.

The **PLUGINS** workspace appears, displaying a list of plug-ins that are imported.

Plugins Management			
<a href="#">+ Import</a>			
Name	Category	Version	
Boilerplate	Visualization		<a href="#">i</a> <a href="#">🗑</a> <a href="#">📄</a>
LiquidGauge	Visualization	1.0.0	<a href="#">i</a> <a href="#">🗑</a> <a href="#">📄</a>
Neon Gauge	Visualization	0.0.2	<a href="#">i</a> <a href="#">🗑</a> <a href="#">📄</a>

- In each row containing the plug-in that you want to delete, select  .  
A message appears, asking you to confirm that you want to delete the plug-in.
- Select **OK**.  
The plug-in is deleted.

## Custom Plug-in Structure

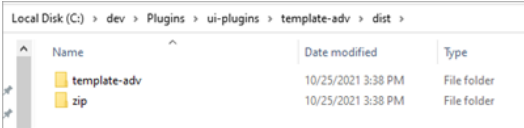
This topic describes how to use plug-in components.

A plug-in must contain the following components:

- [index.html \(on page 357\)](#): Contains the plug-in html code.
- [main.js \(on page 361\)](#): Contains the plug-in JavaScript code.
- [manifest.json \(on page 358\)](#): Contains the plug-in configuration details.
- `style.css`: Contains the plug-in stylesheet details.
- The `scripts` folder: Contains external scripts.

Get started with the sample templates to build your own plug-in.

Template Type	How to Use
<a href="#">Download</a> the sample template for simple plug-in  Includes examples using data source.	Use this template to build a simple plug-in. <ol style="list-style-type: none"> <li>1. Unzip the downloaded file. The unzipped file contains a folder called <code>template</code> with components to build a simple plug-in.</li> <li>2. Modify the plug-in components.</li> </ol>

Template Type	How to Use
	<ol style="list-style-type: none"> <li>Rename the <code>template</code> folder to match with the <code>typeName</code> (plug-in name) in <code>manifest.json</code>.</li> <li>Create a zip file of your modified folder (do not zip only plug-in components). The zip file name should be same as the plug-in name.</li> </ol> <p>For example, if your plug-in name is <code>table</code>, then the zip file and the folder within should also be named as <code>table</code>.</p> <ol style="list-style-type: none"> <li><a href="#">Import (on page 351)</a> the modified zip file to Operations Hub to load as a plug-in.</li> </ol>
<p><a href="#">Download</a> the sample template for advanced plug-in</p> <ul style="list-style-type: none"> <li>Includes examples using data source and data target.</li> <li>Loads external scripts (<code>tools.zip</code>) imported using webpack.</li> <li>Loads DevExtreme using manifest (scripts element).</li> <li><code>tools.js</code> contains color conversion script and connecting to data sources for manual, global, query, or formula.</li> </ul> <div style="border: 1px solid orange; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p><b>!</b> <b>Important:</b></p> <p>Do not import the sample template file as a plug-in. Follow the instructions on how to use the downloaded template to build a plug-in, which can be imported to Operations Hub.</p> </div>	<p>Use this template to build an advanced plug-in.</p> <ol style="list-style-type: none"> <li>Unzip the downloaded file.</li> <li>Perform <code>npm install</code> in the root folder to download dependencies.</li> <li>Modify the plug-in components.</li> <li>To generate a zip file of the modified template: <ul style="list-style-type: none"> <li>Perform <code>npm run build</code> to generate a development package.</li> <li>Perform <code>npm run prodBuild</code> to generate a production package (minified).</li> </ul> </li> <li>The generated zip file is saved to the <code>dist</code> folder in the project folder.</li> </ol>  <ol style="list-style-type: none"> <li><a href="#">Import (on page 351)</a> the zip file to Operations Hub to load as a plug-in.</li> </ol>

## The index.html file

Each plug-in must contain an `index.html` file in the root folder of the plug-in.

**Note:**

If html code is not required, create a blank file.

The markup defined in the `index.html` file is included in the body of a page in an application. Therefore, tags such as `html`, `head`, `meta` will be omitted.

**Important:**

Do not use the `script` tag because of the asynchronous behavior of the tag outside of the `html` head.

## JavaScript Dependencies

The easiest way to add external JavaScript dependencies is to place them in the `scripts` folder (in the root folder) and reference this dependency in the `manifest.json` file.

**Important:**

When using this method, all JavaScript dependencies are included in the global scope of the application, which can create conflicts between different plug-ins. Therefore, we recommend that you use a build tool like Webpack to manage dependencies of plug-ins.

## The `manifest.json` file

Every plug-in must contain a `manifest.json` file in the root folder of the plug-in. This file provides the essential information about the plug-in to Operations Hub.

The following table provides the parameters that you must include in the `manifest.json` file.

Parameter	Description
<code>typeName</code> [String]	The unique name of the plug-in.  Does not support special characters. For example, comma, period, ampersand, dollar sign, percent sign, parenthesis, asterisk, etc.
<code>pluginId</code> [String]	The unique ID of the plug-in. The value for this parameter must be a long, random one.
<code>Type</code> [String]	The type of the plug-in.
<code>category</code> [String]	The category of the plug-in.

Parameter	Description
<code>description</code> [String]	The description of the plug-in. This value appears in Operations Hub when you design an application to include the plug-in.
<code>info</code>	The following information about the plug-in: <ul style="list-style-type: none"> <li>• version</li> <li>• update</li> <li>• size</li> <li>• developer</li> </ul>
<code>scripts</code> [Array]	The array for the scripts that you want to use in the plug-in.
<code>customIcon</code> [String]	The icon that will appear next to the name of the plug-in in Operations Hub when designing an application to include the plug-in.
<code>origin</code> [String]	The origin of the plug-in. Provide the value <code>custom</code> for this parameter.
<code>placeholder</code> [String]	A placeholder for the plug-in, which will appear in Operations Hub when designing an application to include the plug-in.
<code>preview</code> [String]	The picture preview of the plug-in that will appear in Operations Hub when designing an application to include the plug-in.
<code>fieldsDescription</code> [Object]	The plug-in description for informational messages.
<code>isNotAllowToAddFields</code> [Boolean]	Indicates whether to allow the user to add more data fields when designing an application to include the plug-in. If you do not want the user to add data fields, enter <code>true</code> .
<code>schema</code> {}	An array of the following types of schema: <ul style="list-style-type: none"> <li>• <code>JSONSchema</code>{ }</li> <li>• <code>UISchema</code>{ }</li> </ul>

## Schema

The schema is based on JSON. It is used in the `manifest.json` file to specify the plug-in input and output.

- Input: The input for a plug-in can be static or dynamic. Static data is available in any of the following JSON schema types:
  - string
  - number
  - integer
  - boolean
  - null
  - object
  - array

The dynamic data is available in an Operations Hub component such as a query, global variable, or manual entry of data.

- Output: The output of a plug-in is defined in the Operations Hub target, such as a query with inputs or a global variable.

The schema defined in the `manifest.json` is presented in Operations Hub in the html format. This format is implemented using the `react-jsonschema-form` library, which introduces the concept of UI schema to provide the information about the form behavior and to give an extensive API for the form customization. Customization is typically done using custom fields and widgets that become part of the default form registry. The library renders all form fields leveraging the Bootstrap semantics, so that it can be styled with bootstrap themes or custom CSS.



**Tip:**

The following websites provide information on creating plug-ins:

- [React-JSON-Schema Documentation](#)
- [React-JSON-Schema Playground](#)

## Supported Widgets

The following table provides the supported widgets for each field type.

Field Type	Supported Widgets
Boolean	<ul style="list-style-type: none"> <li>• Check box</li> <li>• Radio button</li> <li>• Select</li> </ul>



Field Type	Supported Widgets
String	<ul style="list-style-type: none"> <li>• Text</li> <li>• Password</li> <li>• Email</li> <li>• URI</li> <li>• Radio button</li> <li>• Select</li> <li>• Text area</li> <li>• Datetime</li> <li>• Color</li> </ul>
Number	<ul style="list-style-type: none"> <li>• Text</li> <li>• Select</li> <li>• Range</li> <li>• Radio button</li> </ul>

## The main.js file

The plug-in API is exposed through the global object EMBED. You can access this object when the plug-in source code is included in Operations Hub. For the list of methods used in EMBED, refer to [EMBED Object Functions \(on page 858\)](#).

## Upgrade Plug-in Schema

This topic describes how to update old plug-ins and use them in Operations Hub.

You must perform these steps if you are prompted to upgrade your custom plug-ins using old schema.

1. [Migrate your old plug-in/s to the new React JSON schema \(on page 359\)](#).
2. [Write a transformation specification for plug-in upgrade \(on page 284\)](#).
3. Place the plug-in transformation files in this location folder `..\ProgramData\GE\Operations Hub\iqp-config\plugin-transform-spec`.
4. [Import the plug-in \(on page 351\)](#) updated with the new schema to Operations Hub.  
Plug-ins also get upgraded when you [upgrade applications \(on page 290\)](#) in Operations Hub.

## Update Plug-in Version

This topic describes how to update the version number for custom plug-ins.

Use the following format to update a plug-in's version number: `MAJOR.MINOR.PATCH`. Suppose a version is updated from `1.0.0` to `1.0.2`, then `1` stands for major version, `0` stands for minor version, and `2` refers to patch updates. For more information, refer to the versioning policy in the following table:

Version Update	When
MAJOR	You made major schema changes, which are incompatible with the previous version. For example, modifying existing fields in a plug-in.
MINOR	You added/removed a field. For example, including or deleting source/target fields in a plug-in.
PATCH	You resolved backward compatibility issues. For example, bug fixes for customer cases.

### MAJOR or MINOR Update

If the MAJOR or MINOR version of the plug-in is changed, then do either of the following:

- [Write a transformation specification for plug-in upgrade \(on page 284\)](#). (OR)
- Add version change in plug-in upgrade exempt list to ensure successful plug-in upgrade.

### PATCH Update

If only the PATCH version of the plug-in is changed, then the plug-in is automatically upgraded to the latest version.

## Events

### About Events

In Operations Hub, you can create events that will trigger actions when specific conditions are satisfied. To create an event, you must create a trigger and then create an action.

- **Trigger:** When you create a trigger, you define the set of conditions that must be satisfied for the event to happen. You can create a trigger based on conditions on values added or updated in an entity or values received from a device.
- **Action:** When you create an action, you define what should happen if the conditions specified in the trigger are satisfied (that is, when the event is triggered). You can create one or more of the following actions:

- Send an email: You can create an action to send an email when the event is triggered. You can enter the email addresses manually, fetch them from a query, or allow application users to specify the email addresses.
- Run a query: You can create an action to run a query when the event is triggered.
- Send a command to a device: You can create an action to send a command to a device when the event is triggered. Before you do so, you must configure IQP MQTT to communicate with the device to which you want to send a command.

Creating an event in the event editor only creates a template for the event. It does not activate the event. The event is activated when a notifier is added and turned on in an event settings widget in an application.

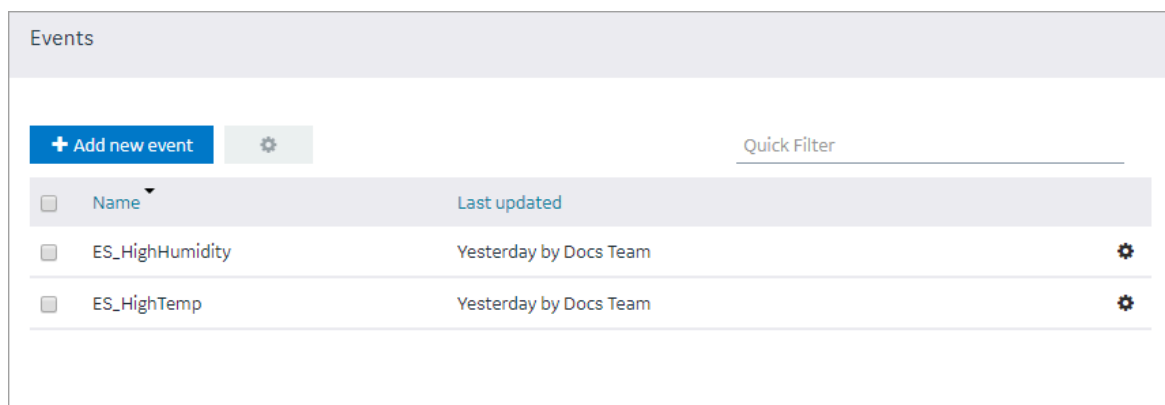
## Access an Event (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

1. In the main navigation menu, select **EVENTS**.

The **EVENTS** workspace appears.



2. In the row containing the event that you want to access, in the **Name** column, select the link. The event appears, displaying a list of fields in the event.



**Tip:**

You can modify values in the available fields, and then select **Save** or **Save And Exit**.

## Create a Trigger Based on an Entity (Classic)

This topic describes how to create a trigger based on conditions on values stored in an entity.

Log in to Operations Hub.

You can also [create a trigger based on conditions on values received from a device \(on page 363\)](#).

1. [Access the event \(on page 363\)](#) for which you want to create a trigger.
2. Select **Add Entity Condition**.

The **Entity** and **Condition** sections appear.

3. In the **Entity Name** box, select the entity based on which you want to create a trigger.  
In the **Entity Field** box, a list of fields in the selected entity appears.
4. In the **Entity Field**, **Operator**, and **Value** boxes, select values that you want to use in the trigger.  
If you want to create a trigger if the temperature recorded in the entity exceeds 40 degrees Celsius, then in the **Entity Field**, **Operator**, and **Value** boxes, select or enter Temperature, >, and 40, respectively.
5. If you want to allow the end user to set the value manually, then select the **Allow End User to set value** check box, and then enter a value in the **Input Name** box.  
If you want to create a trigger when the temperature stored in the entity field reaches a certain limit, and you want application users to specify that limit, then:
  - a. In the **Input Name** box, enter Maximum Temperature.
  - b. In the application, add an event settings widget, and then select the event that you have created.  
  
In the application, the widget contains an input field labeled Maximum Temperature, which allows the user to change the value that you have specified in the event.
6. If there is more than one condition, and if you want to create a trigger only if all the conditions are satisfied, select **Meet ALL of the conditions**. By default, this option is selected. If, however, you want to create a trigger if at least one of the conditions is satisfied, select **Meet ANY of the conditions**.

[Create an action \(on page 363\).](#)

## Create a Trigger Based on a Device (Classic)

This topic describes how to create a trigger based on conditions on values received from a device.

Register the device details and metrics that you want to use in the trigger, using baseline entities.

1. Register at least one device type and metric using the `supported_device_gateway` and the `metrics_device_type` entities, respectively.
2. Register at least one device group and device for the device type using the `M2M_groups` and `device_gateway` entities, respectively.

You can, however, create a trigger that will cover only a single device, a group of devices, or all the devices of a given type.

You can also [create a trigger based on conditions on values stored in an entity \(on page 363\)](#).

1. [Access the event \(on page 363\)](#) for which you want to create a trigger.
2. Select **Add Device Condition**.

The **Device Gateway** and **Condition** sections

appear.

3. In the **Device Type**, **Device Group**, and **Device Units** boxes, select the type, group, and unit of the device, respectively.

The following table provides values that you can select in these boxes, and which devices will be filtered accordingly.

Device Type	Device Group	Device Units	Result
<code>MyDeviceType</code>	Any	Any	All devices of the type <code>MyDeviceType</code> .
<code>MyDeviceType</code>	<code>MyGroup</code>	Any	All devices in the group <code>MyGroup</code> .

Device Type	Device Group	Device Units	Result
MyDeviceType	MyGroup	MyDevice	The device named My- Device.

In the **Metric** box, a list of metrics registered for the device type appears.

4. In the **Metric**, **Operator**, **Input Source**, and **Value** boxes, select or enter the metric, operator, input source, and value, respectively.

If you want to create a trigger when the temperature recorded by the device exceeds 40 degrees Celsius, in the **Metric**, **Operator**, **Input Source**, and **Value** boxes, select or enter Temperature, >, Fixed Value, and 40, respectively.

5. If you want to allow the end user to set the value manually, select the **Allow End User to set value** check box, and then enter a value in the **Input Name** box.

If you want to create a trigger when the temperature stored in the entity field reaches a certain limit, and you want application users to specify that limit:

- a. In the **Input Name** box, enter Maximum Temperature.
- b. In the application, add an event settings widget, and then select the event that you have created.

In the application, the widget contains an input field labeled Maximum Temperature, which allows the user to change the value that you have specified in the event.

6. If there is more than one condition, and if you want to create a trigger only if all the conditions are satisfied, select **Meet ALL of the conditions**. By default, this option is selected. If, however, you want to create a trigger if at least one of the conditions is satisfied, select **Meet ANY of the conditions**.

[Create an action \(on page 365\)](#).

## Create an Action to Send an Email (Classic)

This topic describes how to create an action to send an email.

Create a trigger based on an [entity condition \(on page 363\)](#) or a [device condition \(on page 365\)](#).

You can also create an action to:

- [Run a query \(on page 368\)](#)
- [Send a command to a device \(on page 370\)](#)

1. [Access the event \(on page 363\)](#) for which you want to create an action.
2. Select **Send e-mail**.

The **Send an E-mail** section appears.

**Send an E-mail**

Default E-mails (separate addresses by ,)

Recipient's address:   Allow End User to set e-mail address

[+ Add Query Recipients](#)

Email template: Select Email Template... ▼ [+ Create Email Template](#)

Scheduler  Take action only on initial trigger  Take action on every trigger

3. Enter or select values as specified in the following table.

Field Name	Description
Recipient's address	Enter the email address of the user who will receive an email when the event is triggered. You can enter multiple email addresses separated by commas.
Allow End User to set e-mail address	Select this check box if you want to allow application users to provide the email addresses of the users who will receive an email, and then enter the name of the input field that you will add in the application.
Add Query Recipients	Select this button if you want to add email addresses of the recipients using a query. When you select this button, the <b>Query Name</b> box appears, displaying a list of Get queries created in the site.
Query Name	Select the query that returns a list of email addresses to which you want to send the email. If the query that you have selected requires input values, then the corresponding fields appear. If that happens, enter values in the fields.
Email template	Select the email template that you want to use. If, however, you want to <a href="#">create an email template (on page 374)</a> , select <b>Create Email Template</b> , enter values as needed, and then select <b>Save and Return</b> .

Field Name	Description
Scheduler	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>◦ <b>Take action only on initial trigger:</b> Select this option if you want to run the query after switching from the state of not meeting the condition to meeting the condition. By default, this option is selected. For example, suppose you have created an action to send an email when the temperature recorded by a device exceeds 40 degrees Celsius. Suppose the temperature recorded by the device is as follows: 35, 38, 41, 45, 39, 42. In this scenario, the email is sent when the temperature is 41 and 42.</li> <li>◦ <b>Take action on every trigger:</b> Select this option if you want to send an email every time the event is triggered. For example, suppose you have created an action to send an email when the temperature recorded by a device exceeds 40 degrees Celsius. Suppose the temperature recorded by the device is as follows: 35, 38, 41, 45, 39, 42. In this scenario, the email is sent when the temperature is 41, 45, and 42.</li> </ul>

4. Select **Save** or **Save and Exit**.

The event template is created.

When the event is triggered, an email is sent to the email addresses that you have specified.



**Note:**

Gmail integration is possible on allowing access to less secure apps for the account. Alternatively, you can enable a 2-Step verification for the account and use the Google account “App passwords” feature. This will generate a password to use in conjunction with the email address to configure email server in Operations Hub Admin Console.

## Create an Action to Run a Query (Classic)

This topic describes how to create an action to run a query.

Create a trigger based on an [entity condition \(on page 363\)](#) or a [device condition \(on page 365\)](#).

You can also create an action to:



- [Send an email \(on page 366\)](#)
- [Send a command to a device \(on page 370\)](#)

1. [Access the event \(on page 363\)](#) for which you want to create an action.
2. Select **Run a Query**.

The **Run a Query** section appears.

**Run a Query**

Query Name

Query:

Scheduler  Take action only on initial trigger  Take action on every trigger

3. Enter or select values as described in the following table.

Field Name	Description
Query	Select the query that you want to run when the event is triggered. If the query that you have selected requires input values, the corresponding fields appear. If that happens, enter values in the available fields.
Scheduler	Select one of the following options: <ul style="list-style-type: none"> <li>◦ <b>Take action only on initial trigger:</b> Select this option if you want to run the query after switching from the state of not meeting the condition to meeting the condition. By default, this option is selected. For example, suppose you have created an action to run a query when the temperature recorded by a device exceeds 40 degrees Celsius. Suppose the temperature recorded by the device is as follows: 35, 38, 41, 45, 39, 42. In this scenario, the query is run when the temperature is 41 and 42.</li> <li>◦ <b>Take action on every trigger:</b> Select this option if you want to run the query every time the event is triggered. For example, suppose you have created an action to run a query when the temperature recorded by a device exceeds 40 degrees Celsius. Sup-</li> </ul>

Field Name	Description
	pose the temperature recorded by the device is as follows: 35, 38, 41, 45, 39, 42. In this scenario, the query is run when the temperature is 41, 45, and 42.

4. Select **Save** or **Save and Exit**.

The event template is created.

When the event is triggered, the query that you have specified is run.

## Create an Action to Send a Command to a Device (Classic)

This topic describes how to create an action to send a command to a device.

1. Configure IQP MQTT to communicate with the device to which you want to send a command.
2. Create a trigger based on an [entity condition \(on page 363\)](#) or a [device condition \(on page 365\)](#).

You can also create an action to:

- [Run a query \(on page 368\)](#)
- [Send an email \(on page 366\)](#)

1. [Access the event \(on page 363\)](#) for which you want to create an action.
2. Select **Send Command to Device**.

The **Send a command to a device** section appears.

**Send a command to a device**

Function Name

Function: Select ▼

Scheduler  Take action only on initial trigger  Take action on every trigger

3. Enter or select values as described in the following table.

Field Name	Description
Function	Select <b>Send_MQTT_Command</b> to send a command to a device that is configured with IQP MQTT. The <b>Input Source</b> and <b>Value</b> boxes appear for topic and payload.
Input Source	Select <b>Fixed value</b> if you want to send a fixed value to the device when the event is triggered.
Value	Enter the fixed value that you want to send to the device when the event is triggered.
Allow End User to set value	Select this check box if you want application users to set the value, and then enter a name in the <b>Input Name</b> box that appears.
Scheduler	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>◦ <b>Take action only on initial trigger:</b> Select this option if you want to send the command after switching from the state of not meeting the condition to meeting the condition. By default, this option is selected. For example, suppose you have created an action to send the command when the temperature recorded by a device exceeds 40 degrees Celsius. Suppose the temperature recorded by the device is as follows: 35, 38, 41, 45, 39, 42. In this scenario, the command is sent when the temperature is 41 and 42.</li> <li>◦ <b>Take action on every trigger:</b> Select this option if you want to send the command every time the event is triggered. For example, suppose you have created an action to send a command when the temperature recorded by a device exceeds 40 degrees Celsius. Suppose the temperature recorded by the device is as follows: 35, 38, 41, 45, 39, 42. In this scenario, the command is sent when the temperature is 41, 45, and 42.</li> </ul>

4. Select **Save** or **Save and Exit**.

The event template is created.

When the event is triggered, the command is sent to the MQTT broker.

## Delete an Event (Classic)

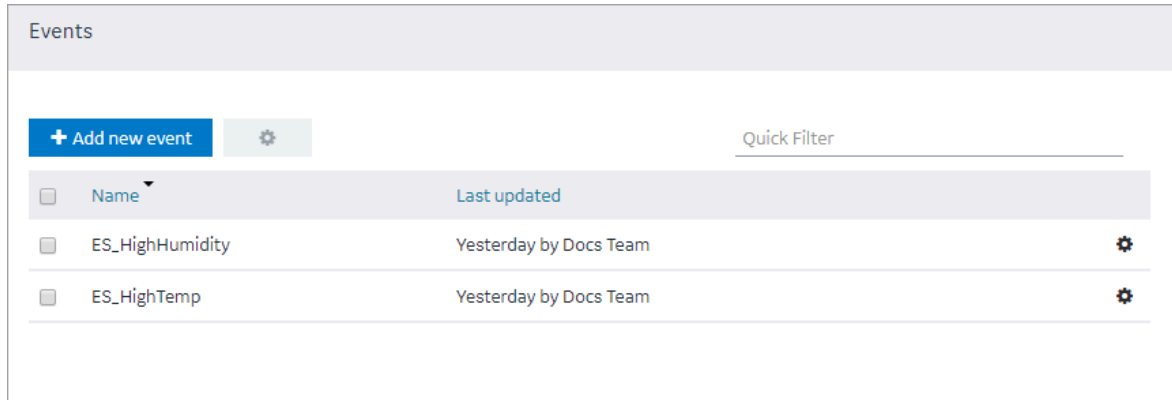
This topic describes how to delete an event.

Log in to Operations Hub.

You cannot delete an event if it is locked or used in an application or a parameter.

1. In the main navigation menu, select **EVENTS**.

The **EVENTS** workspace appears.




2. In the rows containing the events that you want to delete, select the check boxes.

3. In the workspace heading, select , and then select **Delete Events**.

A message appears, asking you to confirm that you want to delete the event.

 **Tip:**

Alternatively, in the row containing each event that you want to delete, select , and then select **Delete event**.

4. Select **Delete**.

The events are deleted.

## Email Templates

### About Email Templates

Email templates store information about the default content and structure of an automated email, which can be sent when an event is triggered. The template allows you to include fixed or dynamic content so that the email is customized to the event that triggered it. You can define the default structure for the following sections in an email template:

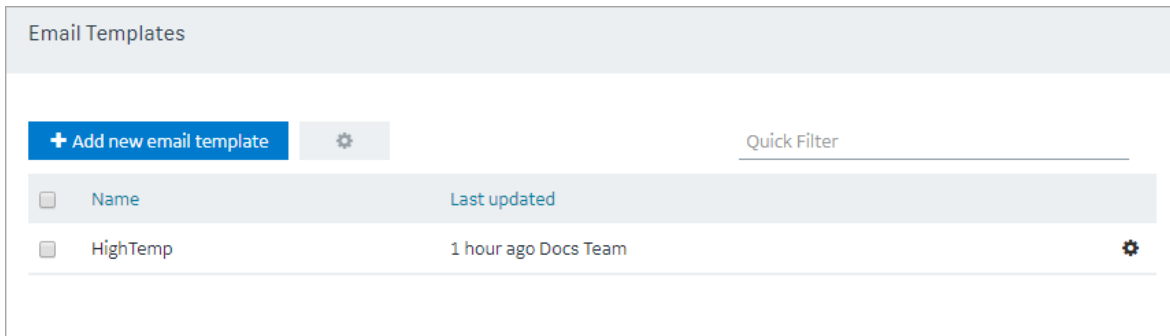
- Subject
- Body
- URL

## Access an Email Template (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

1. In the main navigation menu, select **EMAILS**.  
The **EMAIL TEMPLATES** workspace appears.



2. In the row containing the email template that you want to access, in the **Name** column, select the link.

The email template appears, displaying the **Subject**, **Body**, and **URL** sections.

Email Templates > HighTemp

Subject

Add text Add Parameter

Body

Add text Add Parameter Add Paragraph Add Newline



**Tip:**

If needed, modify the email template, and then select **Save** or **Save and Exit**.

## Create an Email Template (Classic)

This topic describes how to create an email template.

Log in to Operations Hub.

You can also [copy an email template \(on page 375\)](#).

1. In the main navigation menu, select **EMAILS**.

The **EMAILS** workspace appears.

Email Templates

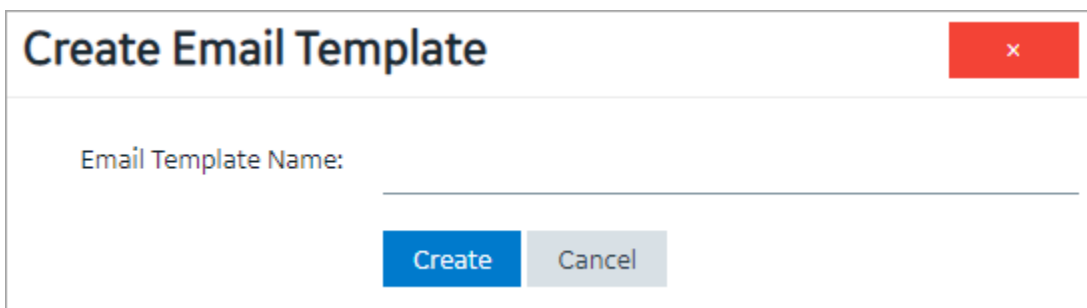
+ Add new email template

Quick Filter

<input type="checkbox"/>	Name	Last updated
<input type="checkbox"/>	HighTemp	1 hour ago Docs Team

2. Select **Add new email template**.

The **Create Email Template** window appears.



3. Enter a value in the **Email Template Name** box, and then select **Create**. The name must contain at least one uppercase or lowercase letter.

The **Subject**, **Body**, and **URL** sections of the email template appear.

4. In the **Subject**, **Body**, and **URL** sections, select the options for which you want to add details.

Field Name	Description
Add Text	When you select <b>Add Text</b> , a text box appears in the corresponding section. You can enter the text that you want to include in the email template.
Add Parameter	<a href="#">Parameters (on page 378)</a> allow you to add dynamic content to the email based on values from the event. When you select <b>Add Parameter</b> , a drop-down list box appears in the corresponding section. You can select the parameter that you want to include in the email template.
Add Paragraph	When you select <b>Add Paragraph</b> , a resizable text box appears in the corresponding section. You can enter the text that you want to include in the email template. You can add a paragraph only in the <b>Body</b> section.
Add Newline	When you select <b>Add Newline</b> , a line appears after the current element.

5. As needed, in the **URL** section, enter a URL that you want to include in the email template.
6. Select **Save** or **Save And Exit**.

The email template is created.

## Copy an Email Template (Classic)

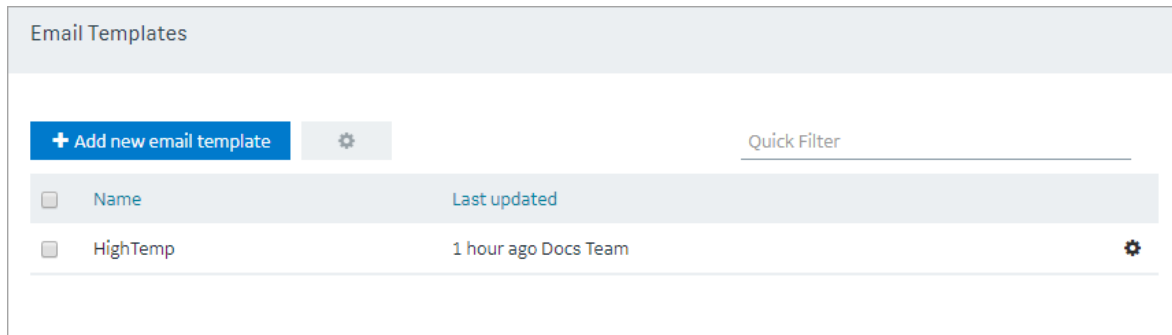
This topic describes how to copy an email template.

Log in to Operations Hub.

You can also [create an email template](#) (on page 374).

1. In the main navigation menu, select **EMAILS**.

The **EMAILS** workspace appears.



2. In the row containing the email template that you want to copy, select the link.

The email template appears.



The screenshot shows the 'Email Templates > HighTemp' editor. It is divided into two main sections: 'Subject' and 'Body'. The 'Subject' section has a toolbar with 'Add text' and 'Add Parameter' buttons. Below the toolbar, the text '[Alert]: High tempe' is visible. The 'Body' section has a toolbar with 'Add text', 'Add Parameter', 'Add Paragraph', and 'Add Newline' buttons. Below the toolbar, the text 'Temperature in the' is visible. Both sections have a large grey area for editing content.

3. Modify the email template as needed, and then select **Save As New**.  
A window appears, asking you to enter a name for the email template. By default, the name contains the name of the original email template, appended with a system-generated value.
4. Modify the default name, and then select **OK**.  
The email template is copied.

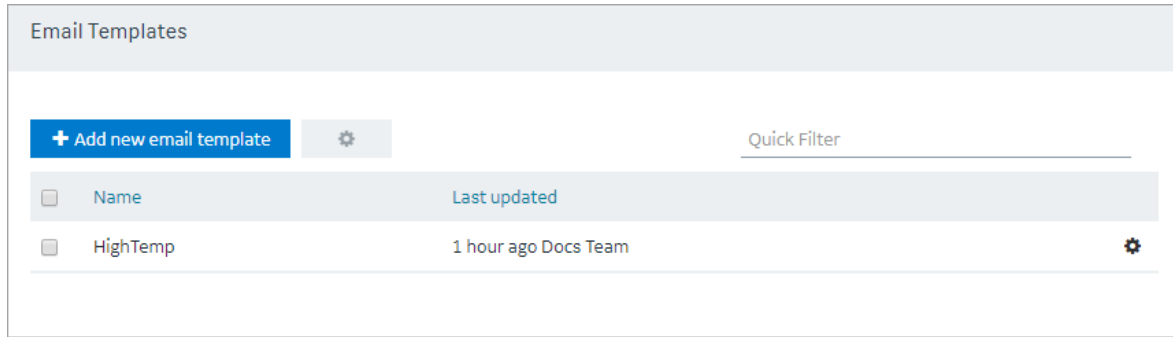
## Delete an Email Template (Classic)


This topic describes how to delete an email template.

Log in to Operations Hub.


You cannot delete an email template if it is used in an event.

1. In the main navigation menu, select **EMAILS**.  
The **EMAILS** workspace appears.



- In the workspace heading, select , and then select **Delete email templates**.  
A message appears, asking you to confirm that you want to delete the email templates.

 **Tip:**

Alternatively, in the row containing each email template that you want to delete, select , and then select **Delete email template**.

- Select **Delete**.  
The email template is deleted.

## Parameters

### About Parameters

Parameters store values that you can use in an email template. These values can be fixed or generated at runtime. You can create one of the following types of parameters:

- **Fixed:** Stores a fixed value that you specify when you create the parameter.
- **Event Variable:** Stores event time values from an entity field or a device field that is used in an event condition.
- **From Query:** Stores the results of a Get query with inputs from event time values. This allows you to retrieve additional data about the device or entity that triggered the event from another entity on the system.

**Example:** Suppose you want to send an automated email when the temperature recorded by a device exceeds 40 degrees Celsius. In the email, you want to include the temperature, date, and time recorded by the device. In this case:

1. Create an event as follows:
  - Create a condition such that the event is triggered when the temperature recorded by the device exceeds 40 degrees Celsius.
  - Create an action such that an email is sent when the event is triggered.
2. Create a parameter to store the temperature recorded by the device.
3. Create another parameter to store the date and time recorded by the device.
4. Create an email template, and include both the parameters in the template.
5. Use the email template in the event that you have created in step 1.

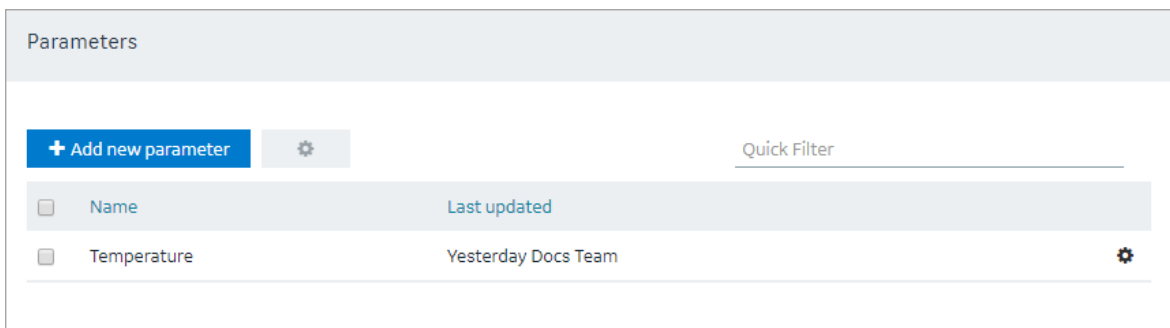
## Access a Parameter (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

1. In the main navigation menu, select **PARAMETERS**.

The **PARAMETERS** workspace appears.



2. In the row containing the parameter that you want to access, in the **Name** column, select the link.  
The parameter appears.

Parameters > Temperature

Select Existing Parameter ▾

Value Source

Fixed 24

Event Variable

From Query

Cancel Save Save As New Save And Exit

**i** **Tip:**  
 If needed, you can modify values in the available fields, and then select **Save** or **Save and Exit**.

## Create a Parameter (Classic)

This topic describes how to create a parameter.

Log in to Operations Hub.

You can also [copy a parameter \(on page 382\)](#).

1. In the main navigation menu, select **PARAMETERS**.

The **PARAMETERS** workspace appears.

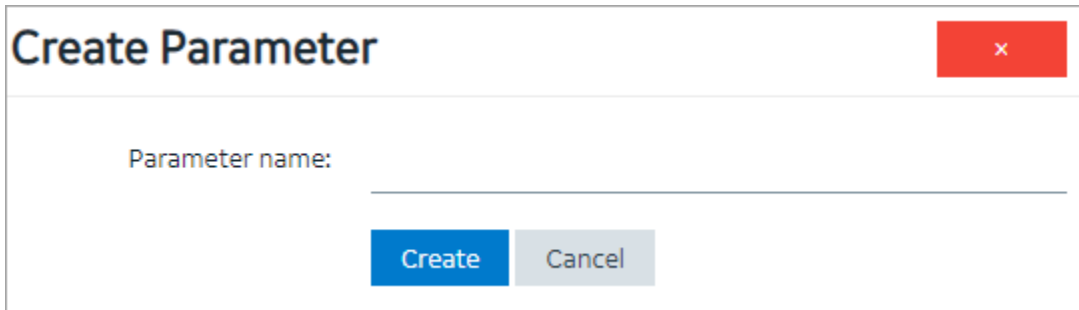
Parameters

+ Add new parameter ⚙️ Quick Filter

<input type="checkbox"/>	Name	Last updated	
<input type="checkbox"/>	Temperature	Yesterday Docs Team	⚙️

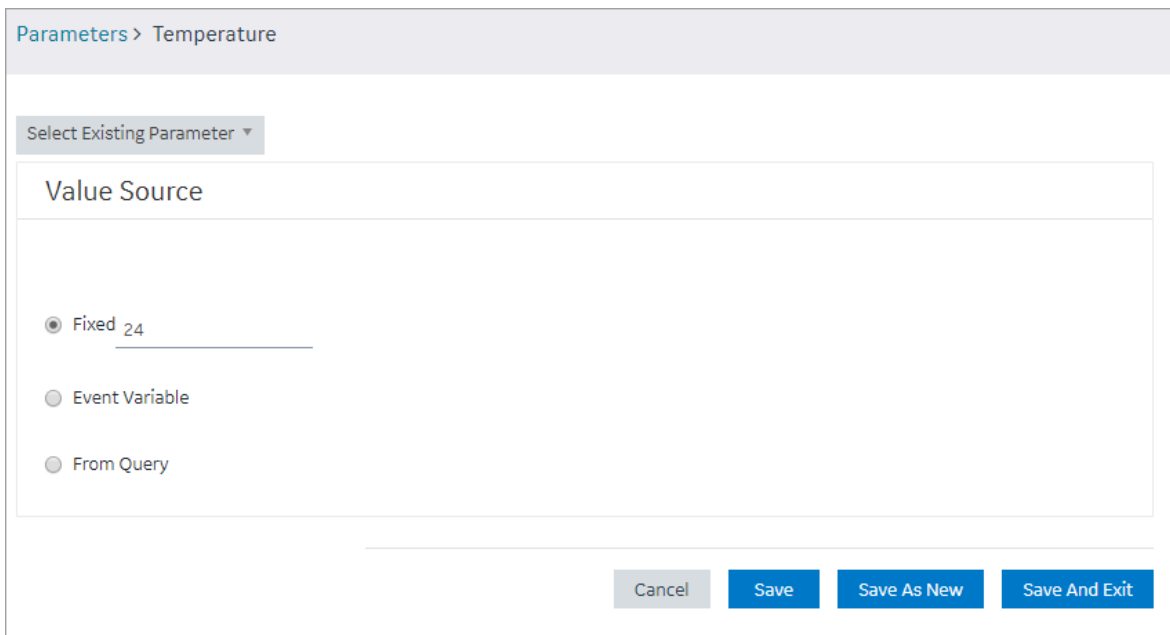
2. Select **Add new parameter**.

The **Create Parameter** window appears.




3. Enter a name in the **Parameter name** box, and then select **Create**. The name must contain at least one uppercase or lowercase letter.

The parameter appears.



4. Enter or select values as described in the following table.

Field Name	Description
Fixed	Select this option if you want to create a parameter with a fixed value, and then enter the value. By default, this option is selected.
Event Variable	Select this option if you want to create a parameter using an event variable, and then select values in the <b>Select Event</b> , <b>Event Condition</b> , and <b>Condition Value</b> boxes that appear.

Field Name	Description
	<ul style="list-style-type: none"> <li>◦ <b>Select Event:</b> Select the event whose variable you want to use while creating the parameter. After you select the event, the <b>Event Condition</b> box contains sequential numbers of conditions in the event. For example, if there are three conditions in the event, the <b>Event Condition</b> box contains the values 1, 2, and 3.</li> <li>◦ <b>Event Condition:</b> Select the sequential number of the condition that you want to use. If you select a number, the <b>Condition Value</b> box contains a list of entity fields or device fields depending on whether you have selected an event condition or a device condition.</li> <li>◦ <b>Condition Value:</b> Select the entity field or device field whose values you want to store in the parameter.</li> </ul>
From Query	<p>Select this option if you want to create a parameter using a query, and then select the query in the <b>Select Query</b> box that appears. It contains a list of Get queries in the site. If the query that you have selected requires input values, the corresponding fields appear. If that happens, enter values as needed.</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> The query that you want to use in a parameter should return only a single value.</p> </div>

5. Select **Save** or **Save And Exit**.

The parameter is created.

## Copy a Parameter (Classic)

This topic describes how to copy a parameter.

Log in to Operations Hub.

You can also [create a parameter \(on page 382\)](#).

1. In the main navigation menu, select **PARAMETERS**.

The **PARAMETERS** workspace appears.

<input type="checkbox"/>	Name	Last updated	
<input type="checkbox"/>	Temperature	Yesterday Docs Team	

- In the row containing the parameter that you want to copy, select the link.  
The workspace for the parameter appears.

Parameters > Temperature

Select Existing Parameter ▾

Value Source

Fixed

Event Variable

From Query

Cancel Save Save As New Save And Exit

- As needed, modify values in the available fields, and then select **Save As New**.  
A window appears, asking you to enter a name for the parameter. By default, the name contains the name of the original parameter, appended with a system-generated value.
- Modify the name of the parameter, and then select **OK**.  
The parameter is copied.

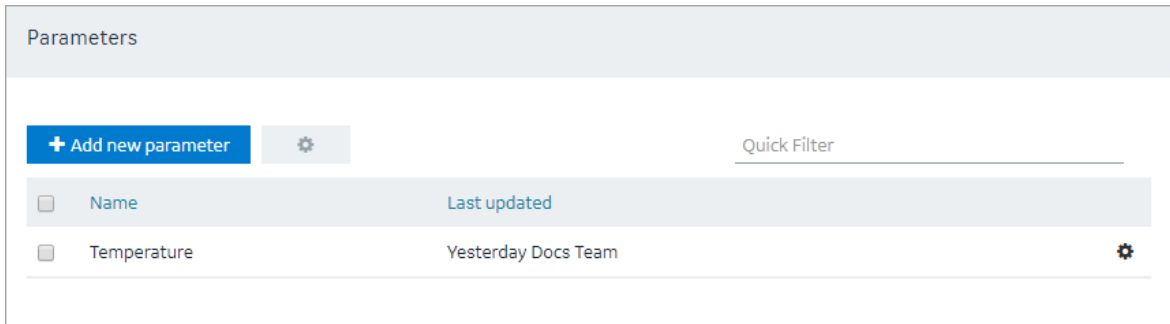
## Delete a Parameter (Classic)


This topic describes how to delete a parameter.

Log in to Operations Hub.

1. In the main navigation menu, select **PARAMETERS**.


The **PARAMETERS** workspace appears.



2. In the rows containing the parameters that you want to delete, select the check boxes.
3. In the workspace heading, select , and then select **Delete parameters**.  
A message appears, asking you to confirm that you want to delete the selected parameters.



**Tip:**

Alternatively, in the row containing each parameter that you want to delete, select , and then select **Delete parameter**.

4. Select **Delete** or **Delete All**.

The parameters are deleted.

## Users

### About Users

Using Operations Hub, you can create the following types of users:

- **Developers:** Users who will develop an application. These users can access the pages for creating an application. When you create a developer, an application user is also created for the developer with the same credentials.
- **Application users:** Users who will use an application. These users can only access applications to which they have been granted access. They cannot access the pages for creating an application.

See [Create a User \(Classic\) \(on page 387\)](#)



**Note:**


You can designate users as developer users or application users by assigning them to the `iqp.developer` and `iqp.user` groups respectively. For more information on how to add users to groups, refer to [Proficy Authentication documentation](#).

## Scopes for Operations Hub Users/Groups

This topic provides a list of scopes you can assign to users/groups for accessing Operations Hub.

To access both the designer and runtime features in Operations Hub, a user must possess, at a minimum, the `iqp.developer` and `iqp.user` scopes.

Scope	Description
<code>iqp.developer</code>	<p>This scope is assigned to developer users.</p> <p>When a developer account is created, an associated application user account is automatically generated, sharing the same login credentials. Users with this scope have the ability to access pages for application creation, granting them access to both application design and runtime functionality.</p>
<code>iqp.user</code>	<p>This scope is assigned to application users.</p> <p>Users with this scope can only access those applications in Operations Hub to which they have been granted access. These users do not have the ability to access pages for application creation. Their access is solely restricted to the runtime functionality of the applications.</p>
<code>iqp.clouduser</code>	<p>This scope is assigned to users who want to use the REST API, mainly the M2M Device RESTful APIs.</p>
<code>iqp.nodered</code>	<p>This scope is assigned to users who want to access the Dataflow Editor.</p>
<code>iqp.studioAdmin</code>	<p>This scope is assigned to privileged users.</p> <p>Users with this scope can access the Administrator Console to configure global settings for an Operations Hub instance, such as the settings for email servers and the MQTT brokers for MQTT data interoperability.</p>

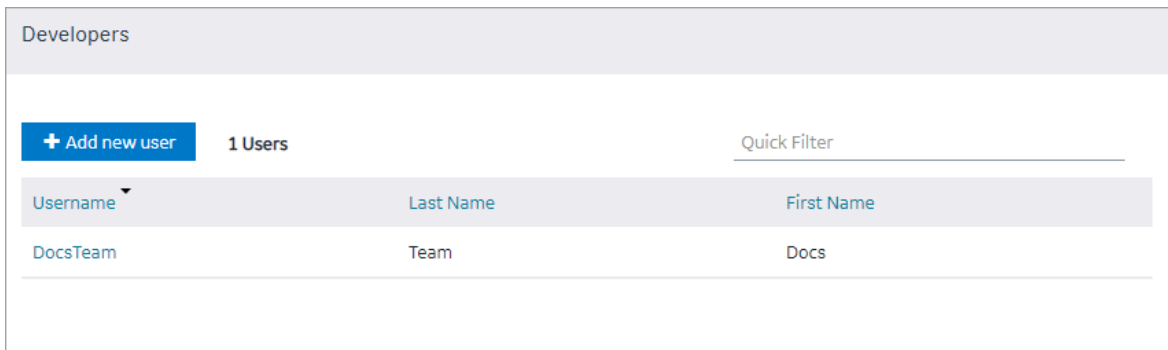
Scope	Description
	 <b>Note:</b> This scope does NOT grant access to Operations Hub designer or runtime.
iqp.tenantAdmin	This scope is assigned to privileged users.  Users with this scope gain administrative authority at the Tenant or System level (in our case, we have one tenant). They enjoy full administrative access to the Operations Hub instance, with the exception of scenarios requiring membership in the <code>iqp.studioAdmin</code> group. Administrators with this scope have the ability to unlock an application that may be locked by another user.

## Access a User (Classic)

Steps for Operations Hub classic version.

1. In the main navigation menu, select **MANAGE**.

The **Developers** workspace appears, displaying a list of users who are developers.



Developers					
+ Add new user		1 Users		Quick Filter	
Username	Last Name	First Name	DocsTeam	Team	Docs

2. If you want to access an application user, in the module navigation menu, select **App Users**.

The **App Users** workspace appears, displaying a list of application users.

App Users		
+ Add new app user	3 Users	Quick Filter
Username	Last Name	First Name
DocsTeam	Team	Docs
Operator	Operator	PLC
Supervisor	Assembly line	Supervisor

3. In the row containing the user that you want to access, in the **Username** column, select the link. The **Account <user name>** window appears, displaying the details of the user.

**Account DocsTeam** [Close]

Username DocsTeam

First Name  
Docs

---

Last Name  
Team

---

[Cancel] [Save]

**i Tip:** If needed, you can modify the first and last names of your user account, and then select **Save** to save your changes. You cannot, however, modify the first and last names of any other user account.

### Create a User (Classic)

Steps for Operations Hub classic version.

Only a tenant administrator can create and manage developers.

1. In the main navigation menu, select **MANAGE**.
2. Select **Add new user**.  
The **New Account** window appears.

## New Account

×

Username

---

E-mail

---

First Name

---

Last Name

---

Password

---

Repeat Password

---

Groups  Only GE groups

Select UAA groups...

3. Enter values in the available fields as described in the following table.

Field Name	Description
Username	Enter the user name that the user will use to log in to Operations Hub. The value must be unique.
E-mail	Enter the email ID of the user. The value must be unique.
First Name	Enter the first name of the user.
Last Name	Enter the last name of the user.
Password	Enter a password that the user will use to log in to Operations Hub. The password must meet the following criteria: <ul style="list-style-type: none"> <li>◦ Must contain between 8 and 15 characters</li> <li>◦ Must include at least one number</li> <li>◦ Must include at least one uppercase or lowercase letter</li> </ul>
Repeat Password	Enter the password that you have entered in the Password field.

Field Name	Description
Only GE Groups	Select this check box if you only want to view groups associated with GE products in the Groups list box.
Groups	<p>Select the Proficiency Authentication groups (UAA) you want to assign to this user.</p> <ul style="list-style-type: none"> <li>◦ <b>Developers:</b> Must have following groups assigned to have elevated privileges to develop apps in Operations Hub: <code>iqp.developer</code>, <code>iqp.user</code> and <code>webhmi.admin</code>.</li> <li>◦ <b>App Users:</b> Must have the <code>iqp.user</code> group assigned to use apps. App users cannot develop apps due to restricted privileges.</li> </ul>

#### 4. Select **Create**.

The user is created. If you have created a developer, an application user is also created.

If you have created an application user, provide access to one or more applications to the user.

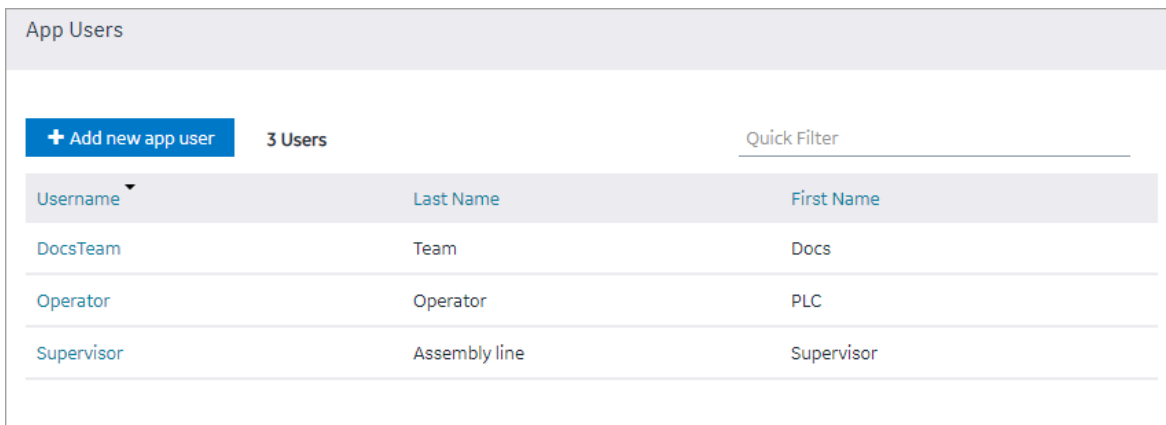
## Grant Access to a Role (Classic)

This topic describes how to grant access to a role.

You can also [grant access to an application \(on page 256\)](#).

#### 1. In the main navigation menu, select **MANAGE**, and then select **App Users**.

The **App Users** workspace appears, displaying a list of application users.

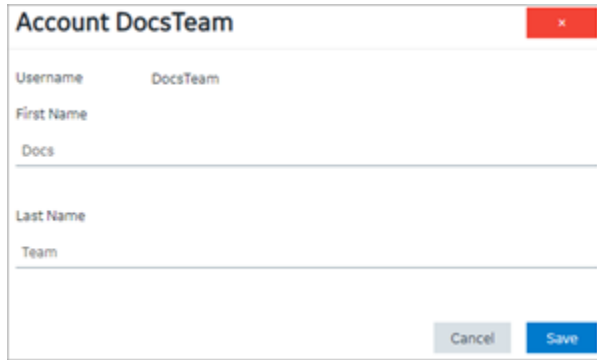


The screenshot shows the 'App Users' workspace. At the top, there is a header 'App Users' and a blue button '+ Add new app user'. To the right of the button, it says '3 Users'. Further right is a 'Quick Filter' input field. Below this is a table with three columns: 'Username', 'Last Name', and 'First Name'. The table contains three rows of data:

Username	Last Name	First Name
DocsTeam	Team	Docs
Operator	Operator	PLC
Supervisor	Assembly line	Supervisor

#### 2. In the row containing the user to whom you want to grant access, in the **Username** column, select the link.

The **Account <user name>** window appears, displaying the details of the user.



Account DocsTeam

Username DocsTeam

First Name

Docs

Last Name

Team

Cancel Save

3. In the **Apps** box, select the applications to which you want to grant access to the user.
4. In the **Role Groups** box, select the check boxes corresponding to the categories and groups to which you want to grant access to the user.



**Tip:**

When you select a category or a group, all the underlying groups in the hierarchy are selected. You can clear the check box corresponding to a category or a group if you do not want to grant access to it.

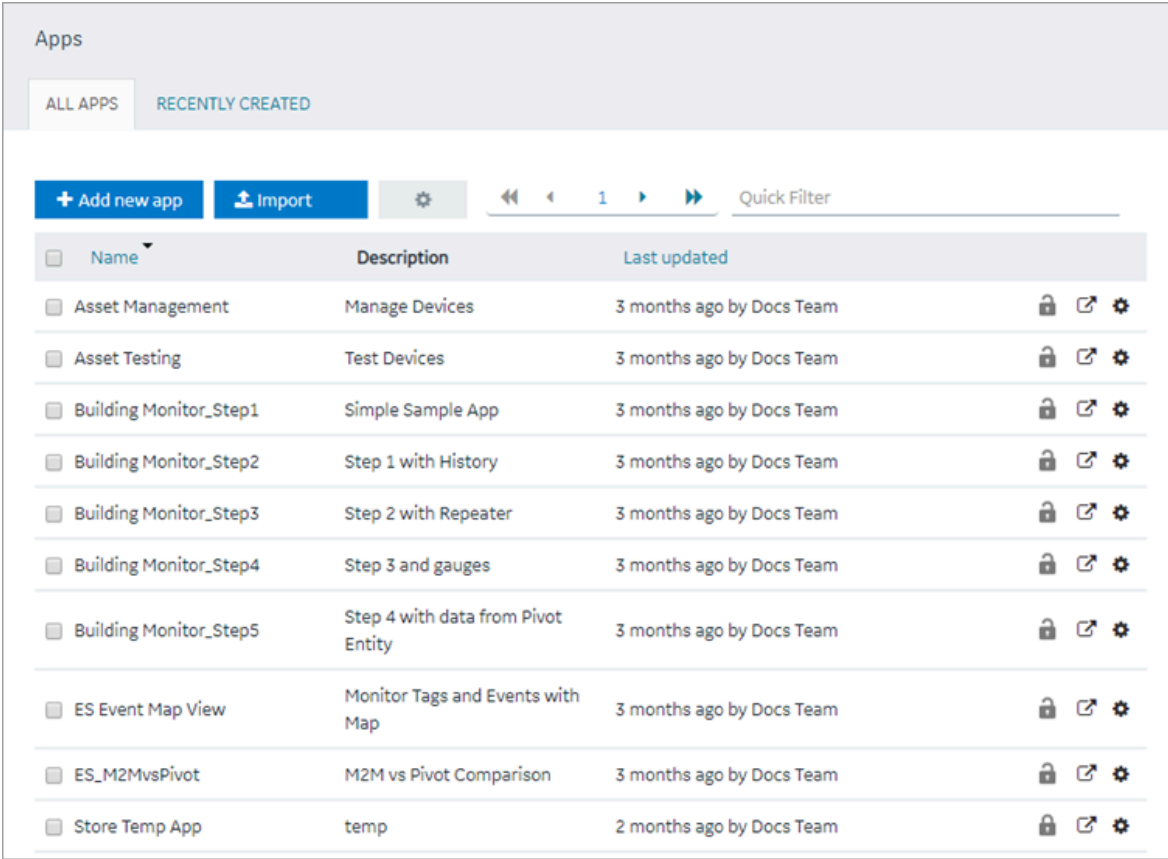
5. Select **Save**.

The user can now access the selected applications, categories, and groups.

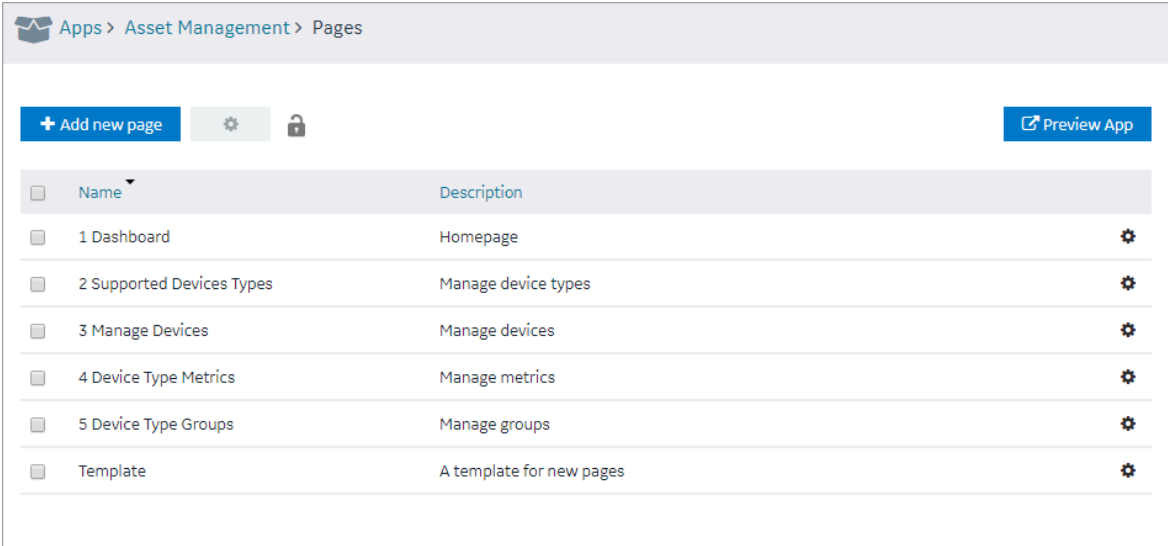
## Revoke Access to an Application (Classic)

Steps for Operations Hub classic version.

1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.



- 2. In the **Name** column, select the application for which you want to revoke access. The **PAGES** workspace appears.



- 3. In the main navigation menu, select **APP USERS**. The **APP USERS** workspace appears, displaying a list of application users created in the site.

App Users		
<a href="#">+ Add new app user</a>	3 Users	<a href="#">Quick Filter</a>
Username	Last Name	First Name
<a href="#">DocsTeam</a>	Team	Docs
<a href="#">Operator</a>	Operator	PLC
<a href="#">Supervisor</a>	Assembly line	Supervisor

- In each row containing a user whose access you want to revoke, clear the check box, and then select **Submit changes**.

Access to the application is revoked for the selected users.

## Delete a User (Classic)

Steps for Operations Hub classic version.

The logged in user cannot delete one's own user account.

- In the main navigation menu, select **MANAGE**, and then select **App Users**.  
The **App Users** workspace appears.

Apps > Asset Management > App Users			
<a href="#">+ Add new app user</a>	<a href="#">Submit changes</a>	3 Users	<a href="#">Only app users</a>
			<a href="#">Quick Filter</a>
Username	Last Name	First Name	Last Login
<input checked="" type="checkbox"/> <a href="#">DocsTeam</a>	Team	Docs	19 hours ago
<input type="checkbox"/> <a href="#">Operator</a>	Operator	PLC	
<input type="checkbox"/> <a href="#">Supervisor</a>	Assembly line	Supervisor	

- In the row containing the user that you want to delete, select the link in the **USERNAME** column.  
The **Account <user name>** window appears, displaying the details of the user.



**Account DocsTeam** ✕

Username: DocsTeam

First Name

Docs

---

Last Name

Team

---

Apps:

- ✕ ES Event Map View
- ✕ Building Monitor\_Step2
- ✕ Building Monitor\_Step3
- ✕ Building Monitor\_Step4
- ✕ Building Monitor\_Step5
- ✕ ES\_M2MvsPivot
- ✕ Asset Testing
- ✕ Building Monitor\_Step1
- ✕ Asset Management
- ✕ Widget font testing 2

Delete
Cancel
Save

3. Select **Delete**.

A message appears, asking you to confirm that you want to delete the user.

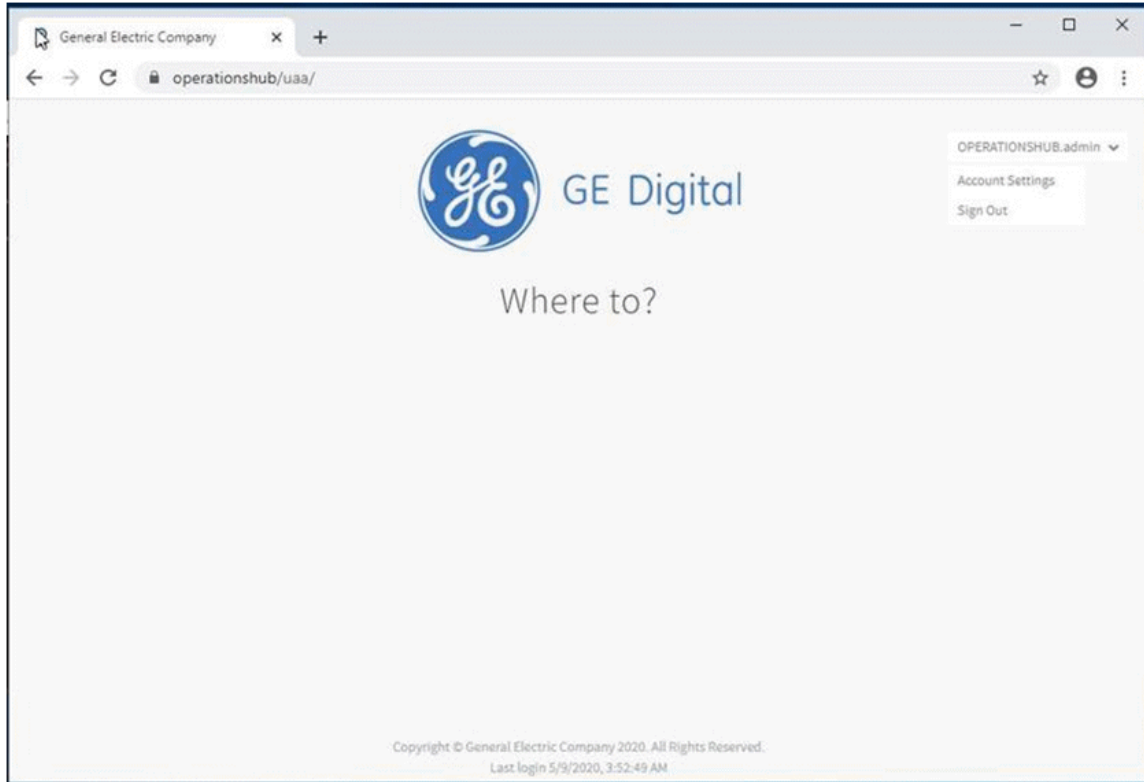
4. Select **OK**.

The user is deleted.

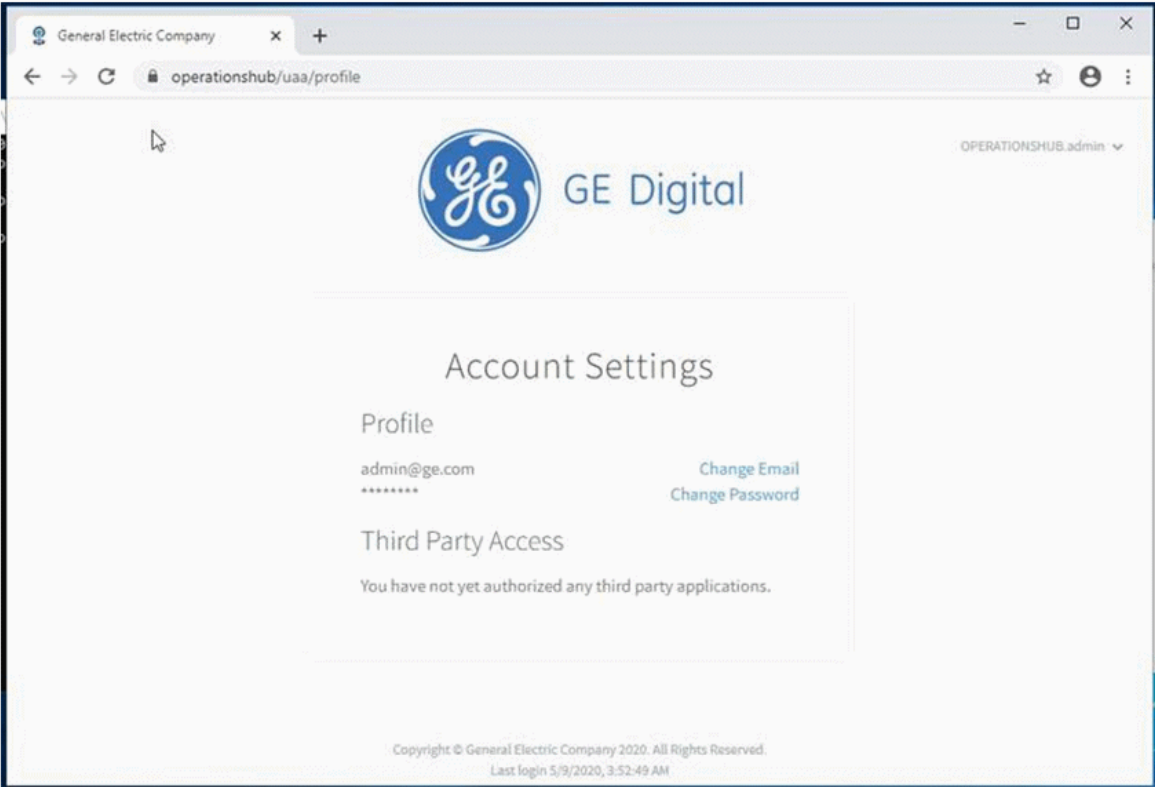
## Change Your Password

Follow the steps to change your password in Operations Hub.

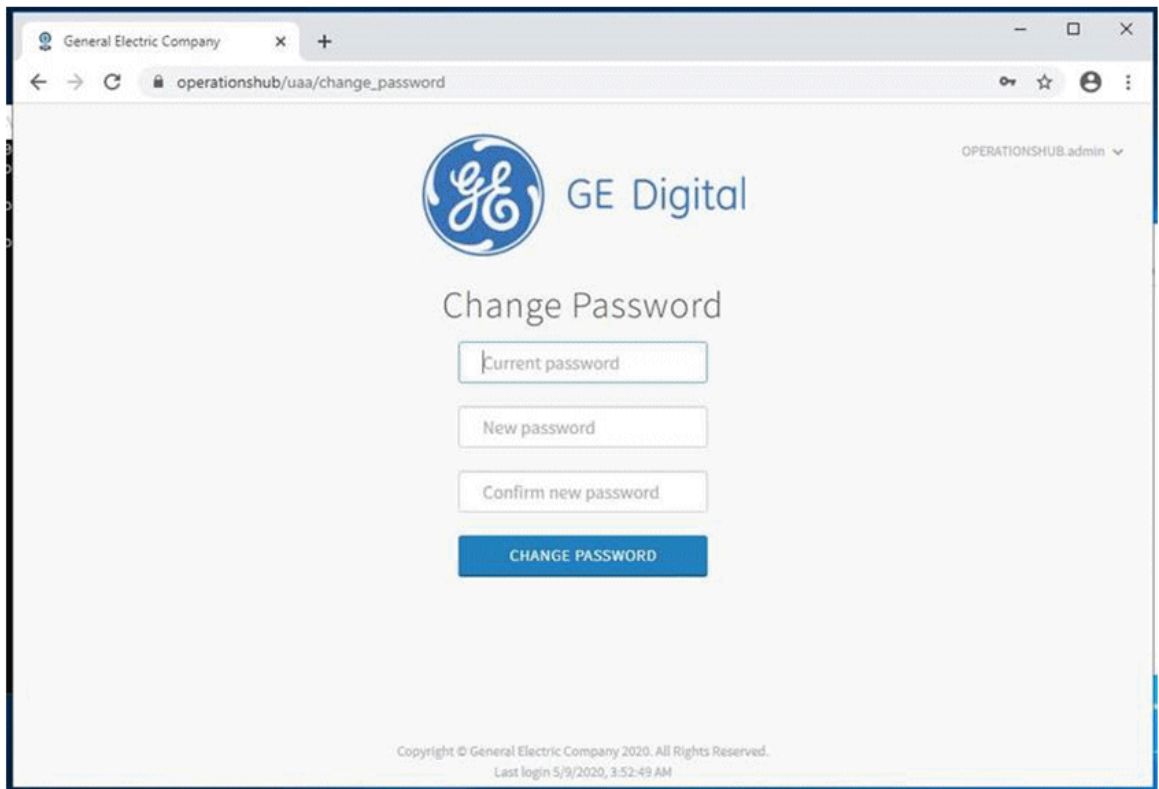
1. Log out of all instances of Operations Hub, and close your browser.
2. Reopen your browser, and go to this page: <https://enter your machine name/uaa/login>.  
The following screen appears.



3. In the upper right-hand corner of the screen, click **Account Settings**.  
The following screen appears.



- 4. Select the **Change Password** link.  
The next screen appears.



The screenshot shows a web browser window with the address bar displaying "operationshub/uaa/change\_password". The page features the GE Digital logo and the title "Change Password". Below the title are three input fields: "Current password", "New password", and "Confirm new password". A blue button labeled "CHANGE PASSWORD" is positioned below the input fields. At the bottom of the page, there is a copyright notice: "Copyright © General Electric Company 2020. All Rights Reserved. Last login 5/9/2020, 3:52:49 AM".

5. In the **Current Password** field, enter the existing password.
6. In the **New Password** field, enter the new password that you want to use to log in to Operations Hub.

The password must meet the following criteria:

- Must contain between 8 and 15 characters



**Note:**

For the 2.0 release, the password cannot be 15 characters long.

This rule applies only when setting up the password for the first time for the first user account (OphubAdmin). After the completion of iqp-provisioner, the initial password for OphubAdmin can also be updated to a password of 15 characters length. Subsequent user accounts (including LDAP, external IDP accounts) can have a password length of 15 characters.

- Must include at least one number
  - Must include at least one uppercase or lowercase letter
7. In the **Confirm New Password** field, enter the new password again.
  8. Click **Change Password** to proceed.

# Roles

## About Roles

You can create roles to define which users can access specific information. When you create a role, you create a category and a group within that category. You can create multiple categories containing multiple levels of groups.

### Managing Access to Data Fields

Suppose you have created an application that provides the following details of users, and you want only the Finance personnel to view the salary details:

- User name
- User ID
- Joining date
- Salary

In this case, you will perform the following tasks:

1. Create a category named Department.
2. In the Department category, create a group named Finance.
3. Modify the **Roles Conditions** section of the query that fetches the user account details as follows:
  - a. In the **Entity field** box, select the field that stores the salary details.
  - b. In the **Access** box, select **Permitted Roles**.
  - c. In the **Roles** box, expand the Department category, and select the check box corresponding to the Finance group.
  - d. Save the query.

When the query is run, the user name, user ID, and joining date details are returned to all users. However, users who belong to the Finance department will also see the salary details.

### Managing Access to Data Rows

Suppose you have created an application that provides the following details of users, and you want all users to only see rows from their location:

- User name
- User ID
- Joining date
- Salary
- Location

In this case, you will perform the following tasks:

1. Create a category named Locations.
2. In the Location category, create groups for each location.
3. Modify the **Roles Conditions** section of the query that fetches the user account details as follows:
  - a. In the **Apply conditions to** section, select **All roles**.
  - b. In the **Row visibility** box, select **Filter rows**.
  - c. In the **Entity field** box, select the field that stores the location of the user.
  - d. In the **In user's role tree** box, select the Locations category.
  - e. Save the query.

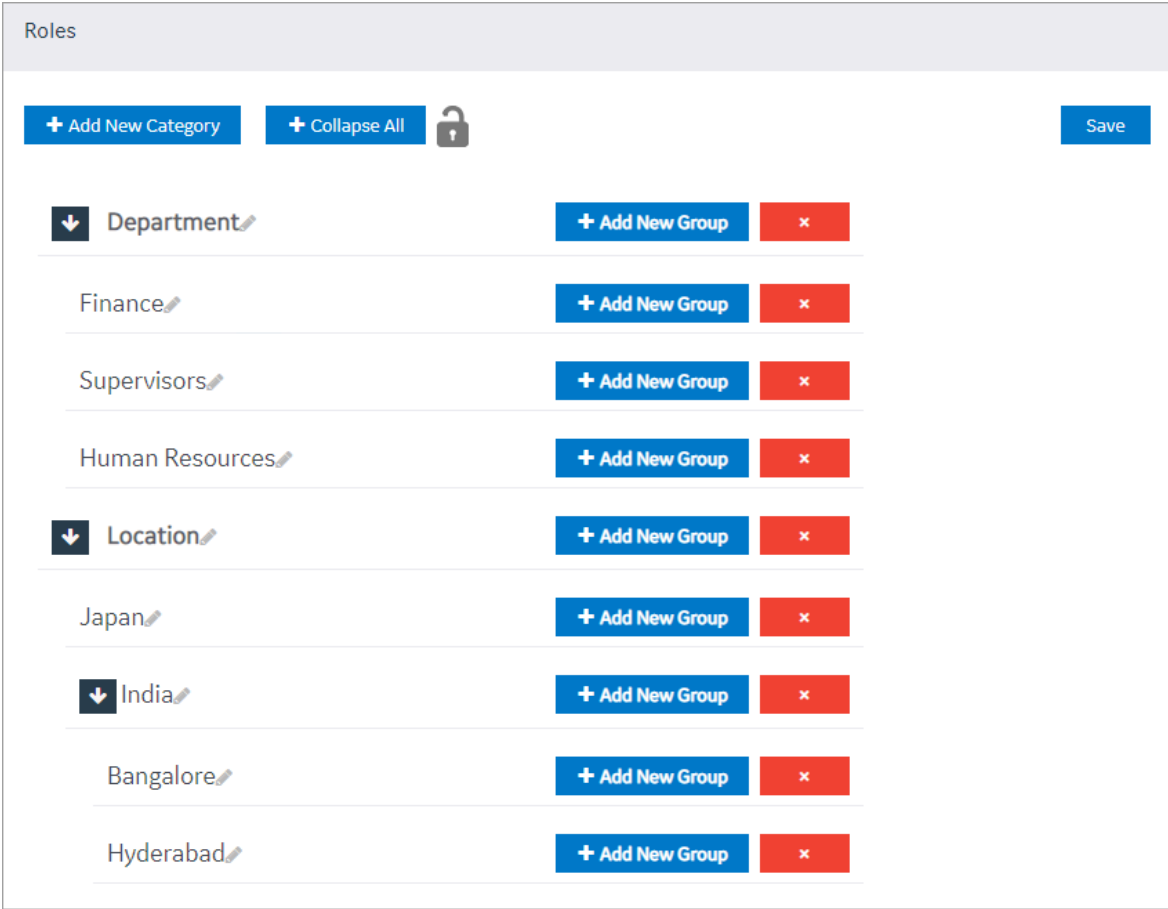
When the query is run, users will only see records where the Location field matches the Location role that has been allocated to them.


## Access a Category or a Group (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.


1. In the main navigation menu, select **MANAGE**, and then select **Roles**.  
The **Roles** workspace appears, displaying a list of categories and groups.



- 2. In the row containing the category that you want to access, select . The category expands, displaying a hierarchical view of groups.

**i Tip:** You can select **Expand All** to expand all categories and groups.

- 3. If you want to access a group, navigate to the group in the hierarchy.

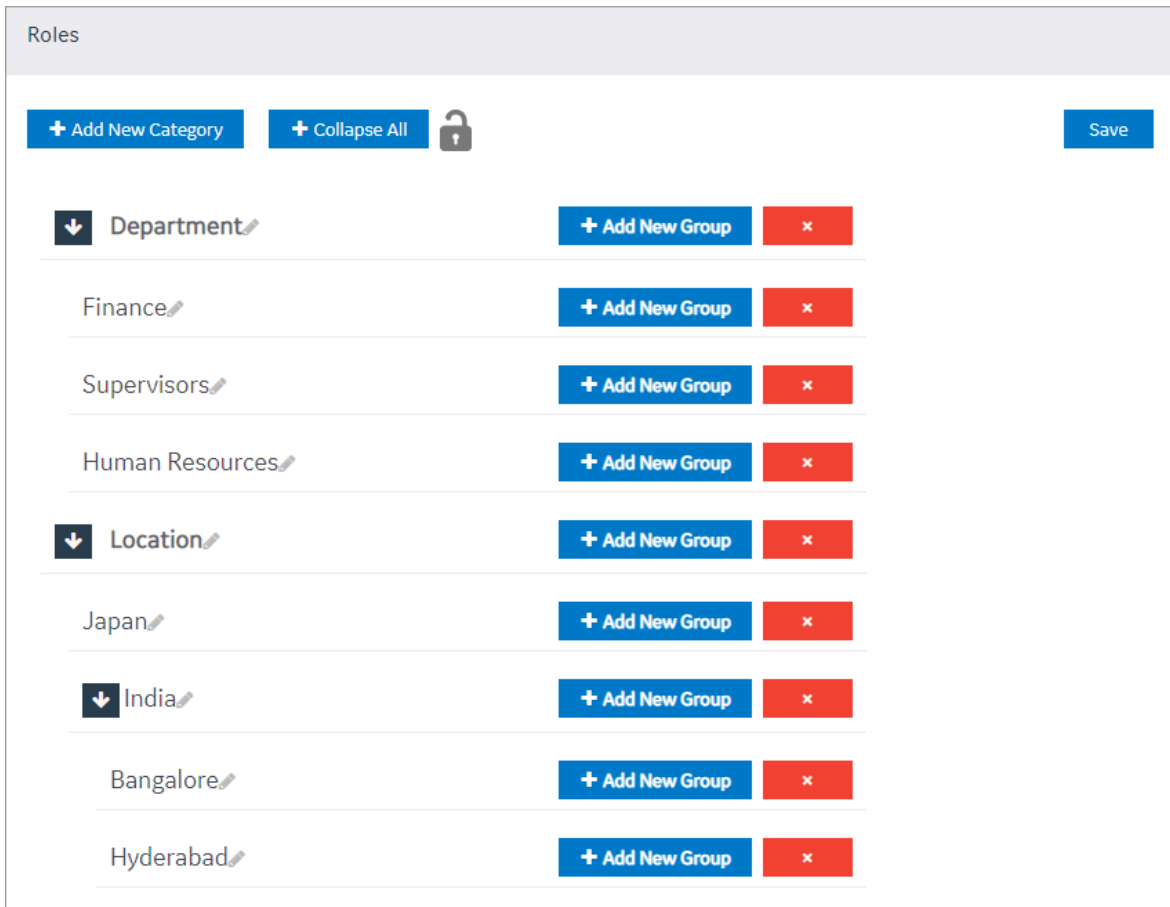
**i Tip:** If needed, you can modify the name of a category or a group by selecting  next to the name.

### Create a Category (Classic)

Steps for Operations Hub classic version.

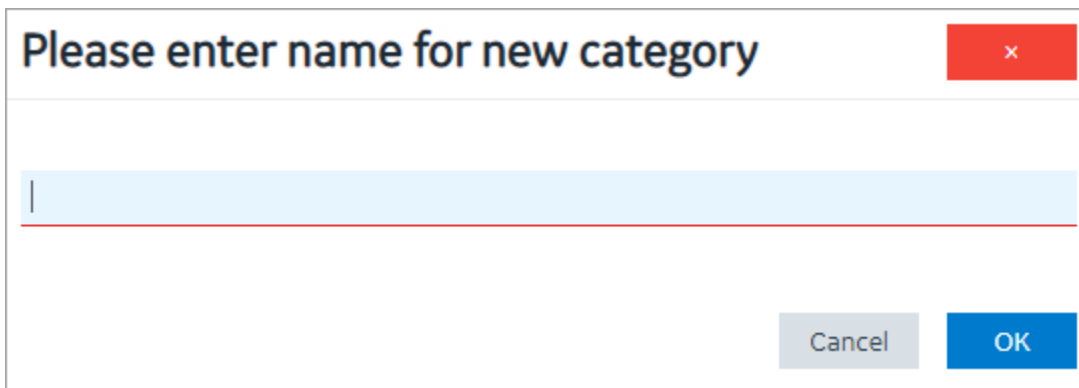
Log in to Operations Hub.

1. In the main navigation menu, select **MANAGE**, and then select **Roles**.  
The **Roles** workspace appears, displaying a list of categories.



2. Select **Add New Category**.

A window appears, asking you to enter a name for the category.





3. Enter a name, and then select **OK**. The name must contain at least one uppercase or lowercase letter.

The category is created.

[Create a group \(on page 399\).](#)

## Create a Group (Classic)

Steps for Operations Hub classic version.

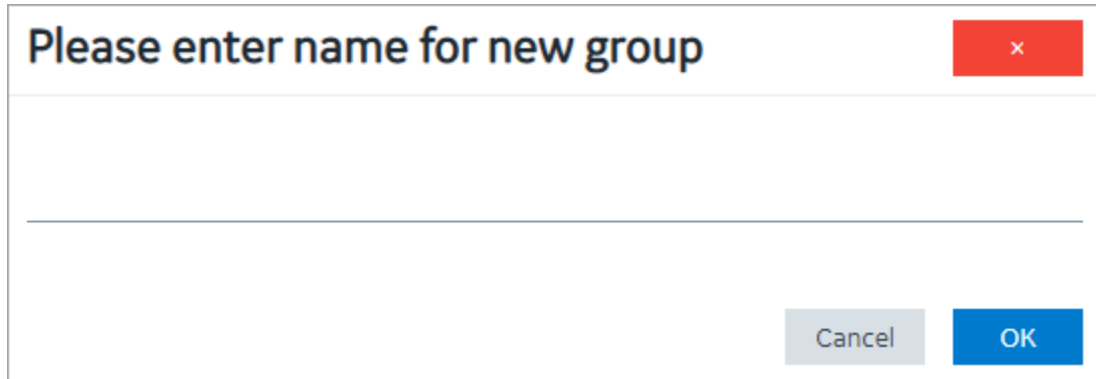
[Create a category \(on page 399\).](#)

1. In the main navigation menu, select **Roles**.

The **Roles** workspace appears, displaying a list of categories.

The screenshot shows the 'Roles' workspace interface. At the top, there are three buttons: '+ Add New Category', '+ Collapse All', and a lock icon. A 'Save' button is located in the top right corner. The main content area displays a list of categories, each with a dropdown arrow and an edit icon. The categories are 'Department', 'Location', and 'India'. Under 'Department', there are sub-categories: 'Finance', 'Supervisors', and 'Human Resources'. Under 'Location', there are sub-categories: 'Japan' and 'India'. Under 'India', there are sub-categories: 'Bangalore' and 'Hyderabad'. Each category and sub-category has a blue '+ Add New Group' button and a red 'x' button next to it.

2. In the row containing the category in which you want to create a group, select **Add New Group**. A window appears, asking you to enter a name for the group.



Please enter name for new group

Cancel OK

3. Enter a name, and then select **OK**. The name must contain at least one uppercase or lowercase letter.

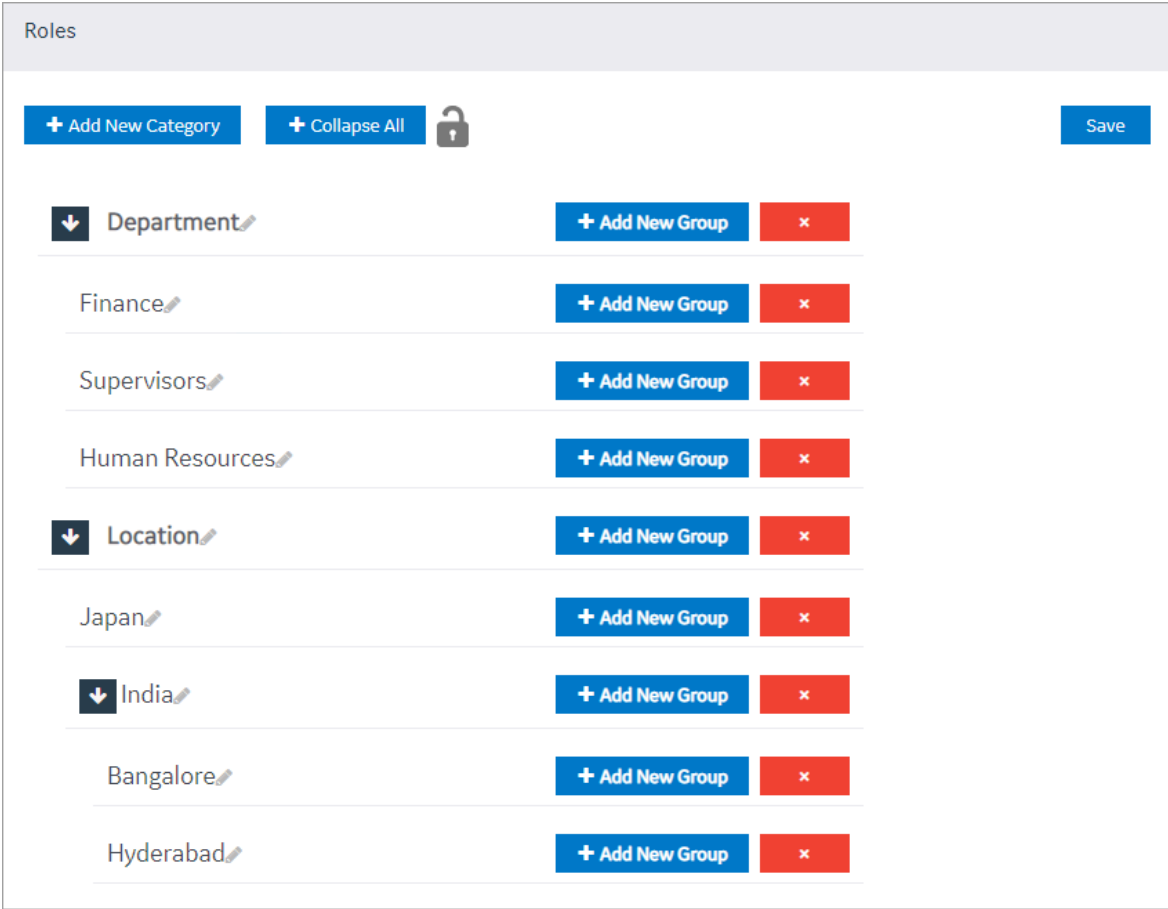
The group is created.


## Delete a Category or a Group (Classic)



Steps for Operations Hub classic version.

Log in to Operations Hub.

1. In the main navigation menu, select **MANAGE**, and then select **Roles**.  
The **Roles** workspace appears.



- 2. In the row containing the category or group that you want to delete, select . A message appears, asking you to confirm that you want to delete the category or group.

 **Tip:** To access a list of groups in a category, select  in the row containing the category.

- 3. Select **OK**. The category or group is deleted.

## Administration

### Runtime Model

Create a model to build the runtime structure and content.

You can set up the types of equipment to use, the instances of equipment to appear in the runtime context, the information to display about the equipment, and the data sources for supplying data. The Model Editor user interface helps you create and modify your model.

## Model Editor

Use the Model Editor to create and modify asset object types and asset objects in your model.

To begin building a model, perform these tasks:

- [Create Data sources \(on page 421\)](#)
- [Configure Data Distributor Settings \(Classic\) \(on page 406\)](#)
- [Set Up the Data Model Structure \(on page 407\)](#)
- [Define Objects \(on page 408\)](#)
- [Set Up Runtime Navigation \(on page 410\)](#)

## Supported Characters for the Model

Before creating object types, objects and data variables, review the following tables to see which characters are supported as well as restricted.

### Supported Characters

Character	Description
!	Exclamation Point
@	At sign
^	Caret
\$	Dollar Sign
()	Parentheses
	Pipe
.	Period
`	Grave Accent
~	Tilde
-	Hyphen
_	Underscore

**Note:**

A single space is allowed but a succession of spaces is not.

**Unsupported Characters**

Character	Description
#	Number Sign
%	Percent Sign
\	Backslash
,	Comma
?	Question Mark
;	Semicolon
+	Plus Sign
:	Colon
"	Quotation Marks
'	Apostrophe
< >	Greater than/Less than Symbols
{ }	Braces
/	Slash
=	Equal Sign
*	Asterisk
&	Ampersand

**Manage Data Source Servers (Classic)**

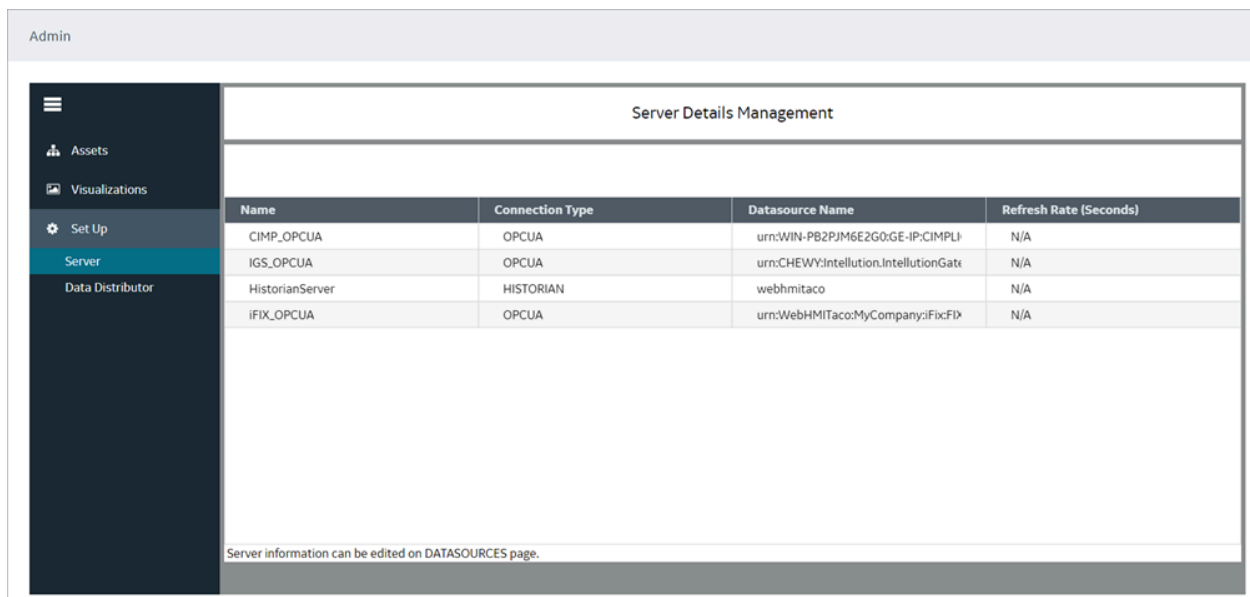
Access the details for the data source servers that are used to populate data in your model.

This is a view-only section in Operations Hub.

To access the data source server details:

1. In the Administration environment, select **Set Up** and then **Server**.
2. The **Server Details Management** screen appears with a list of servers set up in your system along with their details:

Column	Description
Name	The server name.
Connection Type	The connection type, whether OPC UA or Historian.
Datasource Name	The data source name associated to the server.
Refresh Rate (Seconds)	The time set for refreshing the application, for example, every 5 seconds.



To configure data sources for Historian and OPC UA, refer to [Create a Data Source \(Classic\) \(on page 421\)](#).

## Configure Data Distributor Settings (Classic)

Steps for Operations Hub classic version.

[Create a Data Source \(Classic\) \(on page 421\)](#).

Data distributor is a component in Operations Hub that communicates with the Historian servers configured with Operations Hub. It performs the following tasks:

- Fetches a list of Historian tags.
- Fetches Historian data based on the parameters that you have specified.
- Reads and updates notes.
- Subscribes for updates on Historian tag value changes.

Using the data distributor settings, you can specify the log level of the data distributor. For example, you can choose a verbose log level to help you troubleshoot issues with fetching data from the Historian server.

1. In the administrative environment, select **Set Up > Data Distributor**.
2. In the **Logging level** box, select one of the following log levels:
  - Info
  - Error
  - Warn
  - Debug
  - Verbose

The data distributor settings are configured.

## Set Up the Model Structure (Classic)

Object types define the structure of the equipment pieces within your model. For each object type, such as a `StorageTank`, you set up all the data variable names, such as `TankLevel`, that any asset object associated with this type can reuse in its own definition.

Log in to Operations Hub.

Using the **Contained Types** area, you set up the parent/child relationship of asset object types in the model. For example, `StorageTank1` and `SuctionValve2` are the children that comprise the `FinishedWaterPumpStation`. At runtime, the children appear under the parent in the navigational context.

1. In the Administration environment, navigate to **Assets > Object Types > New**.  
The **Object Type Information** screen appears.
2. Enter a unique name for the new object type and provide a description.
3. Select **Save**.
4. Select **Data Variables** to add variable names whose data will come from the data sources.
5. To add a variable name for this object type, do the following:
  - a. Select **+** above the table.
  - b. In **Variable**, enter the name of the data variable, such as Pressure.
  - c. In **Data Type**, select the type of data this variable stores: Boolean, String, or Number.
  - d. In **Description**, explain the purpose of the data variable.

6. Repeat the above steps for each new object type.
7. To define an asset object type as a parent of other types, do the following:
  - a. Select **Contained Types**.
  - b. Choose the parent by selecting an object type on the left panel.
  - c. Select **+** above the table to add children to the parent.
  - d. Select the object type to become a child and provide an alias name.
8. Select **Save**.

## Define Objects (Classic)

Asset objects are the instances of equipment pieces, such as `StorageTank1`, to appear in the model. For each object, you determine which data variables derived from its object type to reuse, and then define them accordingly.

Log in to Operations Hub.

- Objects appear alphabetically.
- Always use a unique object name.

1. In the Administration environment, navigate to **Assets > Objects**.

If objects are already defined, the left panel lists them.

2. To add a new object, select **New**.

The **New Object** screen appears.

3. Select the object type for this object.


The children of the object type appear under **Contained Objects** if defined. The system automatically generates a contained object name from the alias and appends an instance number to it, such as `DPump1_1`. The next time another asset object reuses the object type with this contained object, the instance number is increased by one, which in this example is `DPump1_2`.

4. Type a unique name for the new object and provide a description.



5. Select **Save**.



The new object appears with the data variables of its object type.

6. Define each data variable that you want to use for this object by doing the following:

Column	Description
RealTime Data Alias	<p>You receive real time data from data sources such as iFIX, CIMPLICITY, IGS, or any other third party OPC UA server.</p> <p>Select  to choose a data source from the list of available data sources.</p>



Column	Description																								
	<table border="1"> <thead> <tr> <th>Data Type</th> <th>RealTime Data Ali</th> <th>Real Time Data Sc</th> </tr> </thead> <tbody> <tr> <td>STRING</td> <td>▲</td> <td>...</td> </tr> <tr> <td>BOOLEAN</td> <td>CIMP_OP...</td> <td>...</td> </tr> <tr> <td>STRING</td> <td>IGS_OPC...</td> <td>...</td> </tr> <tr> <td>BOOLEAN</td> <td>iFIX_OPC...</td> <td>...</td> </tr> <tr> <td>STRING</td> <td></td> <td>...</td> </tr> <tr> <td>STRING</td> <td></td> <td>...</td> </tr> <tr> <td>BOOLEAN</td> <td></td> <td>...</td> </tr> </tbody> </table>	Data Type	RealTime Data Ali	Real Time Data Sc	STRING	▲	...	BOOLEAN	CIMP_OP...	...	STRING	IGS_OPC...	...	BOOLEAN	iFIX_OPC...	...	STRING		...	STRING		...	BOOLEAN		...
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RealTime Data Source	<p>...</p> <p>Select  to browse the data source and select items that feed live data to this variable, which can appear in the trend chart or a widget that is configured with this model property.</p> <p>Refer to <a href="#">Browse Data Sources (Classic) (on page 442)</a>.</p>																								
Historical Data Alias	<p>You receive historical data from the Historian data source.</p> <p>Select  to choose a data source from the list of available Historian data sources.</p> <table border="1"> <thead> <tr> <th>Data Sc</th> <th>Historical Data Ali</th> <th>Historical Data S</th> </tr> </thead> <tbody> <tr> <td>...</td> <td>Histori ▼</td> <td>FIX.FWT_FWI ...</td> </tr> <tr> <td>...</td> <td>Server ▲</td> <td>FIX.FWT_FWI ...</td> </tr> <tr> <td>...</td> <td>Historian...</td> <td>FIX.FWT_FWI ...</td> </tr> <tr> <td>...</td> <td>Histori ▼</td> <td>FIX.FWT_FWI ...</td> </tr> <tr> <td>...</td> <td>Histori ▼</td> <td>FIX.FWT_FWI ...</td> </tr> </tbody> </table>	Data Sc	Historical Data Ali	Historical Data S	...	Histori ▼	FIX.FWT_FWI ...	...	Server ▲	FIX.FWT_FWI ...	...	Historian...	FIX.FWT_FWI ...	...	Histori ▼	FIX.FWT_FWI ...	...	Histori ▼	FIX.FWT_FWI ...						
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Column	Description
Historical Data Source	<p>            Select  to select Historian tags that feed Proficiency Historian data to this variable, which can appear in the trend chart or a widget that is configured with this model property.         </p> <p>           Refer to <a href="#">Browse Data Sources (Classic) (on page 442)</a>.         </p>

7. Select **Save**.

## Duplicate Objects (Classic)

When an object uses similar data variables and contained objects as a configured object, you can duplicate the configured object to create new objects for your model.

Log in to Operations Hub.

1. In the Administration environment, navigate to **Assets > Objects**.

2. Select **Duplicate**.

The duplicated object appears highlighted in the left panel with Copy appended to its name.

3. Change the name in the **Name** field and select **Save**.

The renamed asset object appears in the left panel. You cannot rename the asset after selecting **Save**.

4. To duplicate more instances of the same object, continue to select **Duplicate** and repeat step 3.

The duplicated objects appear highlighted in the left panel with Copy and a number appended to their names, such as `pump1_copy(1)`, `pump1_copy(2)`, and so on.

## Set Up Runtime Navigation (Classic)

Use the Navigation app to visually structure the runtime hierarchy of objects.

Log in to Operations Hub.

Changing the root of an existing runtime navigation hierarchy requires that you clear the entire hierarchy and then rebuild it.

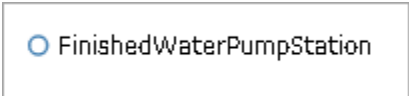
1. In the Administration environment, navigate to **Visualizations > Navigation**.

All objects appear in the left panel with check boxes.

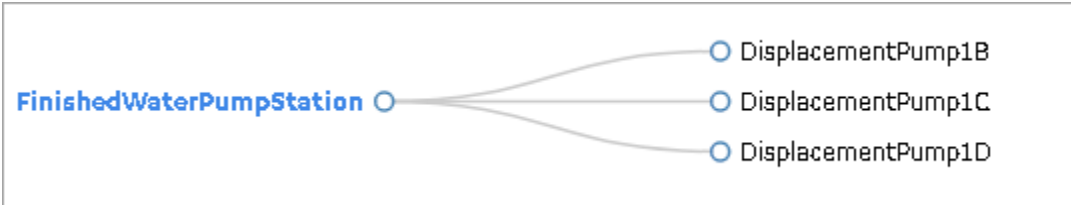
2. Select the parent check box and then select **+** at the top of the left panel.

The parent object instance appears in the app area. The following shows the

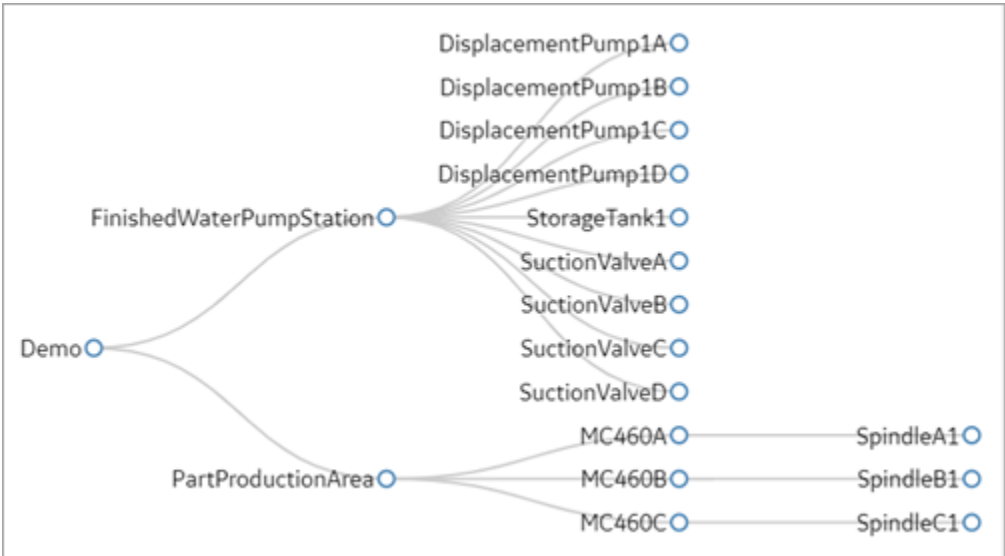
`FinishedWaterPumpStation` parent.



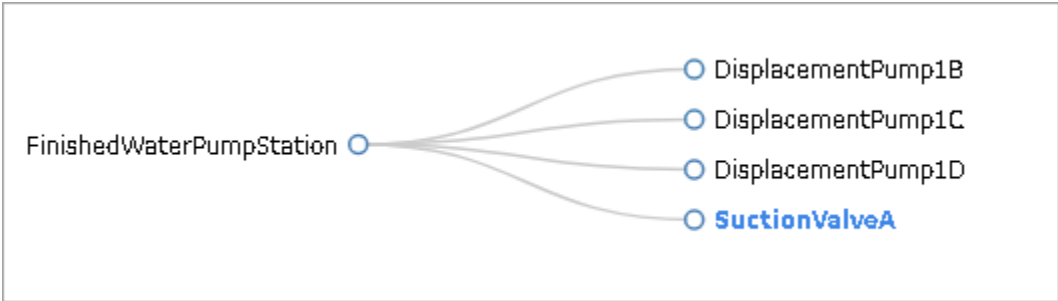
- 3. Select the parent object in the app area, select its children in the left panel and select +.
  - 4. In the app area, expand the parent object to show its children by selecting its filled circle.
- In this example, the FinishedWaterPumpStation has three DisplacementPump children.



- 5. To add object instances to a child, select the child in the app area and select its descendants in the left panel.
- In this example, SpindleA1, B1, C1 are descendants of MC460A, B, C.



- 6. You can also drag and drop objects within the hierarchy to change their order, as shown in this example. SunctionValveA is now a child of FinishedWaterPumpStation.



7. **Optional:** To delete an object from the hierarchy, select its check box and then - at the top of the left panel.
8. **Optional:** At any time, you can remove the hierarchy and start with a blank app area by selecting **Clear Hierarchy**.
9. To save the runtime hierarchy that you created, select **Save**.

## Modify Object Types (Classic)

You can remove an asset object type and delete and modify its data variable names but you cannot change the name of an object type. All changes made to an object type are reflected in its object instances.

Log in to Operations Hub.

You cannot delete an asset object type that has existing objects using its data structure.

1. In the Administration environment, navigate to **Assets > Object Types**.  
The **Object Type Information** screen appears listing the object types.
2. In the left panel, select the object type to modify.
3. Make changes as needed and select **Save**.
4. To remove an object type, select it in the left panel, select **Delete**, and confirm the delete.

## Remove Contained Types (Classic)

When you delete a child from an asset object type, it is also removed from all objects using it.

Log in to Operations Hub.

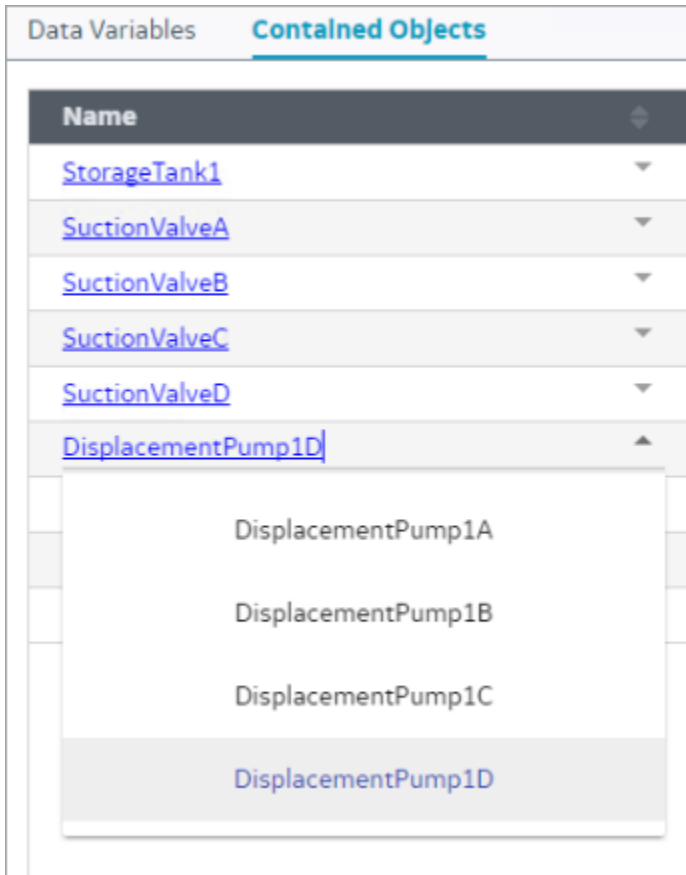
1. In the Administration environment, navigate to **Assets > Object Types**.  
The **Object Type Information** screen appears listing all the asset object types.
2. In the left panel, select the asset object type whose children you want to modify.
3. Select the **Contained Types** tab.
4. To remove children from a parent, select the check box next to each child you want to remove, and select - above the table.
5. Select **Save**.

## Replace Contained Objects (Classic)

You can quickly replace contained objects by browsing through a list of similar objects that are assigned to the same object type.

Log in to Operations Hub.

1. In the Administration environment, navigate to **Assets > Objects**.
2. Select the object type.
3. Select **Contained Objects**.
4. Select the arrow next to the contained object that you want to replace. A list appears with similar objects that are associated with the selected object type, as shown in the following image:



5. Select the object to replace the contained object. This selected object is now a contained object for the object type.
6. **Optional:** To view the details of a contained object, such as its data variables, select its hyper-linked name in the **Name** column.
7. Select **Save**.

## Modify Objects (Classic)

You can remove an asset object as well as change its data sources.

Log in to Operations Hub.

If an object has contained objects, you can change their auto-generated names but not their aliases.

1. In the Administration environment, navigate to **Assets > Objects**.  
The **Object** screen appears.
2. In the left panel, select the object to modify.
3. Make the changes as needed and select **Save**.  
You cannot modify data variables.
4. To remove an object, select it in the left panel, select **Delete**, and confirm the delete.

## Export a Model (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

Model configuration is exported and saved to a CSV format for later use.

1. Go to **ADMIN > Import/Export**.  
The **Model Import/Export** screen appears.
2. You have the option to export the complete model, or only a part of it.  
To export the complete model, do the following:
  - a. Enter a file name for the model you want to export.



The screenshot shows a web form titled "Export". At the top left, there is a checkbox labeled "Export Partial Model". Below this checkbox is a text input field with the placeholder text "Enter export file name". The input field contains the text "Custom ModelS" and has a small downward-pointing arrow on its left side. At the bottom right of the form, there is a dark button labeled "Export".

- b. Select **Export**.  
The model data is exported to a .csv file.

To partially export the model, do the following:

- a. Select the check box for **Export Partial Model**.
- b. From the dropdown list, select a node to serve as a starting point for the export.  
The dropdown list contains all the objects within a hierarchy. For more information on navigation hierarchy, refer to [Set Up Runtime Navigation \(Classic\) \(on page 410\)](#).
- c. Select **Navigation** or **Containment**.  
In Navigation export file, the objects are arranged according to their navigation hierarchy.

In Containment export file, the objects are arranged according to their parent-child relationship.

- d. Enter a file name for the model you want to export.

- e. Select **Export**.

The model data is exported to a .csv file.



**Note:**

The data source connectivity information in the model is not preserved during export. As an alternative, [export the application \(on page 274\)](#).

3. Retrieve the model file from the Windows Downloads folder.

## Import a Model (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

If you want to replace an existing model, you must first [delete \(on page 417\)](#) the old one before importing the new one. You can also merge the new model with the existing model during import.



**Note:**

Data source connectivity information is not preserved in the model you import to your system. After importing the model, reconfigure the data source properties in the model.

1. Go to **ADMIN > Import/Export**.

The **Model Import/Export** screen appears.

2. Select **Browse** to navigate to the .csv model file, and then select **Import**.




3. Follow these instructions to view and download the log file in these browsers:

Browser	What To Do
Chrome	<ul style="list-style-type: none"> <li>◦ To view the log file, right-click <b>[log]</b> to open it in a new tab.</li> <li>◦ To download and then view the log file, click <b>[log]</b>. You can view the file in the Downloads folder.</li> </ul>
Microsoft Edge	<ul style="list-style-type: none"> <li>◦ To view the log file, click <b>[log]</b>, and then <b>Open</b>.</li> <li>◦ To download and view the log file, click <b>[log]</b>, and then <b>Save</b>. You can then view the log file by selecting <b>View downloads</b>.</li> </ul>

4. To view the model in runtime, select **Runtime** from the user icon drop-down list at the top right of the screen.

By default, the highest asset point in the model hierarchy appears.

5. To navigate through the asset objects in the hierarchy model, select the Asset Context Selector, . The model displays the relevant data in context to each asset object selected in the navigation scheme.

## Define Trend Data (Classic)

You can view trend-line analysis of variable data for a selected time frame in Historian. You select which historical variables to view.

Log in to Operations Hub.

1. In the Administration environment, navigate to **Visualizations > Designer**.
2. Select **Types**.
3. In the left pane, select the asset object type containing the data variables to display in trend lines.
4. Select **Trend Card**.
5. Select the check box next to each variable containing the data to use as a trend point.
6. Select **Save**.



## Delete a Model (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

If importing a model fails or you want to replace a model with a new one, you may choose to delete the model. Before deleting the model, we recommend that you [export \(on page 414\)](#) it for a backup. You can then import it again or import a new model.

1. In the main navigation menu, select **ADMIN**.  
The **ADMIN** workspace appears.
2. Select **Delete Model**.  
A message appears, asking you to confirm that you want to delete the model.
3. Select **Delete**.  
The model is deleted.

## Import Mimics (Classic)

HMI graphics are imported as mimics to Operations Hub.

Verify iFIX pictures or CimEdit screens were exported as JSON files.

- In Proficy iFIX, go to **Tools > Publish Picture** to export pictures.
- In Proficy CIMPLICITY, export CimEdit screens.

Process diagrams created in an HMI/SCADA system are imported and used as mimics in Operations Hub.

1. Go to **ADMIN > Visualizations > Mimic Management**.
2. Select **Import**.
3. In the **Import Mimics** screen, browse and select the JSON zip file you want to import to Operations Hub, then select **Import**.  
The zip files contain exported iFIX pictures or CimEdit screens.
4. Repeat the steps to import more files.

All the imported files are listed on the **Mimic Management** screen.

## Assign Mimics to Assets (Classic)

Assign a mimic to object types and objects.

[Import Mimics \(Classic\) \(on page 417\)](#).

When you assign a mimic to an object type, the mimic is assigned to all the objects that belong to the object type.

1. Go to **ADMIN > Visualizations > Designer**.
2. Select an item under the **Object Types** tab and perform these tasks:

<b>Details</b> tab	<ol style="list-style-type: none"> <li>a. Select a <b>Mimic</b> from the drop-down list to associate with this object type.</li> <li>b. Select <b>Save</b>.</li> </ol>
<b>Mimic Card</b> tab	<p>Mimic fields represent animation sources within a mimic. For example, <code>@Flow@</code> and <code>@OpenClose@</code> are mimic fields for displaying data for the <i>Suction Value</i> object type.</p> <p>Choose any of these:</p> <ul style="list-style-type: none"> <li>◦ On the <b>Mimic Binding</b> tab, for each <b>Mimic Field</b>, select a <b>Data Variable</b> from the drop-down list.</li> <li>◦ Select <b>Autobind</b> tab to allow automatic binding of data by matching the data variables to the mimic fields.</li> </ul> <p>For example, the <i>TPump</i> object type with <code>Flow</code> variable is auto binded to a picture representing a pump with the <code>@Flow@</code> animation.</p>

3. Repeat the steps to assign a mimic to another object type.

The selected mimic is assigned to the object type and their objects. You can choose to [override and assign a different mimic \(on page 418\)](#) for a particular object.

## Override an Assigned Mimic (Classic)

Assigning a new mimic to an object overrides the mimic assigned at the object type level.

A mimic is already assigned at the object type level, which applies to all the objects belonging to that type.

At runtime, the newly assigned mimic appears for the object instead of the mimic assigned for the object type.

1. Go to **ADMIN > Visualizations > Designer**.
2. Under **Objects**, select the object for which you want to modify the assigned mimic.

3. On the **Details** tab, for the **Mimic** field, select a different mimic from the drop-down list.
4. Select **Save**.

A new mimic is assigned to the object. The original mimic appears in the list with 'default' before its name, such as *Default - FWPS, Pump*.

## Set Up Mimic Target Zones (Classic)

Target zones represent areas on a mimic that were set as selectable in the HMI/SCADA system. You set the navigation of these target zones for an operator.

You define a target zone to navigate to any asset in the model and view historical data.

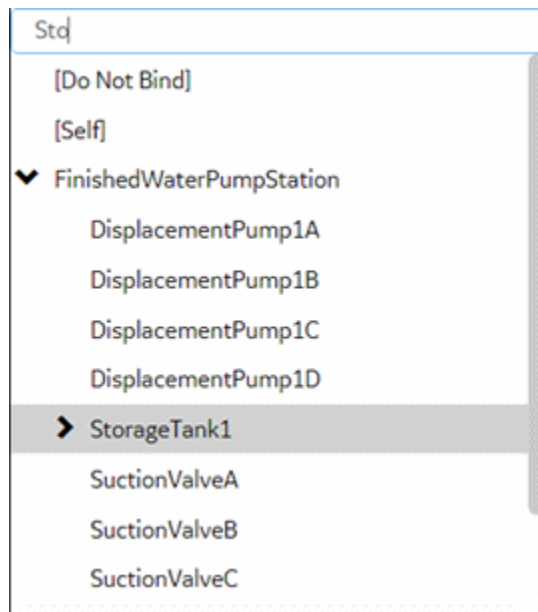


### Note:

These steps are also applicable for mimics bound at the asset level.

- In iFIX, set regions on a picture as *Is Selectable* to appear as clickable targets on the Mimic Card.
  - In CIMPLICITY, only groups with the mouse-up or mouse-down event show as selectable targets on the Mimic Card. When defining a mouse-up or mouse-down event for a group, you must specify the script action, and then create an empty script.
  - Assign the mimic to an asset type.
1. Go to **ADMIN > Visualizations > Designer**.
  2. Under **Object Types**, select an object type.
  3. For the selected item, go to **Mimic Card > Click Target Binding**.
  4. To enable an operator to navigate to a particular asset object in the model, do the following:

- a. In the **Referenced Object** column and next to the target name, select or search for the asset object in the model hierarchy tree. You can do a partial search, such as `Sto`, and Operations Hub highlights all assets containing `Sto`, as shown in this example.



- b. Select the related **Action** field and then **Navigate**.

In Runtime, the background of a target zone changes to blue when an operator hovers over it. After an operator selects a target on the mimic card, the target asset becomes the active one, changing the mimic and content in the trend and alarm cards accordingly.

5. Select **Save**.

## Data Sources

### About Data Sources

To create applications in Operations Hub, you can fetch data from the following sources:

- **Data stored in Operations Hub:** This data is created and stored in entities, which are database tables. To create data, you can:
  - Manually enter the data in an entity.
  - Import data using a Microsoft Excel spreadsheet.
  - Insert data into entities using insert queries, which you can create using Operations Hub.
  - Send data from an MQTT client to an M2M entity. In addition, you can also use pivot tables to send data dynamically.
  - Create an API that will work with the Operations Hub APIs to send data to an entity.

- **Data stored externally:** This data is stored in an external database, such as a Historian server. You can use this data in an Operations Hub application. To do so:
  1. Create a data source to provide the details of the external database whose data you want to use.
  2. Create a REST or SQL query to specify the expected inputs and outputs of a REST endpoint (as defined in the REST API) .
  3. Run the query to fetch the data from the external database.

**Note:**

The data will still be stored only in the external database; it will not be stored in Operations Hub.

## Access a Data Source (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

1. From the main navigation menu, select **DATASOURCES**.  
The **DATASOURCES** workspace appears, displaying a list of data sources.
2. Select the data source that you want to access.  
The data source appears.

## Create a Data Source (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

1. From the main navigation menu, select **DATASOURCES**.  
The **DATASOURCES** workspace appears, displaying a list of data sources.
2. Select **Add New Data Source**, and then enter values as specified in the following table.

Field Name	Description
Name	Enter a unique name for the data source.
Product	Select one these products for the data source: <ul style="list-style-type: none"> <li>◦ Proficy CIMPLICITY</li> <li>◦ Proficy Historian</li> <li>◦ Proficy iFIX</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>◦ OPC UA</li> <li>◦ Relational Database</li> <li>◦ REST API</li> <li>◦ Proficy Workflow</li> <li>◦ Proficy Batch</li> <li>◦ Plant Applications</li> </ul>
Description	Enter a brief description of the new data source.

3. For relational database, refer to [Add Relational Database Data Source \(Classic\) \(on page 422\)](#).
4. For Historian and REST API, refer to [Add Historian or Custom REST Data Source \(Classic\) \(on page 424\)](#).
5. For CIMPLICITY, iFIX, and OPC UA, refer to [Add a Data Source with OPC UA Configuration \(Classic\) \(on page 429\)](#).

You can also use MQTT as an OPC UA translator. The OPC UA client can read or write the data that has been translated from MQTT. For more information, refer to [MQTT documentation](#).

6. For Batch, refer to [Add a Batch Data Source \(Classic\) \(on page 436\)](#).
7. For Plant Applications, refer to [Add Plant Applications Data Source \(Classic\) \(on page 436\)](#).
8. Save the data source.

Save	Select to save the data source details and remain on the screen.
Save As New	Select to copy the details and save as a new data source.
Save And Exit	Select to save the data source details and exit the screen.



## Add Relational Database Data Source (Classic)

Creates a relational database data source.

[Provide a name, product, and description for your data source \(on page 421\)](#).

1. Select the check box for **Enable Relational Database Connection** and enter these details:

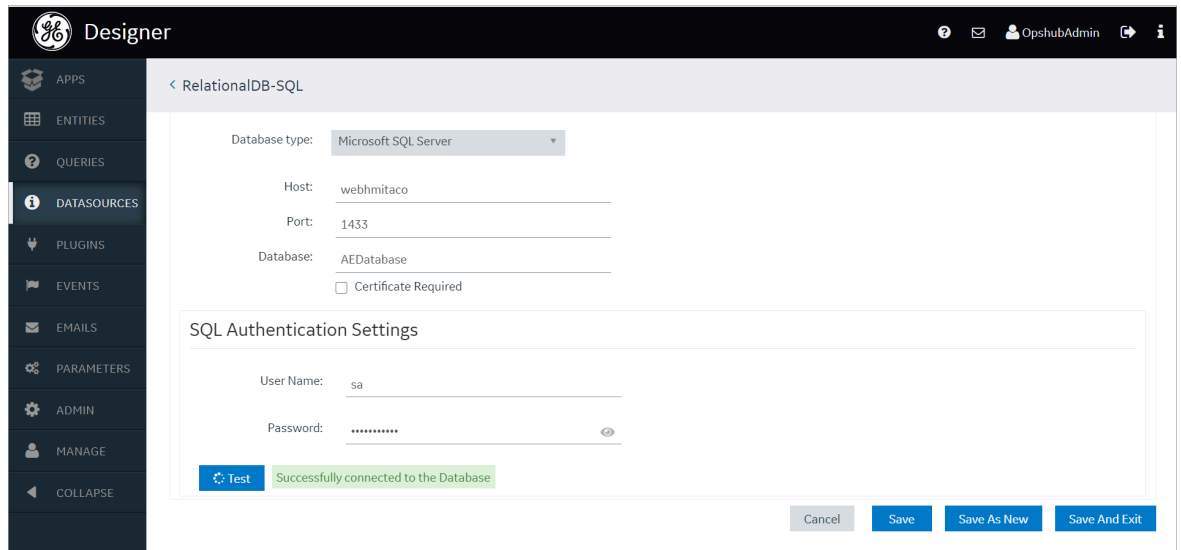
Field Name	Description
Database Type	Currently, Microsoft SQL Server is the only supported database type.
Host	Enter the IP address or host name of database server. <i>For example:</i> <i>10.181.213.211 or databaseserver01.</i>

Field Name	Description
	 <b>Note:</b> If using a SQL named instance, enter the host name in the format <code>ServerName\InstanceName</code> . <i>For example: databaseserver01\SQLEXPRESS.</i>
Port	Enter the port number to connect to the SQL Server.   <b>Note:</b> If using a SQL named instance, enter the exact port of the SQL named instance.
Database	Enter the database name to connect.
Certificate Required	Select the check box if connecting to the data source requires SSL certificates.  Select <b>Choose Certificate</b> to browse to your system and add certificates.

2. Provide SQL server authentication details:

Field Name	Description
User Name	Enter the user name for the database you want to access.
Password	Enter the password of the user configured in the database.
Test	Select to check whether the database connection is established using the server and authentication details.  A message confirms on a successful connection to the database.  If test fails, the message provides more details on the failure.

### A successful SQL Database



connection.

3. Select **Save**.

## Add Historian or Custom REST Data Source (Classic)

Creates a Historian or Custom REST data source.



Provide a name, product, and description for your data source *(on page 421)*.


1. Select the check box for **Enable System Connection** and provide these details to authenticate the Historian system API:



Field Name	Description
Hostname	Enter the hostname of the Historian data source.
Authentication Required	Select the check box if connecting to the data source requires authentication.  Enter the <b>Username</b> and <b>Password</b> of the user who can access the APIs.
Test	Select to verify the authentication details. A message appears, confirming whether connection to the system API is established.

2. Select the check box for **Enable REST Connection** and provide these details:



Field Name	Description
Base URL	<p>Enter the URL of the data source in the following format: https://&lt;host name or IP address of the data source&gt;:&lt;port number&gt;</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b> The port number should not be used if your data source is Historian 8.x.</p> </div>
REST Authentication Required	<p>Select the check box if authentication to a REST API is required. If selected, Operations Hub sends authorization details along with a request while connecting to a data source.</p>
Auth Type	<p>Appears when the <b>REST Authentication Required</b> check box is selected.</p> <p>Select one of the following types of authentication:</p> <ul style="list-style-type: none"> <li>◦ <b>Basic Auth:</b> Sends a verified user name and password along with the request.</li> <li>◦ <b>Bearer Token:</b> Sends an access key along with the request.</li> <li>◦ <b>OAuth:</b> Retrieves an access key to access an API, and then uses the key to authenticate future requests.</li> </ul> <div style="border: 1px solid #ffc000; border-radius: 10px; padding: 10px; background-color: #fff9c4;"> <p> <b>Important:</b> For connecting to a Custom REST data source such as eAndon, select <b>OAuth</b> for authentication.</p> </div> <p>Depending on the authentication type you select, a few boxes appear.</p>
Auth Token	<p>Appears when the <b>Bearer Token</b> authentication type is selected.</p> <p>Enter the access key required to authenticate the APIs. The access key is included in the request header.</p>
Auth Grant Type	<p>Appears when the <b>OAuth</b> authentication type is selected.</p> <p>Select one of the following types of granting the authentication:</p> <ul style="list-style-type: none"> <li>◦ <b>client_credentials</b></li> <li>◦ <b>password</b></li> </ul>

Field Name	Description
Auth URL	<p>Enter the URL for the endpoint of the authentication server. This value is used to exchange the authorization code for an access token.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b></p> <p>In the following cases, you must add the IP address to the list of supported subdomains/zones:</p> <ul style="list-style-type: none"> <li>◦ entering an IP address instead of a hostname results in a 404 error.</li> <li>◦ application needs to use an IP address, and no additional hostname or IP was provided during installation.</li> </ul> <p>If using an IP address in the URL, then follow the steps outlined below:</p> <ol style="list-style-type: none"> <li>a. Browse to the location directory on the machine where Operations Hub is installed: <code>..\ProgramData\GE\Operations Hub\uaa-config</code></li> <li>b. Open the <code>uaa.yml</code> file in a text editor.</li> <li>c. Search for the keyword <code>hostnames</code> in the file and enter the IP address.</li> <li>d. Save and close <code>uaa.yml</code>.</li> <li>e. Restart Proficity Authentication to apply the changes.</li> </ol> </div>
Auth Client Id	<p>Appears when the <b>OAuth</b> authentication type is selected.</p> <p>The client identifier issued to the client during the application registration process.</p>
Auth Client Secret	<p>Appears when the <b>OAuth</b> authentication type is selected.</p> <p>The client secret issued to the client during the application registration process.</p>
Ignore TLS/SSL	<p>Select the check box if verifying SSL certification can be ignored. Normally, this check box is cleared when using the data source in a production environment, which implies that SSL certification will be verified while connecting to the data source. If, however, you want to troubleshoot issues with connecting to a data source, you may select this check box to isolate certification issues.</p>

Field Name	Description
Certificate Required	<p>Select the check box if connecting to the data source requires SSL certificates.</p> <p>Select <b>Choose Certificate</b> to browse to your system and add certificates.</p>
Auth Certificate	<p>If you want to provide a certificate for authentication, select <b>Choose Certificate</b> and navigate to the certificate. Alternatively, you can select the <b>Use Datasource Certificate</b> check box if you want to use the same certificate that is used by the data source.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> You can use certificates only in the base-64-encoded format. A DER-encoded certificate is not supported.</p> </div>
Test	<p>Select to test the connection. A message appears, confirming whether token from the OAuth data source is retrieved. The connection is tested using the authentication details of the REST APIs, including the authentication URL; the data source base URL is not used.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> You can create multiple data sources with the same URL. After you restart the services, the Data Distributor service uses the most recently saved System API authentication settings for the URL. Therefore, if the most recently saved credentials do not work, you cannot connect to the data source. To fix this issue, modify the data source to specify working credentials, and then test the data source. We recommend that you do not save the data sources that do not pass the test or data sources with the same URL.</p> </div>

### 3. Select **Save**.

Look at the following examples for configuring a data source for Historian 7.x and Historian 8.x.

Historian 7.x requires entry of port used – in this instance, port 8443 – whereas Historian 8.x does not require any port to be specified.

The Auth Client ID is admin for Historian 7.x, whereas Historian 8.x requires the Auth Client ID to be of the form `MachineName.admin`, where MachineName is case sensitive.

**Example of Historian 7.2 Data Source:**

Name:

Product: Proficy Historian ▼

Description:

---

**Enable System Connection** - This connection is used for trending.

Hostname:

Authentication Required

Username:

Password:  👁

🔄 Test

---

**Enable REST Connection** - This connection is used for queries.

Base URL:

REST Authentication Required

Ignore TLS/SSL

Certificate Required

Cancel Save

**Example of Historian 8 Data Source:**

< HistorianServer

Name:

Product: Profcy Historian

Description:

---

**Enable System Connection** - This connection is used for trending. ①

Hostname:

Authentication Required

Username:

Password:

---

**Enable REST Connection** - This connection is used for queries. ①

Base URL:

Auth Type: OAuth

REST Authentication Required

Ignore TLS/SSL

Certificate Required

Certificate:  WebHMITacoRoot.cer

Auth URL:

Auth Client Id:

Auth Client Secret:

**Note:**

The Auth Client ID field is case sensitive. For example, if the Historian server name is `hist8Server`, the user must use `hist8Server.admin` and not `HIST8Server.admin` or `Hist8Server.admin`, otherwise REST authentication will fail.

## Add a Data Source with OPC UA Configuration (Classic)


Creates a data source with OPC UA configuration.

Provide a name, product, and description for your data source (on page 421).

You cannot add multiple data sources to use the same database connection. Make sure that the Endpoint URL and Application URI configuration is unique to every data source.

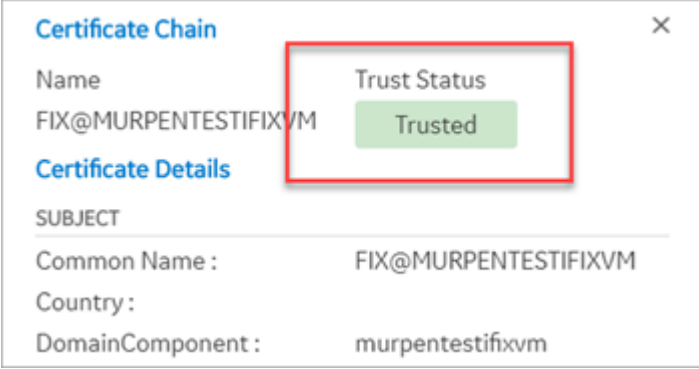
1. If you selected Proficy iFIX, Proficy CIMPLICITY, or OPC UA as the product, provide these details to **Enable OPC UA Connection.**


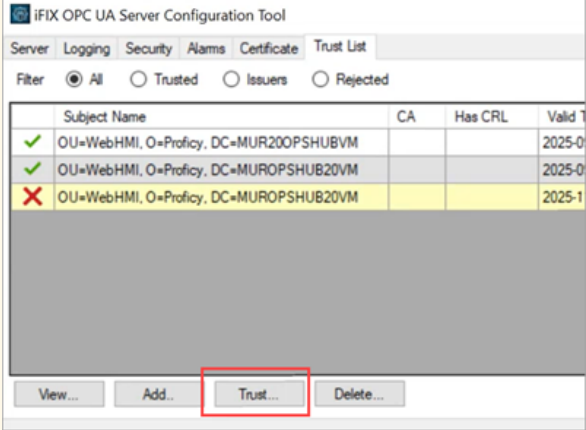
Field Name	Description
Endpoint URL	<p>Enter the machine name and port number to connect to an OPC UA server. For example: <code>opc.tcp://MyServer:51400</code>.</p> <p>In iFIX, you can copy the URL from here:</p> <ul style="list-style-type: none"> <li>◦ <b>Applications &gt; OPC UA Configuration</b> screen.</li> </ul> <p>In CIMPLICITY, you can copy the URL from here:</p> <ul style="list-style-type: none"> <li>◦ <b>Project &gt; Properties</b> screen.</li> </ul>
Discover policies	<p>Select to discover and display all the security profiles supported by the OPC UA server to establish a secure connection. The display list is based on the entered endpoint URL; the security modes and policies supported by either iFIX, CIMPLICITY, or IGS.</p> <div style="border: 1px solid gray; padding: 10px;"> <p>Choose a server endpoint for <span style="float: right;">✕</span></p> <p><code>opc.tcp://murpentestifixvm:51400</code></p> <ul style="list-style-type: none"> <li><input type="radio"/> Basic128Rsa15 - Sign</li> <li><input type="radio"/> Basic128Rsa15 - SignAndEncrypt</li> <li><input checked="" type="radio"/> Basic256 - Sign</li> <li><input type="radio"/> Basic256 - SignAndEncrypt</li> <li><input type="radio"/> None - None</li> <li><input type="radio"/> Basic256Sha256 - Sign</li> <li><input type="radio"/> Basic256Sha256 - SignAndEncrypt</li> <li><input type="radio"/> Aes128_Sha256_RsaOaep - Sign</li> <li><input type="radio"/> Aes128_Sha256_RsaOaep - SignAndEncrypt</li> <li><input type="radio"/> Aes256_Sha256_RsaPss - Sign</li> <li><input type="radio"/> Aes256_Sha256_RsaPss - SignAndEncrypt</li> </ul> <p style="text-align: right;"> <input type="button" value="Cancel"/> <input type="button" value="Apply"/> </p> </div>

Field Name	Description
	From the discovered list for the endpoint URL, select the security profile you want to use for this connection, then select <b>Apply</b> .
Application URI	This field is auto populated after defining a security profile for the OPC UA server.
Security Mode	<p>This field is auto populated after defining a security profile for the OPC UA server.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> If security mode is <code>None</code>, the connection is not secured. This is acceptable if you simply want to test a connection. Make sure to change this setting later to ensure that you have adequate security enabled for your connections.</p> </div>
Security Policy	This field is auto populated after defining a security profile for the OPC UA server.
View Certificate	<p>For a secured connection, security certificates must be exchanged between Operations Hub and the OPC UA server.</p> <p>Select to view the OPC UA server certificate, and if <code>Untrusted</code>, select <b>Trust</b>.</p>

Field Name	Description																																
	<div style="border: 1px solid black; padding: 10px;"> <p><b>Certificate Chain</b> <span style="float: right;">×</span></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Name</td> <td style="width: 50%;">Trust Status</td> </tr> <tr> <td>FIX@MURPENTESTIFIXVM</td> <td style="text-align: center; background-color: #f8d7da;">Untrusted</td> </tr> </table> <p><b>Certificate Details</b></p> <p><b>SUBJECT</b></p> <hr/> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Common Name :</td> <td style="width: 50%;">FIX@MURPENTESTIFIXVM</td> </tr> <tr> <td>Country :</td> <td></td> </tr> <tr> <td>DomainComponent :</td> <td>murpentestifixvm</td> </tr> <tr> <td>Locality :</td> <td></td> </tr> <tr> <td>Organization :</td> <td>MyCompany</td> </tr> <tr> <td>Organization Unit :</td> <td>iFIX</td> </tr> </table> <p><b>ISSUER</b></p> <hr/> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Common Name :</td> <td style="width: 50%;">FIX@MURPENTESTIFIXVM</td> </tr> <tr> <td>Country :</td> <td></td> </tr> <tr> <td>DomainComponent :</td> <td>murpentestifixvm</td> </tr> <tr> <td>Locality :</td> <td></td> </tr> <tr> <td>Organization :</td> <td>MyCompany</td> </tr> <tr> <td>Organization Unit :</td> <td>iFIX</td> </tr> </table> <p><b>VALIDITY</b></p> <hr/> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Valid From :</td> <td style="width: 50%;">2020-11-03T11:44:41.000Z</td> </tr> <tr> <td>Valid To :</td> <td>2025-11-02T11:44:41.000Z</td> </tr> </table> <div style="text-align: right; margin-top: 10px;"> <span style="background-color: #6c757d; color: white; padding: 5px 15px; border: 1px solid #6c757d;">Cancel</span> <span style="background-color: #007bff; color: white; padding: 5px 15px; border: 1px solid #007bff; margin-left: 10px;">Trust</span> </div> </div> <p>The server certificate gets added to the <code>C:\ProgramData\GE\Operations Hub\pki\trusted\certs</code> folder in your machine running Operations Hub.</p> <p>The certificate status now appears as <code>Trusted</code>.</p>	Name	Trust Status	FIX@MURPENTESTIFIXVM	Untrusted	Common Name :	FIX@MURPENTESTIFIXVM	Country :		DomainComponent :	murpentestifixvm	Locality :		Organization :	MyCompany	Organization Unit :	iFIX	Common Name :	FIX@MURPENTESTIFIXVM	Country :		DomainComponent :	murpentestifixvm	Locality :		Organization :	MyCompany	Organization Unit :	iFIX	Valid From :	2020-11-03T11:44:41.000Z	Valid To :	2025-11-02T11:44:41.000Z
Name	Trust Status																																
FIX@MURPENTESTIFIXVM	Untrusted																																
Common Name :	FIX@MURPENTESTIFIXVM																																
Country :																																	
DomainComponent :	murpentestifixvm																																
Locality :																																	
Organization :	MyCompany																																
Organization Unit :	iFIX																																
Common Name :	FIX@MURPENTESTIFIXVM																																
Country :																																	
DomainComponent :	murpentestifixvm																																
Locality :																																	
Organization :	MyCompany																																
Organization Unit :	iFIX																																
Valid From :	2020-11-03T11:44:41.000Z																																
Valid To :	2025-11-02T11:44:41.000Z																																




Field Name	Description
	<div><p>The screenshot shows a 'Certificate Chain' dialog box with a close button (X) in the top right. The 'Name' field contains 'FIX@MURPENTESTIFIXVM'. Below it, the 'Trust Status' is shown as 'Trusted' in a green box. Underneath, there is a 'Certificate Details' section with a 'SUBJECT' header. The details listed are: 'Common Name : FIX@MURPENTESTIFIXVM', 'Country :', and 'DomainComponent : murpentestifixvm'.</p></div> <p>Select <b>Cancel</b> to close the trusted server certificate screen.</p> <div><p><b>!</b> <b>Important:</b></p><p>Operations Hub client certificate must also be trusted on the OPC UA server (iFIX, CIMPLICITY, IGS) to establish a secured connection.</p><ul style="list-style-type: none"><li>◦ To trust the certificate on the CIMPLICITY server,<ol style="list-style-type: none"><li>a. Start the CIMPLICITY project.</li><li>b. Attempt to connect via the Data source dialog box.</li><li>c. Trust the certificate on the Data source dialog box.</li><li>d. Go to the CIMPLICITY project's <code>\pki\rejected\certs</code> folder, and copy the rejected certificate to the <code>\pki\trusted\certs</code> folder.</li><li>e. Test the connection again; it should now work.</li></ol></li><li>◦ To trust the certificate on the iFIX server,<ol style="list-style-type: none"><li>a. Access the iFIX OPC UA Server Configuration Tool dialog box.</li><li>b. On the <b>Trust List</b> tab, select the failed entry and trust it.</li></ol></li></ul></div>

Field Name	Description
	<div style="background-color: #ffffcc; padding: 10px;">   <p>The failed entry appears when you attempt to test the connection in Operations Hub client.</p> <p>Another option is to directly copy the Operations Hub certificate from the client location (<code>C:\ProgramData\GE\Operations Hub\pki\own\certs</code>) to server location (<code>\pki\trusted\certs</code>).</p> <p>Ensure that you modify the certificate file name if you plan to copy more than one Operations Hub certificate to the CIMPLICITY trusted folder, to avoid replacing the already trusted clients.</p> </div>

2. Select the authentication type for read and write access to the database.

It is recommended that you select Username/Password to provide the highest level of encryption. Anonymous does not provide any protection for accessing data or login.

Field Name	Description
Read	To authenticate read access: <ul style="list-style-type: none"> <li>◦ Select <b>User Name/Password</b> and enter the credentials in the text field.</li> <li>◦ Enter the user name to connect to the OPC UA server (iFIX, CIMPLICITY, IGS).</li> <li>◦ Enter the password for the user name to connect to the OPC UA server.</li> </ul>
Write	To authenticate write access:

Field Name	Description
	<ul style="list-style-type: none"> <li>◦ Select <b>Logged On User Token</b> if you want to use token-based authentication.</li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin: 10px 0;">  <b>Note:</b>            To validate tokens, make sure to configure the OPC UA server with Proficiency Authentication (UAA).         </div> <ul style="list-style-type: none"> <li>◦ Select <b>User Name/Password (provided by user)</b> if you want to enter credentials to authenticate.</li> <li>◦ Select the check box for <b>Use Read Credentials for Write</b> to use the same user name and password that you provided for read access.</li> </ul>
Test Connection	<p>Select to test the OPC UA connection. If the details provided to establish the connection are correct, a message appears confirming the successful connection.</p> <p>To troubleshoot connection related issues, refer to <a href="#">Error Messages (on page 895)</a>.</p>

3. Select **Save**.

Name:

Product:

Description:

---

**Enable OPC UA Connection**

Endpoint URL:

Application URI:

Security Mode:

Security Policy:  [Discover Policies](#)

[View Certificate](#)

### Authentication

**Read**

Anonymous  User Name/Password

User Name:

Password:  👁

[Test Connection](#)

**Write**

Use Read Credentials for Write

Logged On User Token  User Name/Password (provided by user)

[Cancel](#)
[Save](#)
[Save As New](#)
[Save And Exit](#)

## Add a Batch Data Source (Classic)

Steps for Operations Hub classic version.

Provide a name, product, and description for your data source *(on page 421)*.

1. Select the check box for **Enable Batch Connection**.
2. Enter the **Endpoint URL** of the Batch server you want to access.  
Only REST URLs are allowed. For example, `https://perfbatch2vm:4867/BatchRESTAPI`. The host name is the machine where you installed the Proficy Batch application.
3. Select **Save And Exit**.



## Add Plant Applications Data Source (Classic)

Creates a Plant Applications data source.

Provide a name, product, and description for your data source (on page 421).

Plant Applications is a combination of relational database system and REST connections.

1. If you selected Plant Applications as the product, then enter these details for **Enable Relational Database Connection**.


Field Name	Description
Database Type	Currently, Microsoft SQL Server is the only supported database type.
Host	<p>Enter the IP address or host name of database server. <i>For example:</i> 10.181.213.211 or databaseserver01.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> If using a SQL named instance, enter the host name in the format <code>ServerName\InstanceName</code>. <i>For example:</i> databaseserver01\SQLEXPRESS.</p> </div>
Port	<p>Enter the port number to connect to the SQL Server.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> If using a SQL named instance, enter the exact port of the SQL named instance.</p> </div>
Database	Enter the database name to connect.
Certificate Required	<p>Select the check box if connecting to the data source requires SSL certificates.</p> <p>Select <b>Choose Certificate</b> to browse to your system and add certificates.</p>


2. Enter these details for **SQL Authentication Settings**.


Field Name	Description
User Name	Enter the user name for the database you want to access.
Password	Enter the password of the user configured in the database.
Test	Select to check whether the database connection is established using the server and authentication details.

Field Name	Description
	A message confirms on a successful connection to the database.  If test fails, the message provides more details on the failure.

3. Enter these details for **Enable REST Connection**.

Field Name	Description
Base URL	Enter the URL of the data source in the following format: <code>https://&lt;host name or IP address of the data source&gt;:&lt;port number&gt;</code>
REST Authentication Required	Select the check box if authentication to a REST API is required. If selected, Operations Hub sends authorization details along with a request while connecting to a data source.
Auth Type	<p>Appears when the <b>REST Authentication Required</b> check box is selected.</p> <p>Select one of the following types of authentication:</p> <ul style="list-style-type: none"> <li>◦ <b>Basic Auth</b>: Sends a verified user name and password along with the request.</li> <li>◦ <b>Bearer Token</b>: Sends an access key along with the request.</li> <li>◦ <b>OAuth</b>: Retrieves an access key to access an API, and then uses the key to authenticate future requests.</li> </ul> <div style="border: 1px solid orange; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Important:</b> For connecting to a Custom REST data source such as eAn- don, select <b>OAuth</b> for authentication.</p> </div> <p>Depending on the authentication type you select, a few boxes appear.</p>
Auth Token	<p>Appears when the <b>Bearer Token</b> authentication type is selected.</p> <p>Enter the access key required to authenticate the APIs. The access key is included in the request header.</p>
Auth Grant Type	<p>Appears when the <b>OAuth</b> authentication type is selected.</p> <p>Select one of the following types of granting the authentication:</p>

Field Name	Description
	<ul style="list-style-type: none"> <li>◦ <b>client_credentials</b></li> <li>◦ <b>password</b></li> </ul>
Auth URL	Enter the URL for the endpoint of the authentication server. This value is used to exchange the authorization code for an access token.
Auth Client Id	<p>Appears when the <b>OAuth</b> authentication type is selected.</p> <p>The client identifier issued to the client during the application registration process.</p>
Auth Client Secret	<p>Appears when the <b>OAuth</b> authentication type is selected.</p> <p>The client secret issued to the client during the application registration process.</p>
Ignore TLS/SSL	Select the check box if verifying SSL certification can be ignored. Normally, this check box is cleared when using the data source in a production environment, which implies that SSL certification will be verified while connecting to the data source. If, however, you want to troubleshoot issues with connecting to a data source, you may select this check box to isolate certification issues.
Certificate Required	<p>Select the check box if connecting to the data source requires SSL certificates.</p> <p>Select <b>Choose Certificate</b> to browse to your system and add certificates.</p>
Auth Certificate	<p>If you want to provide a certificate for authentication, select <b>Choose Certificate</b> and navigate to the certificate. Alternatively, you can select the <b>Use Datasource Certificate</b> check box if you want to use the same certificate that is used by the data source.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> You can use certificates only in the base-64-encoded format. A DER-encoded certificate is not supported.</p> </div>
Test	Select to test the connection. A message appears, confirming whether token from the OAuth data source is retrieved. The connection is test-

Field Name	Description
	<p>ed using the authentication details of the REST APIs, including the authentication URL; the data source base URL is not used.</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b></p> <p>You can create multiple data sources with the same URL. After you restart the services, the Data Distributor service uses the most recently saved System API authentication settings for the URL. Therefore, if the most recently saved credentials do not work, you cannot connect to the data source. To fix this issue, modify the data source to specify working credentials, and then test the data source. We recommend that you do not save the data sources that do not pass the test or data sources with the same URL.</p> </div>

4. Select **Save**.

Product: Plant Applications

---

**Enable Relational Database Connection** - Connect to a relational database. Can be used in queries.

Database type: Microsoft SQL Server

Host: Cardinal

Port: 1433

Database: OpHubtesting

Certificate Required

---

**SQL Authentication Settings**

User Name: sa

Password: \*\*\*\*\*

Test Successfully connected to the Database

---

**Enable REST Connection**

Base URL: https://webhitaco:444

Auth Type: OAuth

Auth URL: https://webhitaco:444/uaa/oauth/token

REST Authentication Required

Ignore TLS/SSL

Certificate Required

Auth Grant Type: client\_credentials

Auth Client Id: WebHMTaco.admin

Auth Client Secret: \*\*\*\*\*

Test Successfully connected to authentication endpoint



## Rename a Data source (Classic)

Data source aliasing is necessary for renaming a data source.

- After upgrading from Operations Hub 2.0, resave all the queries and their respective pages. This practice directs them to use the data source aliasing instead of the machine name. This also ensures that the queries and pages created in 2.0 are compatible with renaming data sources in the current version.
- If [importing an application \(on page 278\)](#) that was exported from version 2.0, resave all the queries and pages after importing to the upgraded version of Operations Hub.

1. From the main navigation menu, select **DATASOURCES**.

The **DATASOURCES** workspace appears, displaying a list of data sources.

2. Select the data source that you want to rename.

The data source appears.

3. Enter the new name for the data source in the **Name** text box.

The new name must be a unique name.

4. Select **Save**.

The data source is successfully renamed.

In case you want to [export an application \(on page 274\)](#) after renaming a data source, save all the associated queries and pages before application export. The application and the queries have references to the renamed data source.


## Delete a Data Source (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

1. From the main navigation menu, select **DATASOURCES**.

The **DATASOURCES** workspace appears.

2. Select , and then select **Delete**.

A message appears, asking you to confirm that you want to delete the data source.

3. Select **Delete**.

The data source is deleted.

## Browse Data Sources (Classic)


Allows to browse a data source and select the properties or tags.

Log in to Operations Hub.



1. From the **select** drop-down, select a server alias and its data source to browse through the server properties and tag IDs.



Data Source	Description
Assets / Objects	This is the asset model configured in the system. You can browse through the asset hierarchy, and add properties to the trend chart from any hierarchy level. You can add or remove data variables of the asset from the trend chart.
Historian	The Historian servers configured in the system. You can browse through the servers for tags that you want to add to the widgets.
Proficy iFIX	The iFIX servers configured in the system. You can browse through the servers for tags that you want to add to the widgets.
Proficy CIMPLICITY	The CIMPLICITY servers configured in the system. You can browse through the servers for tags that you want to add to the widgets.
OPC UA	The OPC UA servers configured in the system. You can browse through the servers for tags that you want to add to the widgets.

A list of server nodes appear in a tree structure. For the Historian data source, a list of native tags from the data source appear.

2. Expand the tree structure and select the check box for only value  to pull data from the data source.

The tree structure is made up of nodes, each with a unique NodeID.

Icon	Description
	Objects are assets from a data source. The Alarms folder contains alarm area nodes.
	Servers

Icon	Description
	Data arrays
	The Tags folder provides access to the tag types and fields. Each tag has a value node, which represents the current value of the tag.

- For Historian, you can [search and select \(on page 445\)](#) from the list of native tags.
- Save or close the screen.

The selected properties or tags are applied.

## Create a SQL Data Source (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

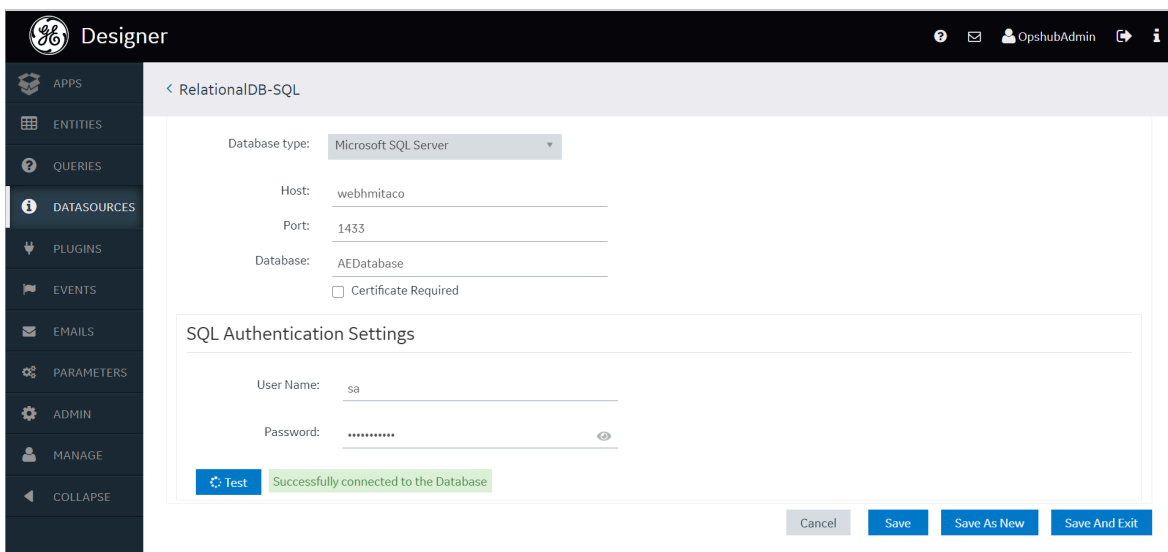
- From the main navigation menu, select **DATASOURCES**.  
The **DATASOURCES** workspace appears, displaying a list of data sources.
- Select **Add New Data Source**, and then enter values as specified in the following table.

Field Name	Description
<b>Name</b>	Enter the unique name of the data source.
<b>Description</b>	Enter the description of the data source.
<b>Datasource Type</b>	Select <b>Relational Database</b> .
<b>Database Type</b>	Observe that this field defaults to Microsoft SQL Server, currently the only supported database type.
<b>Host</b>	Enter the IP address or host name of database server. <i>For example:</i> <i>10.181.213.211 or databaseserver01.</i>  This field only appears if you select Relational Database as the Data-source Type.
<b>Port</b>	Enter the port you want to use to connect to the SQL Server.  This field only appears if you select Relational Database as the Data-source Type.
<b>Database</b>	Enter the database name that you want to connect to.

Field Name	Description
	This field only appears if you select Relational Database as the Data-source Type.
<b>Certificates Required</b>	Select the check box if connecting to the data source requires SSL certificates. If you select this check box, the <b>Choose Certificate</b> button appears, allowing you to select the certificate.
<b>User Name</b>	In the SQL Authentication section, provide the user name for the database you want to access.
<b>Password</b>	In the SQL Authentication section, provide the password of the user configured in the database.
<b>Test button</b>	<p>After the required fields are filled in, click the <b>Test</b> button.</p> <p>On a successful connection check, a message is shown beside the Test button as "Successfully connected to the Database" indicating that test connection to database can be established using the above details.</p> <p>If it fails, it reads: "Failed to connect to the Database. More Details." Click the "More Details" link to view detailed reason in a pop-up.</p>

3. Select the **Test** button.

The following example shows a successful SQL Database connection.



If it fails, a message appears stating: Failed to connect to the Database. Click on **More Details** link to view detailed reason in a popup.

4. Select **Save**.

## Search for Tags (Classic)

Allows to search for tags by tag name and description.

Log in to Operations Hub.

1. Enter a keyword in **Search** and select  .





**Tip:**

You can also perform a wild card search by entering \*.

By default, only tags that match the keyword in their name and description are displayed.

2. To streamline your search, use these options:

Field Name	Description
Tag name	This is the default search filter. Select the check box to match the keyword only to tag names.  Additionally, to view the description for tags returned in keyword search, select  next to <b>Description</b> .
Description	Select the check box to match the keyword only to tag descriptions.  Additionally, to view the names of tags returned in keyword search, select  next to <b>Tag name</b> .
Both	Select the check box to match the keyword with tag name or description, and return results.

# Pages

## About Pages

Using Operations Hub, using the application editor, you can create pages that appear in an application. You can use pages in multiple ways, such as:

- Display information to users in the application. Information can be displayed in plain text or using multiple components, such as tables, images, graphs, and other components.
- Display a form to allow application users to enter or modify data. Forms can include items such as text, numbers, dates, times, and uploaded images from a mobile device.
- Allow application users to control assets by sending commands via MQTT or REST services.

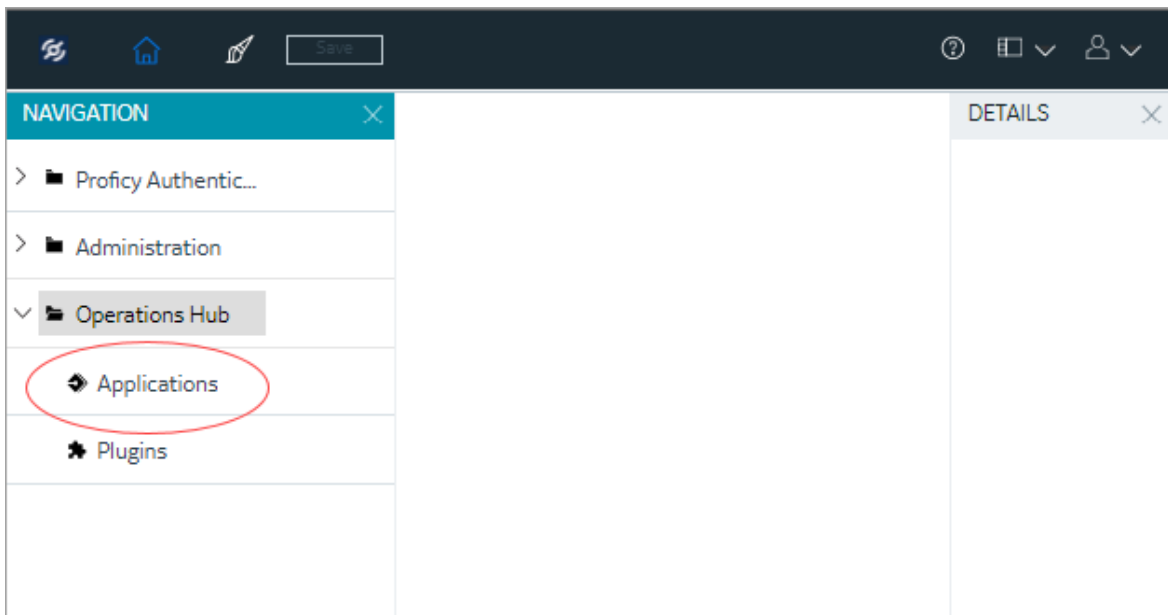
## Grant Group Access to Page within an Application

Steps to grant group access to a page in the latest version of Operations Hub.

Log in to Configuration Hub.

For steps to grant group access to a page in the Operations Hub classic version, refer to [Grant Group Access to Page within an Application \(Classic\) \(on page 447\)](#).

1. On the navigation panel, select **Operations Hub > Applications**.



The existing list of applications and their pages appear.

2. Select the page to which you want to grant access.

The page details appear on the details panel.

3. On the details panel, pop open **GROUPS**.

The **Manage Page Permissions** screen appears.

4. Select group/s and apply to the page.

Field Name	Description
Search	Enter keywords to search for specific group/s.
Only GE Groups	Select to show only GE groups.
Selected Groups	You can do the following: <ul style="list-style-type: none"> <li>◦ Sort groups by ascending/descending order.</li> <li>◦ Select individual groups, or all groups at once.</li> </ul>
Child Group	Displays the child group, if exists.

The selected groups can now access the page. Please note these users must already have the ability to access the app.

## Grant Group Access to Page within an Application (Classic)

Steps to grant group access to a page in the Operations Hub classic version.

Log in to Operations Hub.

For steps to grant group access to a page in the latest version of Operations Hub, refer to [Grant Group Access to Page within an Application \(on page 446\)](#).

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import

1 Quick Filter

<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	

- In the **Name** column, select the application to which you want to grant access.  
The **PAGES** workspace appears, including a column summarizing the current page permissions. By default, newly created pages display “All users”, indicating all users who have access to the application will have access to the page.
- In the **Permissions** column, select the page to which you wish to grant access.  
The page permission dialog appears.
- In the **Manage Page Permissions** dialog box, if you wish to grant visibility to select groups only, select the “Selected Groups” option.
- In the groups field, select the group or groups you would like to grant access to this page and then select **Submit changes**.  
The selected groups can now access the page. Please note these users must already have the ability to access the app.
- In each row containing an application user to whom you want to grant access, select the check box, and then select **Submit changes**.



The selected users can now access the application.



**Note:**

It is possible to create a circular reference by nesting a parent group into its child. If there are circular references, the child groups will not display in the permissions dialog box.

## Access a Page (Classic)

Steps to access a page in the Operations Hub classic version.

Log in to Operations Hub.

To access application pages in the latest version of Operations Hub, refer to [Navigation Panel \(on page 214\)](#).

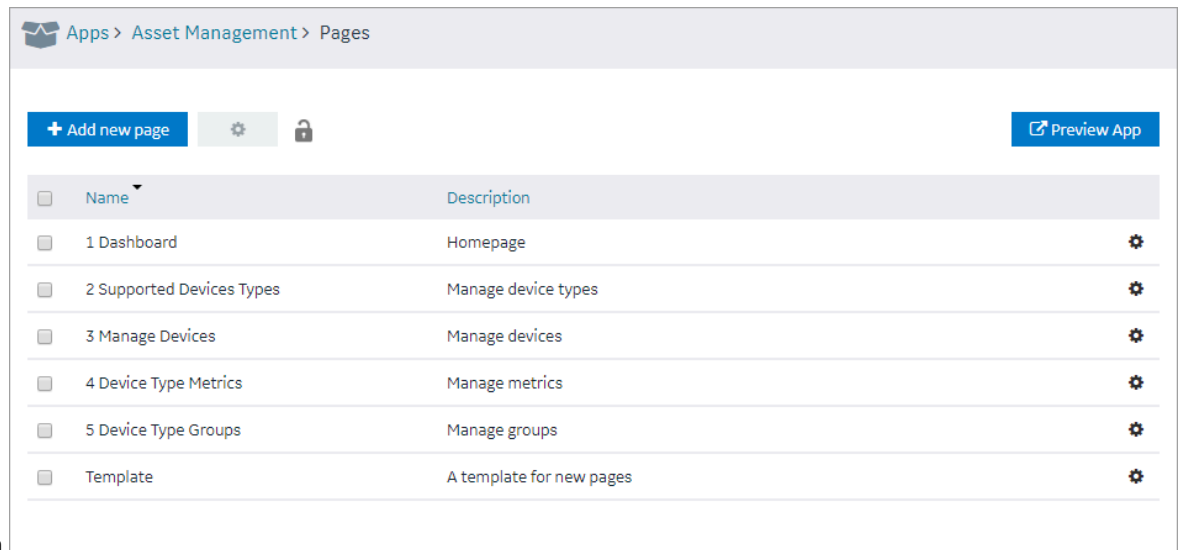
1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears, displaying a list of applications created in the site.

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/>	ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/>	ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/>	Store Temp App	temp	2 months ago by Docs Team	

2. In the **Name** column, select the application that contains the page that you want to access.

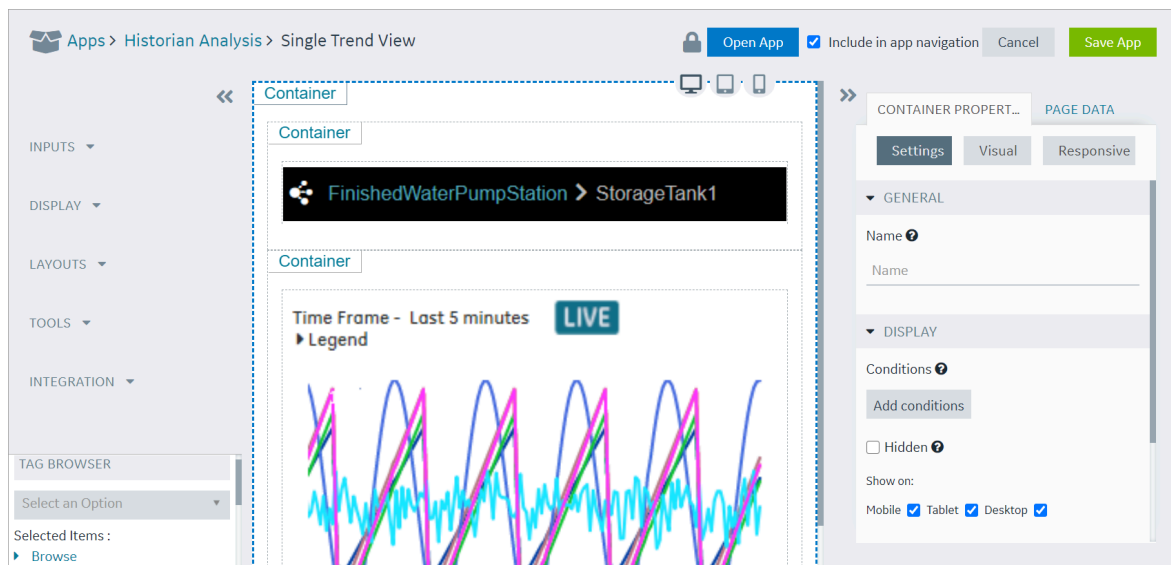
The **PAGES** workspace appears, displaying a list of pages created in the



application.

3. In the **Name** column, select the page that you want to access.

The page designer appears, displaying the elements in each container in the page.



**Tip:**

If needed, you can add or remove components from a container in the page, or modify the properties of a container (on page 824), and then select **Save App** to save your changes.

## Create a Page

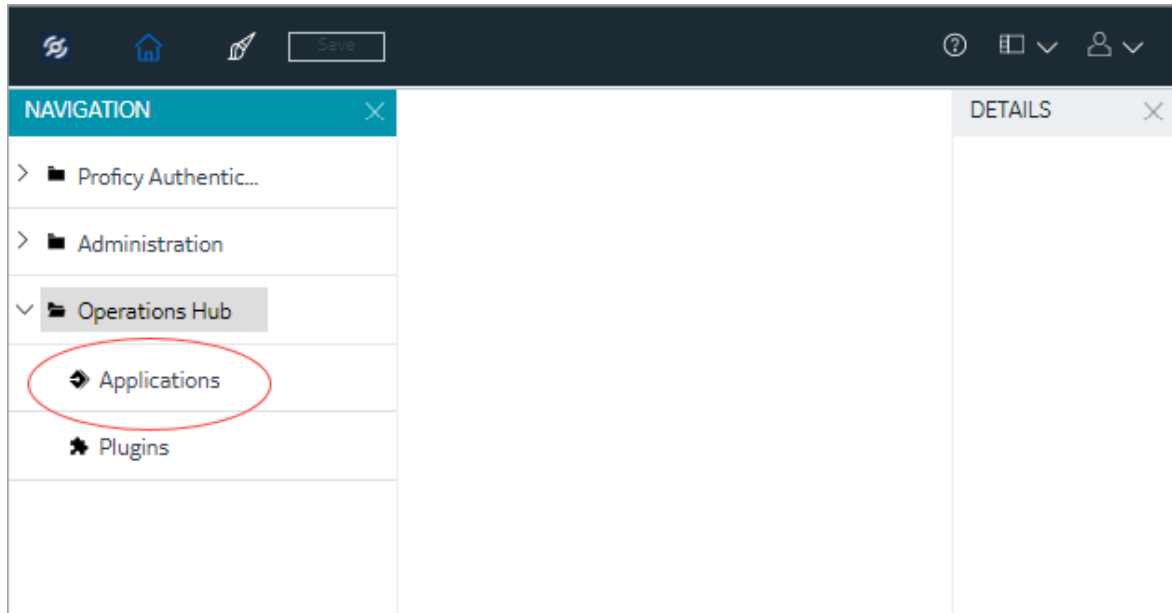
Steps to create a page in the latest version of Operations Hub.

Log in to Configuration Hub.

When you create an application in the latest version of Operations Hub, a default first page is also created. The following steps show you how to create additional pages for an application.


For steps to create pages in the Operations Hub classic version, refer to [Create a Page \(Classic\)](#) (on page 453).

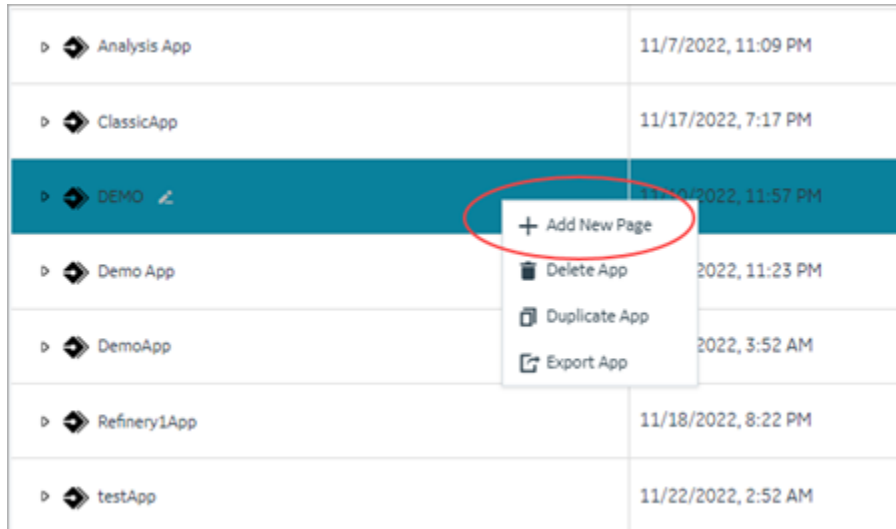
1. On the navigation panel, select **Operations Hub > Applications**.



The existing list of applications appear.

2. For the application you want to create a new page:

- Select  > **Add New Page**
- Right-click and select **Add New Page**.



The **Create Page** screen appears.

3. Enter the following field values:

Field Name	Description
PAGE NAME	Name of your application page.  The name must contain at least one uppercase or lowercase letter.
DESCRIPTION	Brief description of your page.
LAYOUT	Based on your page design requirements, select a layout. <ul style="list-style-type: none"> <li>◦ <a href="#">Grid (on page 239)</a></li> <li>◦ <a href="#">Flexbox (on page 240)</a></li> <li>◦ <a href="#">Coordinate (on page 248)</a></li> </ul>

4. Select **Add**.

**Create Page**

PAGE NAME  
Pump\_02

DESCRIPTION  
Water Station

LAYOUT  
Grid

Cancel Add

The page is created and a blank page designer screen appears. Refer to [Panels Layout \(on page 213\)](#).

- From the components panel **Visuals** tab, drag-and-drop or double-click the plug-ins you want to add to the page designer area, and configure their properties.  
See [Visuals Tab \(on page 220\)](#)
- From the components panel **Data** tab, bind data to the plug-ins.  
See [Data Tab \(on page 224\)](#)
- On the toolbar, select **Save**.

## Create a Page (Classic)

Steps to create a page in the Operations Hub classic version.

Log in to Operations Hub.

For steps to create pages in the latest version of Operations Hub, refer to [Create a Page \(on page 450\)](#).

- In the main navigation menu, select **APPS**.  
The **APPS** workspace appears, displaying a list of applications created in the site.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import [Settings] << < 1 > >> Quick Filter

<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	

- In the **Name** column, select the application in which you want to create a page.  
The **PAGES** workspace appears.

Apps > Asset Management > Pages

+ Add new page [Settings] Preview App

<input type="checkbox"/> Name	Description	
<input type="checkbox"/> 1 Dashboard	Homepage	
<input type="checkbox"/> 2 Supported Devices Types	Manage device types	
<input type="checkbox"/> 3 Manage Devices	Manage devices	
<input type="checkbox"/> 4 Device Type Metrics	Manage metrics	
<input type="checkbox"/> 5 Device Type Groups	Manage groups	
<input type="checkbox"/> Template	A template for new pages	

- Select **Add new page**.  
The **Create Page** window appears.

## Create Page ×

Page name:

Page description:

Include in app navigation:

Create
Cancel

4. Provide values as described in the following table.



Field Name	Description
Page name	Enter a name for the page. The name must contain at least one uppercase or lowercase letter.
Page description	Enter a description for the page.
Include in app navigation	Select this check box if you want this page to be included in the application navigation. By default, this check box is selected.

5. Select **Create**.

The page is created, and the page designer appears.

The container and the left/right panels on the page designer are flexible to use.

- Drag the left/right sides of the container to resize for a wider view.

- Select  and  to show or hide left/right panels.

6. As needed, [add components to the page \(on page 824\)](#).
7. As needed, add queries to the page. Set options for the query, including query submission options.

Several queries require the multi-select parameter to be selected on the App Page, otherwise no output data will be displayed.

The following Historian REST queries require the multi-select input to be enabled on the EndApp page for output data to be displayed:

- Get > Raw Data
  - Get > Calculated Data
  - Get > Sampled Data
  - Post > Calculated Data
  - Post > Interpolated Data
8. Bind the inputs and outputs of widgets to page data, such as manually entered values, queries, formulas, and globals.
  9. Select **Save App**.

The changes made to the page are saved.



**Note:**

At any point in time, if you attempt to navigate away from the page, a confirmation message appears to confirm whether you want to stay on the page, and finish your work.

## Copy a Page

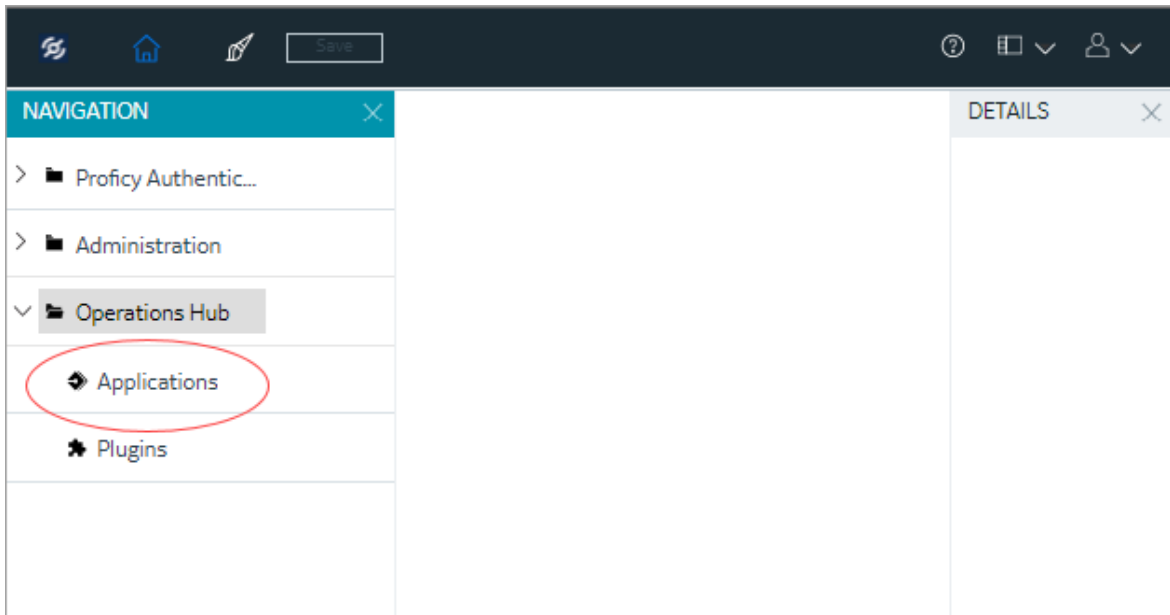
Steps to copy a page in the latest version of Operations Hub.

Log in to Configuration Hub.

For steps to copy pages in the Operations Hub classic version, refer to [Copy a Page \(Classic\) \(on page 458\)](#).

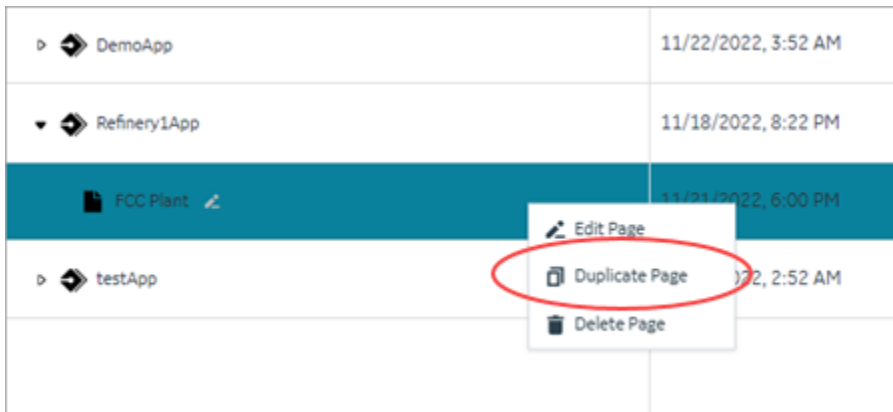


1. On the navigation panel, select **Operations Hub > Applications**.




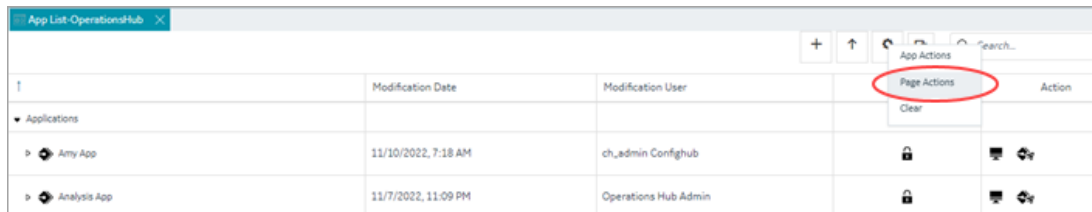
The existing list of applications and their pages appear.

2. Right-click the page you want to copy, and select **Duplicate Page**.



You can also duplicate multiple pages at a time. To do so:

a. Select , and then select **Page Actions**.



A selection check box appears next to each page.

- b. Select the check box for page you want to duplicate.



**Note:**

To select/clear a check box, you must first select the page in the list.

- c. Right-click and select **Duplicate Pages**.

A confirmation message appears.

3. Select **Ok** to confirm the duplicate action.

The **Select an Application** screen appears.

4. From the drop down list, select the application to which you want to copy this page.

You can copy page/s from one application to another, and also within the same application.

5. **Optional:** You can modify **New Page Name**.

The **New Page Name** field is already populated with a unique system-generated value.

6. Select **Ok**.

## Copy a Page (Classic)

Steps to copy a page in the Operations Hub classic version.

Log in to Operations Hub.

For steps to copy pages in the latest version of Operations Hub, refer to [Copy a Page \(on page 456\)](#).

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.

The screenshot shows the 'Apps' management interface. At the top, there are tabs for 'ALL APPS' and 'RECENTLY CREATED'. Below the tabs are buttons for '+ Add new app', 'Import', and a settings gear icon. A pagination control shows '1' and navigation arrows. A 'Quick Filter' input field is on the right. The main content is a table with the following data:



<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	

2. In the **Name** column, select the application that contains the page that you want to copy.  
The **PAGES** workspace appears.

The screenshot shows the 'Pages' workspace for the 'Asset Management' app. The breadcrumb navigation is 'Apps > Asset Management > Pages'. At the top, there are buttons for '+ Add new page', a settings gear icon, a lock icon, and a 'Preview App' button. The main content is a table with the following data:

<input type="checkbox"/> Name	Description	
<input type="checkbox"/> 1 Dashboard	Homepage	
<input type="checkbox"/> 2 Supported Devices Types	Manage device types	
<input type="checkbox"/> 3 Manage Devices	Manage devices	
<input type="checkbox"/> 4 Device Type Metrics	Manage metrics	
<input type="checkbox"/> 5 Device Type Groups	Manage groups	
<input type="checkbox"/> Template	A template for new pages	

3. Select the check box for the page you want to copy and choose one of these options.

Option	Description
<b>Copy a single page</b>	Select  in the row, then select <b>Duplicate page</b> .
<b>Copy multiple pages</b>	Select  in the header, then select <b>Duplicate Pages</b> .

A confirmation message appears.

4. Select **OK** to proceed to duplicate the page/s.

**Select an Application** screen appears.

5. From the drop down, select the application to copy this page.

You can copy page/s from one application to another, and also within the same application.

6. Provide a name for the page.

Option	Description
<b>Copy a single page</b>	Enter a name for the duplicate page. The name must contain at least one uppercase or lower-case letter.
<b>Copy multiple pages</b>	By default, unique names are assigned to each duplicate page.

7. Copying page/s from one application to another requests for handling globals.

- **Duplicate Globals:** Creates page globals with a different name. Recommended when globals have the same name but are of different types.
- **Attempt to reuse Globals:** Reuses the page globals. Does not create new globals with the same or duplicate name.

8. Select **OK**.

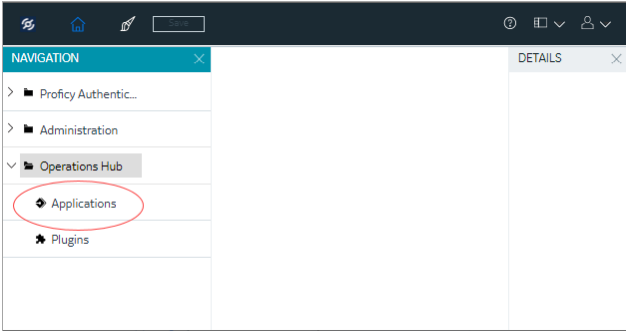
The pages, along with the UI components, queries, and global variables used in them, are copied.

## Export a Page

Steps to export application page(s) in the latest version of Operations Hub.

Log in to Configuration Hub.


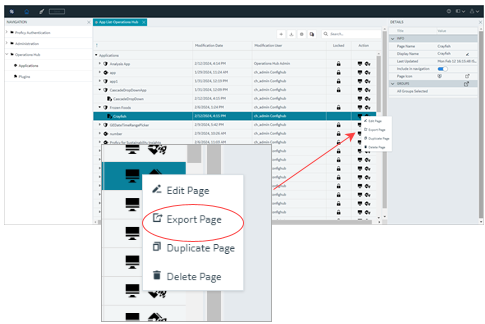
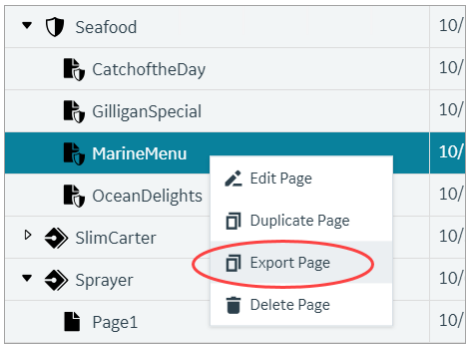
1. On the navigation panel, select **Operations Hub > Applications**.



The existing list of applications and their pages appear.

2. Select the page(s) to export.

Multiple ways to select:

<p>For the page you want to export, select  &gt;</p> <p><b>Export Page.</b></p>	 A screenshot of a table listing various pages. A context menu is open over one of the rows, showing options: 'Edit Page', 'Export Page', 'Duplicate Page', and 'Delete Page'. The 'Export Page' option is circled in red. A red arrow points from the 'Export Page' option in the menu to the corresponding icon in the table row.
<p>Right-click the page and select <b>Export Page.</b></p>	 A screenshot of a table listing various pages. A context menu is open over the 'MarineMenu' row, showing options: 'Edit Page', 'Duplicate Page', 'Export Page', and 'Delete Page'. The 'Export Page' option is circled in red.

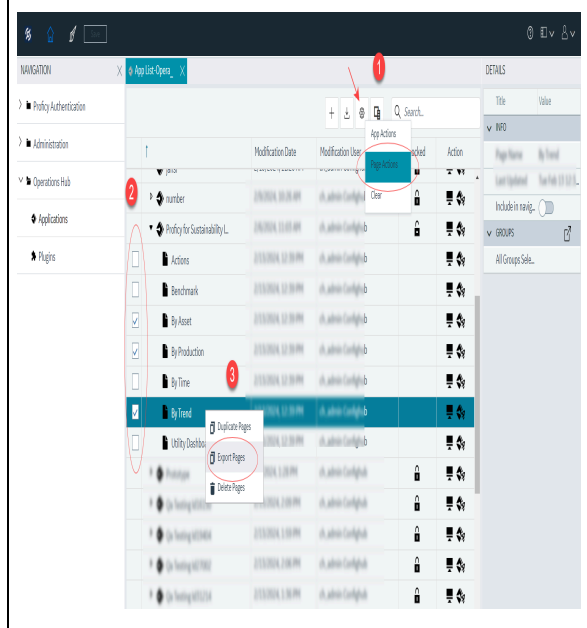
**Select Multiple Pages within App to Export:**

- a. Select the App (which contains multiple pages you want to export) and go to



A selection check box appears next to each page.

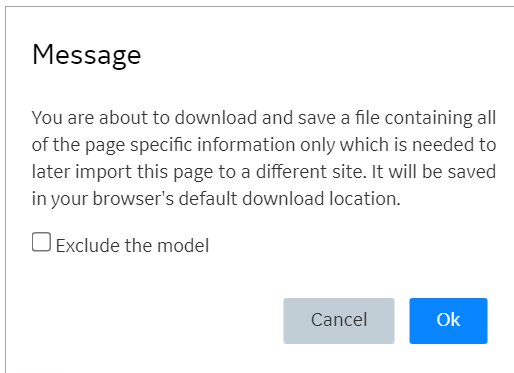
- b. Select the check box for the pages you want to export.
- c. Right-click and select **Export Pages**.



A confirmation message appears.

3. Select **Ok** to confirm the export action.

If you prefer not to export the data configuration associated with the page(s), then select the **Exclude the model** check box.



4. In case, the page(s) being exported contain extension queries, then the related data sources for extension queries are displayed. Choose the data source(s) you want to export along with the page(s).

- a. Select the check box to include compatible data sources.

### Select Datasources

This app includes some queries which can work with multiple data sources. Please select additional compatible data sources to include in this export.

<input type="checkbox"/>	Name
<input type="checkbox"/>	BlueRaz
<input type="checkbox"/>	LocalHist
<input type="checkbox"/>	CDemoOPCServer
<input type="checkbox"/>	FIX
<input type="checkbox"/>	HistorianDS
<input type="checkbox"/>	PP-HIST2

To ensure upgradability, resave each query and page associated with this app before export.

Cancel
Export

- b. Select **Export**.

The exported data is saved as a page artifact (.zip file). The file name is appended with `_IQPPagePackage` to indicate that it is an exported page artifact. For example, if the page name is 'Utility\_Dashboard', then the exported artifact is named `Utility_Dashboard_IQPPagePackage`.

The exported file is saved to the default download location of the browser.

## Export a Page (Classic)

Steps to export application page(s) in the Operations Hub classic version.

Log in to Operations Hub.

To access application pages in the latest version of Operations Hub, refer to [Navigation Panel \(on page 214\)](#).

1. In the main navigation menu, select **APPS**.


The **APPS** workspace appears.

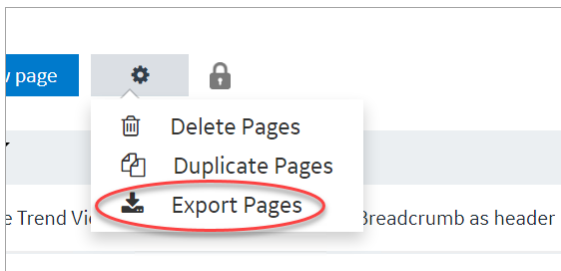
Name	Description	Last updated
Asset Management	Manage Devices	3 months ago by Docs Team
Asset Testing	Test Devices	3 months ago by Docs Team
Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team
Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team
Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team
Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team
Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team
ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team
ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team
Store Temp App	temp	2 months ago by Docs Team

- In the **Name** column, select the application that contains the page that you want to access. The **PAGES** workspace appears, displaying a list of pages created in the

Name	Description
1 Dashboard	Homepage
2 Supported Devices Types	Manage device types
3 Manage Devices	Manage devices
4 Device Type Metrics	Manage metrics
5 Device Type Groups	Manage groups
Template	A template for new pages

application.

- Select the check box for the page(s) you want to export.
- In the workspace heading, select , and then select **Export Pages**.



A confirmation message appears with the file download information.

- Select **OK**.



In the message dialog, if you select the check box for **Exclude the model**, then the data configuration associated with the page(s) will not be exported.

6. **Required:** In case, the page(s) being exported contain extension queries, then the related data sources for extension queries are displayed. Choose the data source(s) you want to export along with the page(s).
  - a. In the **Select Datasources** pop-up screen, select the compatible data sources.
  - b. Select **Export**.

The exported data is saved as a page artifact (.zip file). The file name is appended with `_IQPPagePackage` to indicate that it is an exported page artifact. For example, if the page name is 'Utility\_Dashboard', then the exported artifact is named `Utility_Dashboard_IQPPagePackage`.

See [Import a Page \(on page 465\)](#).

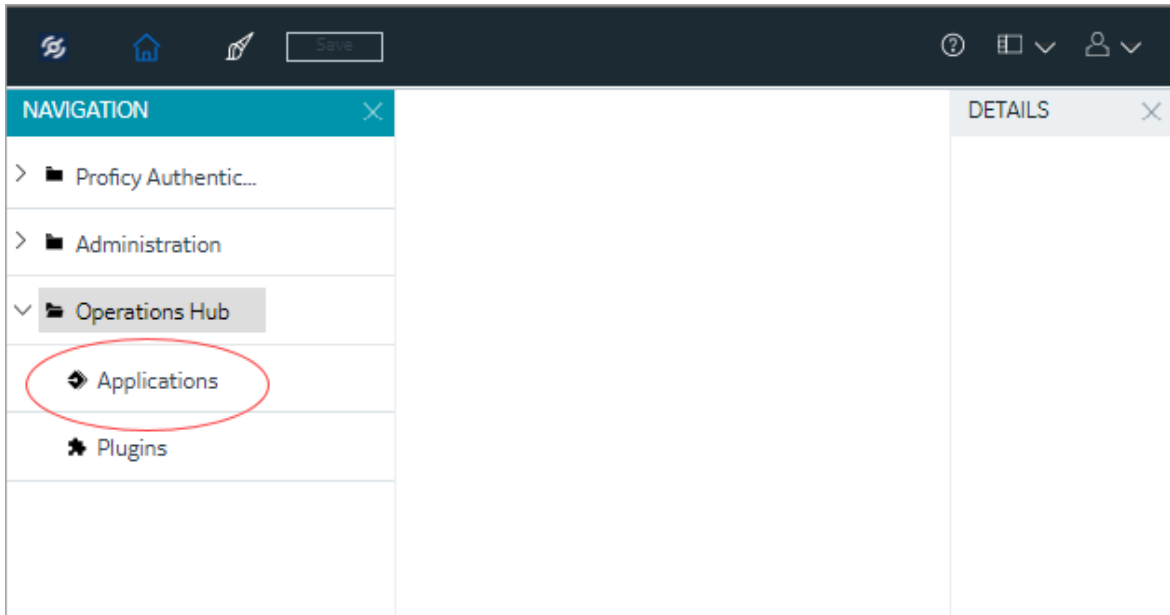
## Import a Page

Steps to import application page/s in the latest version of Operations Hub.

[Export the page/s \(on page 460\)](#) that you want to import.

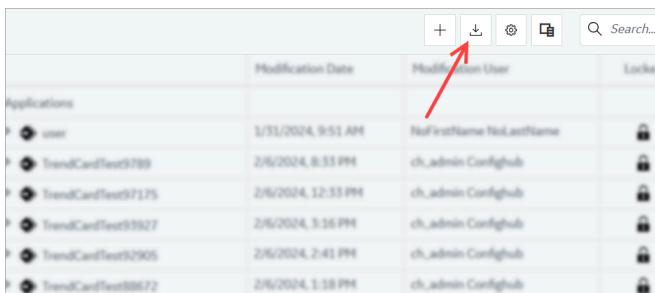
For steps to import pages in the Operations Hub classic version, refer to [Import a Page \(Classic\) \(on page 467\)](#).

1. Log in to Configuration Hub.
2. On the navigation panel, select **Operations Hub > Applications**.



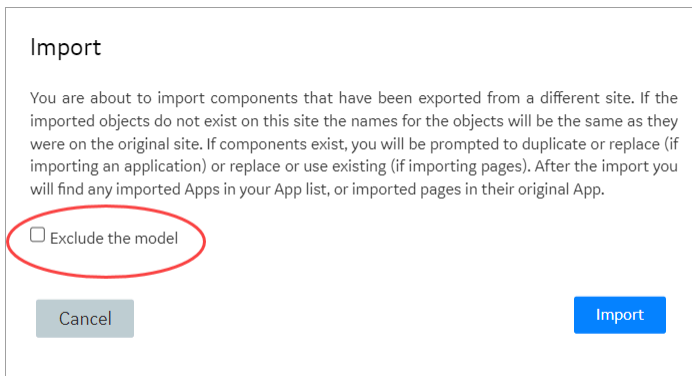
The existing list of applications and their pages appear.

3. On the toolbar, select the import icon.



An import confirmation message appears.

4. **Optional:** If you prefer not to import the data configuration associated with the page(s), then select the **Exclude the model** check box.



5. Select **Import** to navigate your local system.

- Locate and choose the exported page artifact (.zip file), then select **Open**.

**Tip:**

The filename contains `_IQPPagePackage`.

- In case of artifact conflicts, a **Confirm** screen appears to resolve the import conflict. Select one of the following:

<b>Replace</b>	Deletes the existing page/s in Operations Hub and replaces with those from the import file.
<b>Use Existing</b>	Does not replace or duplicate any existing page artifact (plug-ins, queries, data source, etc.). Only new artifacts are brought in, while the existing page(s) in Operations Hub remain unchanged.  The imported artifact will be configured to point to the existing page artifact. For instance, queries from the imported artifact will connect to an existing data source.

- Select **Confirm** to proceed with the import.

If the system detects that the imported page/s have widgets/plug-ins eligible for upgrades, then they are automatically updated to their latest versions. See [Configure Plug-in Upgrades \(on page 284\)](#).

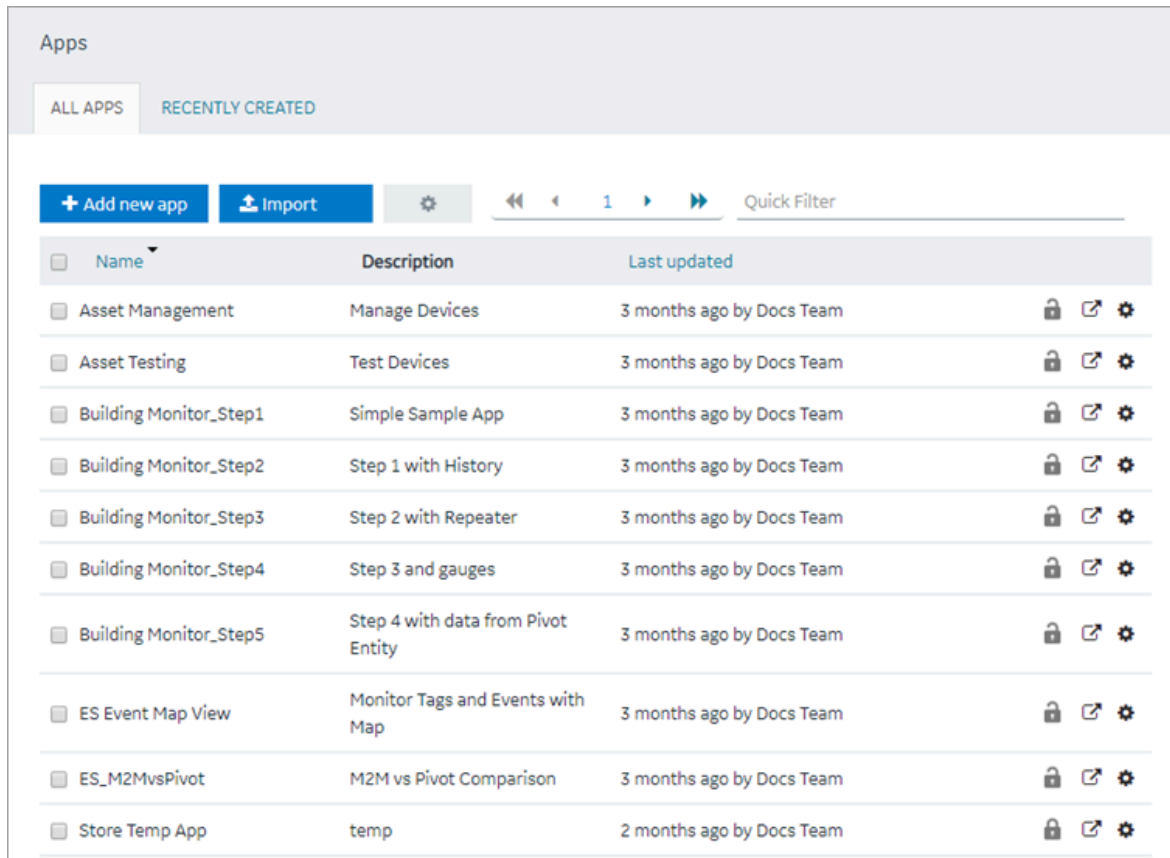
## Import a Page (Classic)

Steps to import application page/s in the Operations Hub classic version.

[Export the page/s \(on page 460\)](#) that you want to import.

For steps to import applications in the latest version of Operations Hub, refer to [Import a Page \(on page 465\)](#).

- Log in to the Operations Hub server where you want to import the application pages.
- In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.



3. Select **Import**.

An import confirmation message appears.

4. Select **Import**.

In the message dialog, if you select the check box for **Exclude the model**, then the data configuration associated with the page/s will not be imported.

5. To import, navigate and select the exported page artifact (.zip file), then select **Open**.

**Tip:**  
The filename contains `_IQPPagePackage`.

6. In case of artifact conflicts, a **Confirm** screen appears to resolve the import conflict. Select one of the following:

<b>Replace</b>	Deletes the existing page/s in Operations Hub and replaces with those from the import file.
----------------	---

<b>Use Existing</b>	<p>Does not replace or duplicate any existing page artifact (plug-ins, queries, data source, etc.). Only new artifacts are brought in, while the existing page(s) in Operations Hub remain unchanged.</p> <p>The imported artifact will be configured to point to the existing page artifact. For instance, queries from the imported artifact will connect to an existing data source.</p>
---------------------	---

7. Select **Confirm** to proceed with the import.

If the system detects that the imported page/s have widgets/plugin-ins eligible for upgrades, then they are automatically updated to their latest versions. See [Configure Plug-in Upgrades \(on page 284\)](#).

Page/s are imported to the new Operations Hub server. They are added to the App (of the same name) if it exists on the server. If not, a new App is created to store the imported pages.

## Delete a Page

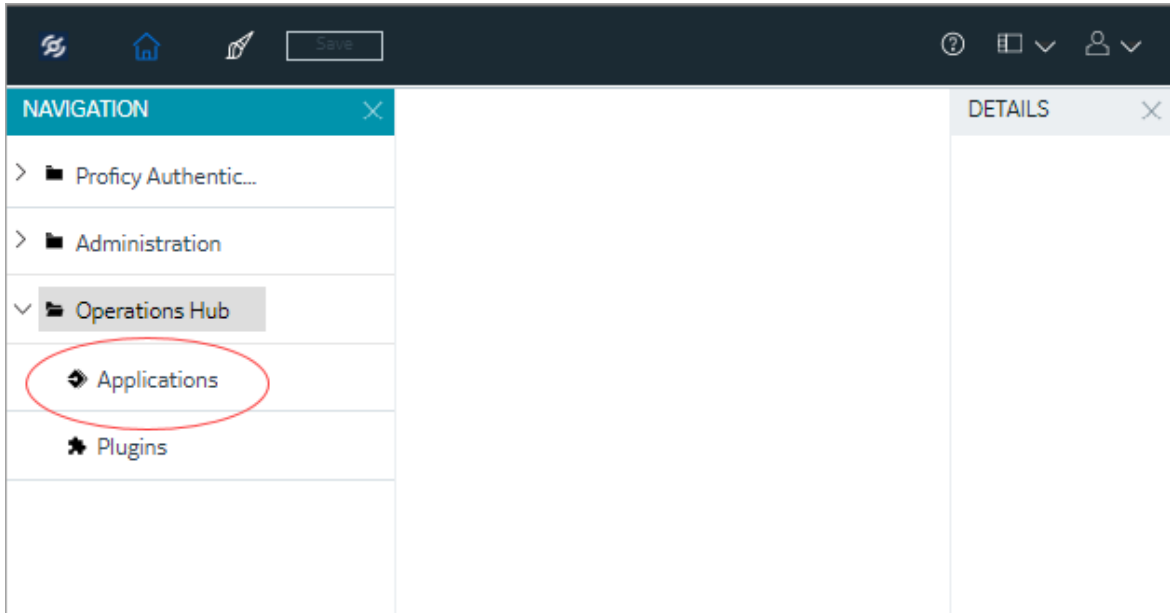
Steps to delete a page in the latest version of Operations Hub.

Log in to Configuration Hub.

When you delete a page, the global variables applied to the page also get deleted.

For steps to create pages in the Operations Hub classic version, refer to [Delete a Page \(Classic\) \(on page 471\)](#).


1. On the navigation panel, select **Operations Hub > Applications**.

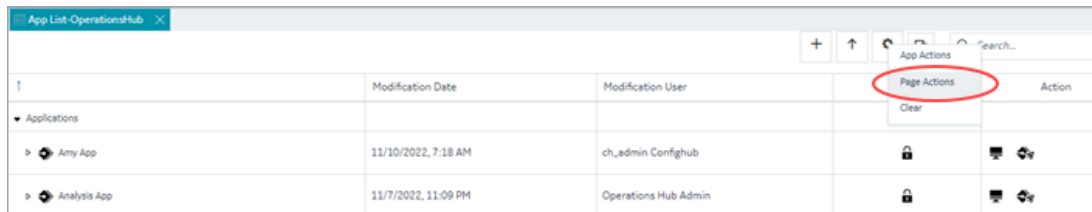


The existing list of applications and their pages appear.

2. Right-click the page you want to delete, and select **Delete Page**.

You can also delete multiple pages at a time. To do so:

- a. Select , and then select **Page Actions**.



A selection check box appears next to each page.

- b. Select the check box for page you want to delete.



**Note:**

To select/clear a check box, you must first select the page in the list.

- c. Right-click and select **Delete Pages**.

A confirmation message appears.

3. Select **Ok** to confirm the delete action.

## Delete a Page (Classic)

Steps to create a page in the Operations Hub classic version.

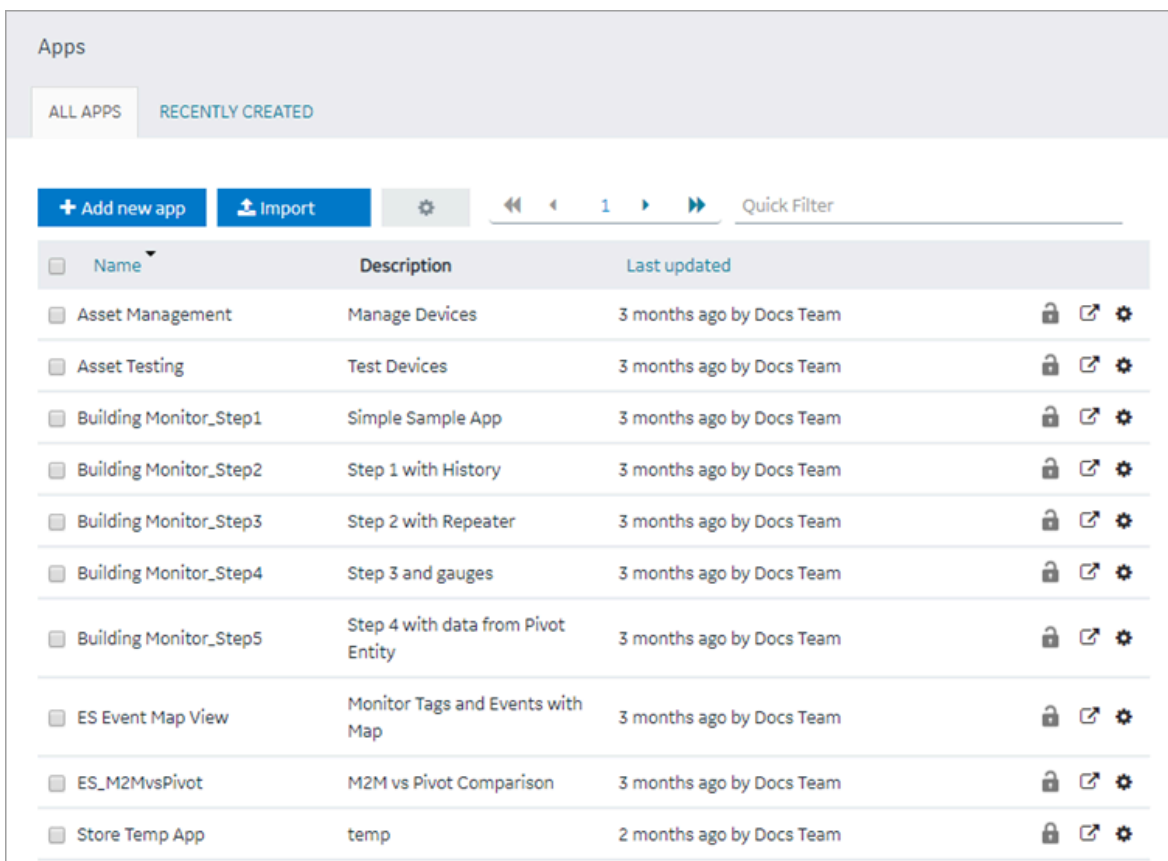
Log in to Operations Hub.

When you delete a page, the global variables applied to the page also get deleted.

For steps to create pages in the latest version of Operations Hub, refer to [Delete a Page \(on page 469\)](#).

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.

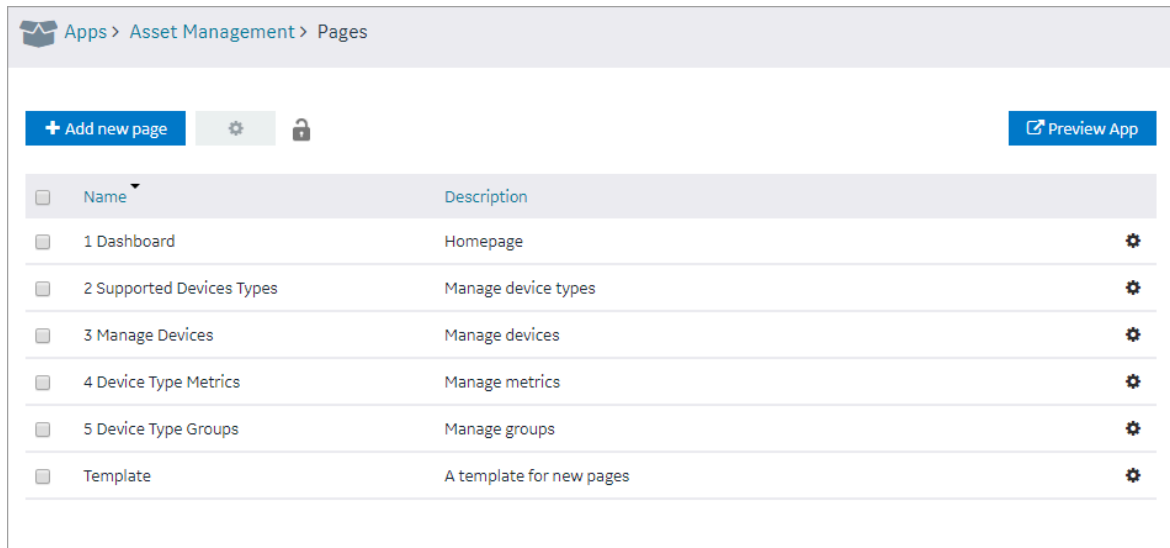



The screenshot displays the 'Apps' workspace. At the top, there are tabs for 'ALL APPS' and 'RECENTLY CREATED'. Below the tabs, there are buttons for '+ Add new app', 'Import', and a settings gear icon. A pagination control shows '1' and navigation arrows. A 'Quick Filter' input field is also present. The main content is a table with the following data:

<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	

2. In the **Name** column, select the application that contains the page that you want to delete.

The **PAGES** workspace appears.




- In the workspace heading, select , and then select **Delete Pages**.

A message appears, stating that the global variables used in the page will also be deleted.



**Tip:**

Alternatively, in each row containing a page that you want to delete, select , and then select **Delete page**.

- Select **OK**.


The pages are deleted.

## Navigation


### About Navigation

Using navigation, you can configure the navigation menu of an application by performing the following tasks:

- Add a page to the navigation menu of the application.
- Remove a page from the navigation menu of the application.
- Specify the name of the page that should appear in the navigation menu of the application.
- Specify the sequence of the pages that should appear in the navigation menu of the application.
- Select the icon that should appear for each page in the navigation menu of the application. By

default,  is selected.



When you access the application, a list of pages that you have added appear in the navigation menu of the application, displaying the icon that you have specified for each page. You can expand the navigation menu of the application by selecting . It will then display the name of each page along with the icon.

Using navigation, you can configure the navigation menu of an application by performing the following tasks:

- Add a page to the navigation menu of the application.
- Remove a page from the navigation menu of the application.
- Specify the name of the page that should appear in the navigation menu of the application.
- Specify the sequence of the pages that should appear in the navigation menu of the application.

## Add a Page to the Navigation Menu of an Application (Classic)

Steps to enable page navigation in the Operations Hub classic version.

Log in to Operations Hub.

By default, when you create a page, it is included in the navigation menu of the application. This topic describes how to add a page to the navigation menu of an application in case it has been removed from the navigation menu.

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears, displaying a list of applications in the site.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import [Settings] [Navigation] 1 [Filter] Quick Filter

<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	

2. In the **Name** column, select the application for which you want to add a page to the navigation menu.

The **PAGES** workspace appears.

Apps > Asset Management > Pages

+ Add new page [Settings] [lock] [Preview App]

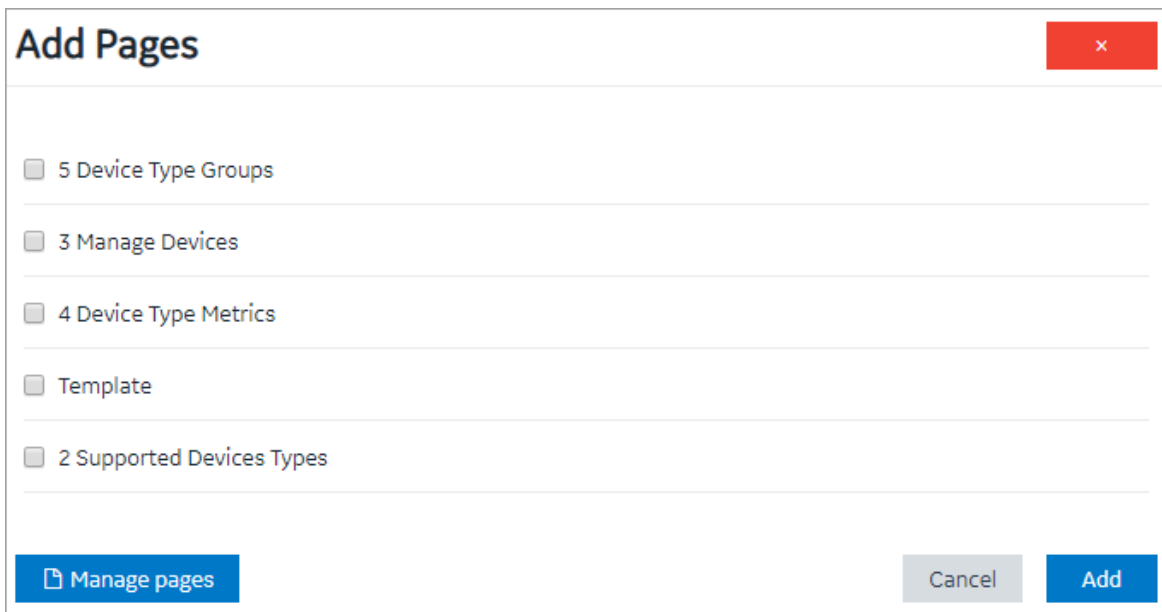
<input type="checkbox"/> Name	Description	
<input type="checkbox"/> 1 Dashboard	Homepage	
<input type="checkbox"/> 2 Supported Devices Types	Manage device types	
<input type="checkbox"/> 3 Manage Devices	Manage devices	
<input type="checkbox"/> 4 Device Type Metrics	Manage metrics	
<input type="checkbox"/> 5 Device Type Groups	Manage groups	
<input type="checkbox"/> Template	A template for new pages	

3. In the main navigation menu, select **NAVIGATION**.

The **NAVIGATION** workspace appears, displaying a list of pages that have been added to the navigation menu of the application.

4. Select **Add Pages**.

The **Add Pages** window appears, displaying a list of pages that have been created in the application, but have not been added to the navigation menu.





5. Select each check box that corresponds to a page that you want to add to the navigation menu of the application, and then select **Add**.

The selected pages are added to the navigation menu of the application.



**Tip:**

- You can modify the display name of a page by selecting  in the **DISPLAY NAME** column.
- You can modify the name of a page by selecting  in the **Page Name** column.
- You can select the icon that should appear for the page in the navigation menu of the application by selecting an icon in the **Page Icon** column.
- You can change the sequence of pages in the navigation menu of the application by dragging each page to the required location.
- You can preview the application by selecting **Preview App**.

## Remove a Page from the Application Navigation Menu (Classic)

Steps to disable page navigation in the Operations Hub classic version.

Log in to Operations Hub.

1. In the main navigation menu, select **APPS**.

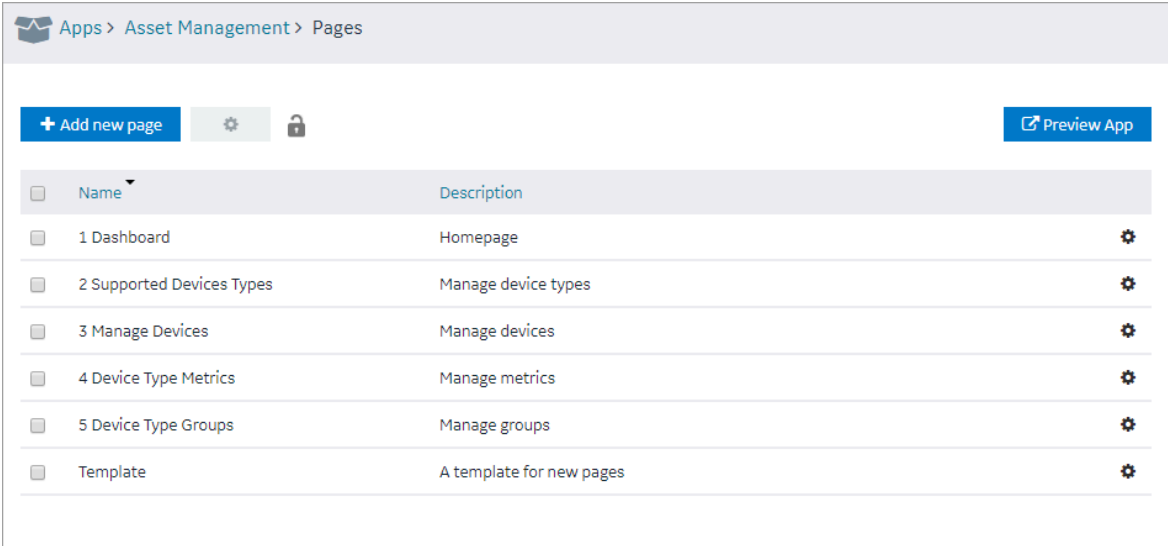
The **APPS** workspace appears, displaying a list of applications in the site.

The screenshot shows the 'Apps' workspace interface. At the top, there are tabs for 'ALL APPS' and 'RECENTLY CREATED'. Below the tabs are buttons for '+ Add new app', 'Import', and a settings gear icon. There is also a pagination control showing '1' and a 'Quick Filter' input field. The main content is a table with the following data:

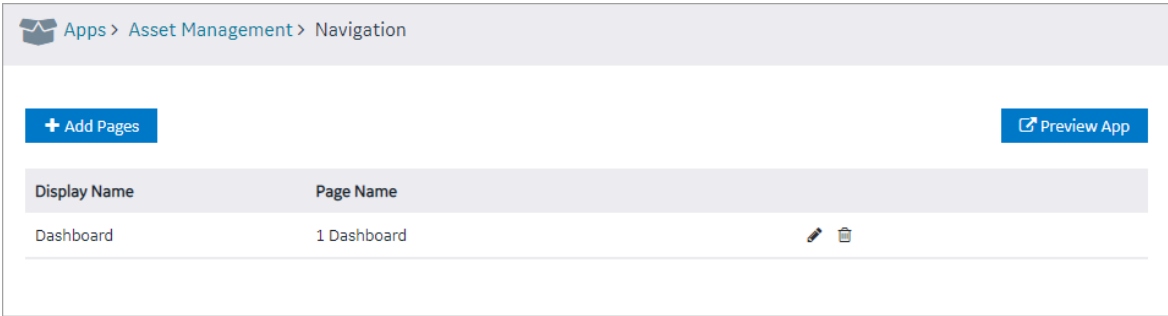
<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/>	Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/>	ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/>	ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/>	Store Temp App	temp	2 months ago by Docs Team	


2. In the **Name** column, select the application in which you want to change the application navigation menu.


The **PAGES** workspace appears.



- 3. In the main navigation menu, select **NAVIGATION**.  
The **NAVIGATION** workspace appears, displaying a list of pages that have already been added to the application navigation menu.



- 4. In the row containing the page that you want to remove, select  .  
The page is removed from the application navigation menu.

 **Note:**  
The page is removed only from the application navigation menu; it is not deleted. You can still access it in the application by performing an action such as selecting a button or an image.

# Explorer

## About Explorer (Classic)

Explorer provides a hierarchical view of the following items:

- Containers and UI elements used in each page in the application, which appear in the Pages hierarchy.
- Variables defined in the application, which appear in the Globals hierarchy.

Using Explorer, you can view the links between variables and UI elements on application pages, which will help you follow the application structure.

The variables defined in an application are classified as follows:

- System
- Output
- UI
- Custom
- URL

When you expand a variable in the hierarchy, one of the following options appears:

- app global: true: Indicates that the variable is visible in every page of the application.
- app global: false: Indicates that the variable is visible only in the page where it is defined.

If a variable contains an initial value, that value also appears in the hierarchy.

# Themes

## About Themes (Classic)

Themes are used to specify the default background color, font color and type, border color, style, width, and other attributes. These attributes are used in the headings, tables, containers, and other elements in an application. Themes help you create a common look and feel across all the pages in your application.

Operations Hub contains a few baseline themes. You cannot modify or delete them. You can, however, copy them.

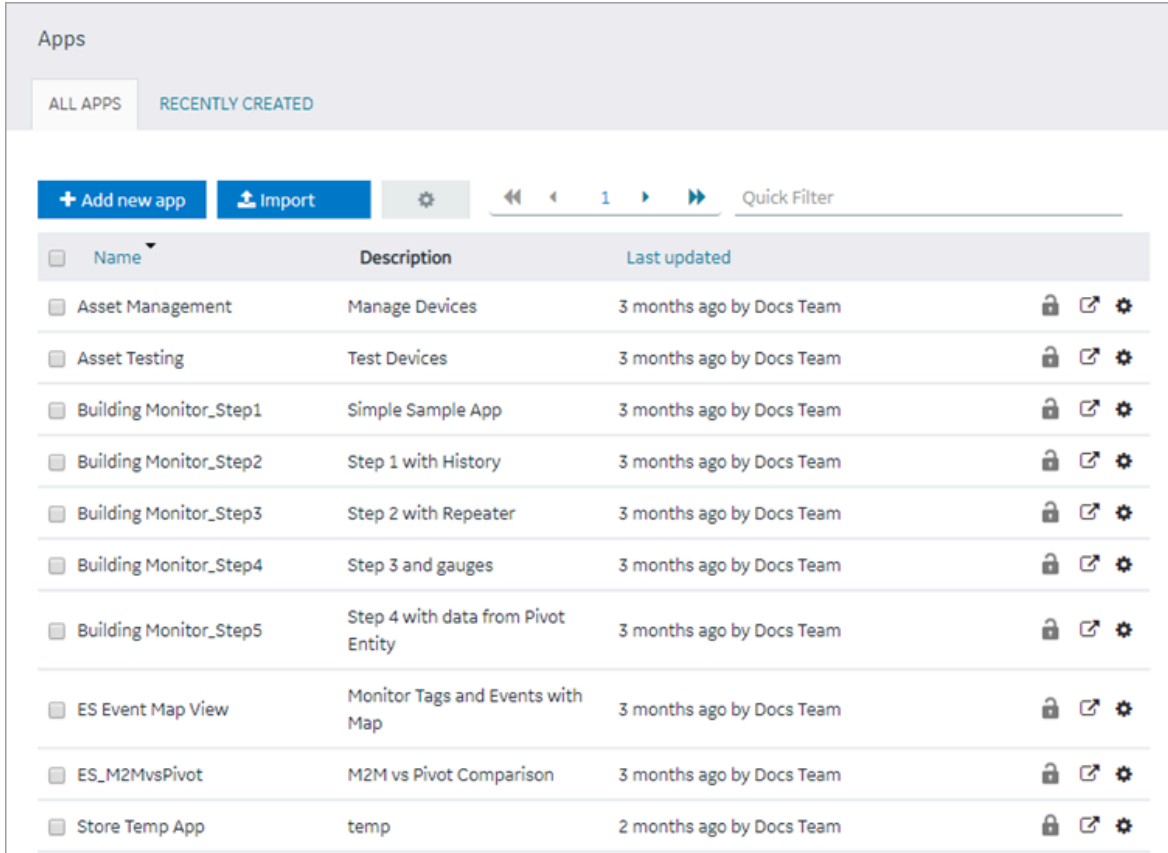
## Access a Theme (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.

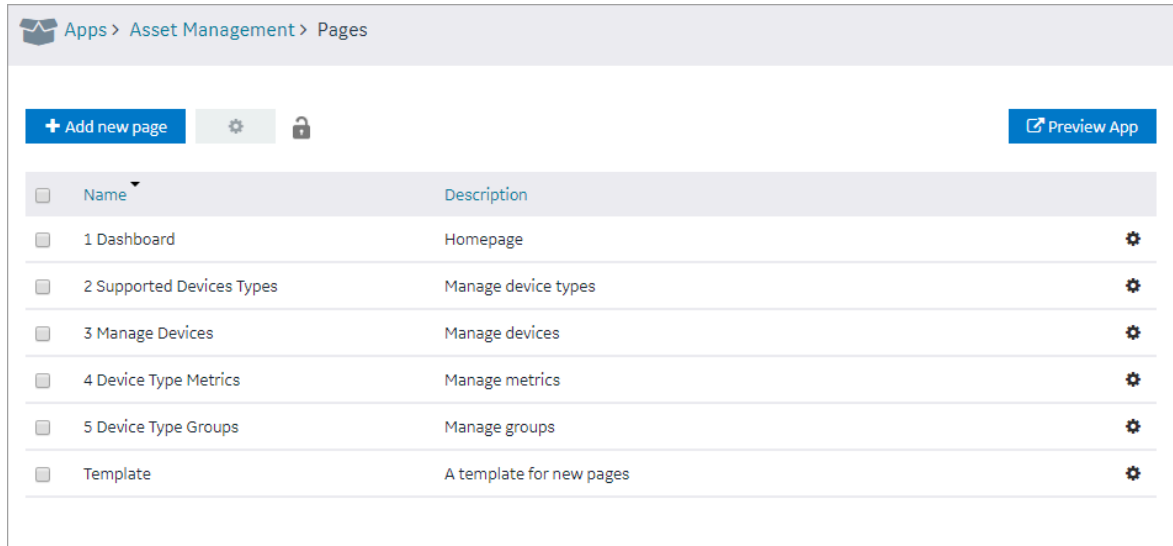


The screenshot displays the 'Apps' workspace. At the top, there are tabs for 'ALL APPS' and 'RECENTLY CREATED'. Below the tabs, there are buttons for '+ Add new app', 'Import', and a settings gear icon. A pagination control shows '1' and navigation arrows. A 'Quick Filter' input field is also present. The main content is a table with the following data:


<input type="checkbox"/> Name	Description	Last updated	
<input type="checkbox"/> Asset Management	Manage Devices	3 months ago by Docs Team	
<input type="checkbox"/> Asset Testing	Test Devices	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	
<input type="checkbox"/> Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	
<input type="checkbox"/> ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	
<input type="checkbox"/> ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	
<input type="checkbox"/> Store Temp App	temp	2 months ago by Docs Team	


2. In the **Name** column, select an application.

The **PAGES** workspace appears.



3. In the main navigation menu, select **THEME**.

The **THEME** workspace appears, displaying a list of themes. The theme that is applied to the application is indicated by .

4. In the row containing the theme that you want to access, select .

The workspace for the theme appears, displaying the settings for each attribute.



Apps > Asset Management > Themes > BM\_MD\_BKG\_Transfer\_153906621...

Cancel Save theme

### General

Text Color

Background Color   Use gradient

Background Image URL

Font Type

Loader color

### Headers

Header 1 background   Use gradient

Header 1 text

Header 2 background   Use gradient

Header 2 text

Header 3 background   Use gradient

Header 3 text



**Tip:**

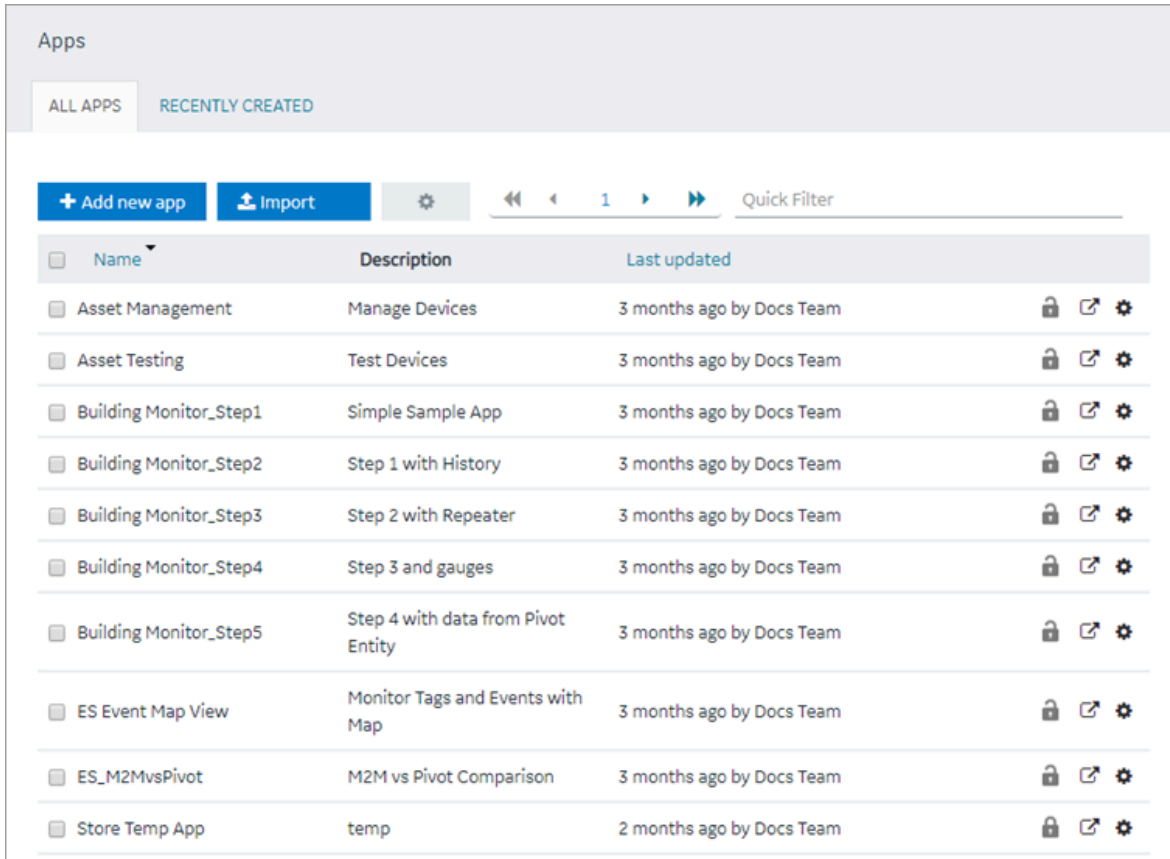
If needed, modify the settings, and then select **Save theme** to save your changes. You cannot, however, modify a baseline theme.

## Create a Theme (Classic)

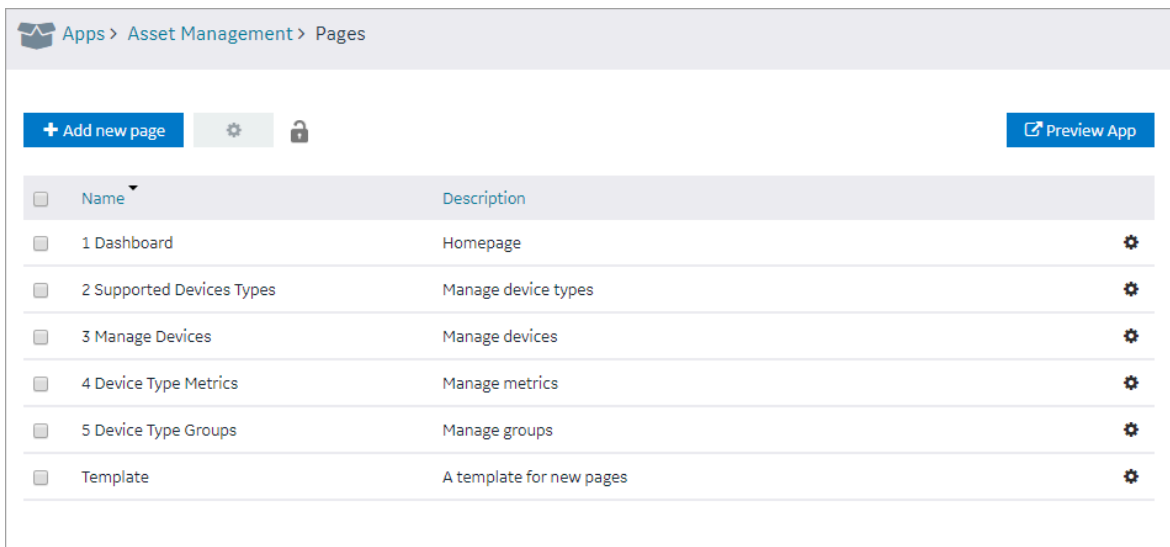
When you create a theme, it is automatically used in the application that you have selected. You can, however, use a different theme in the application.

Log in to Operations Hub.

1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.

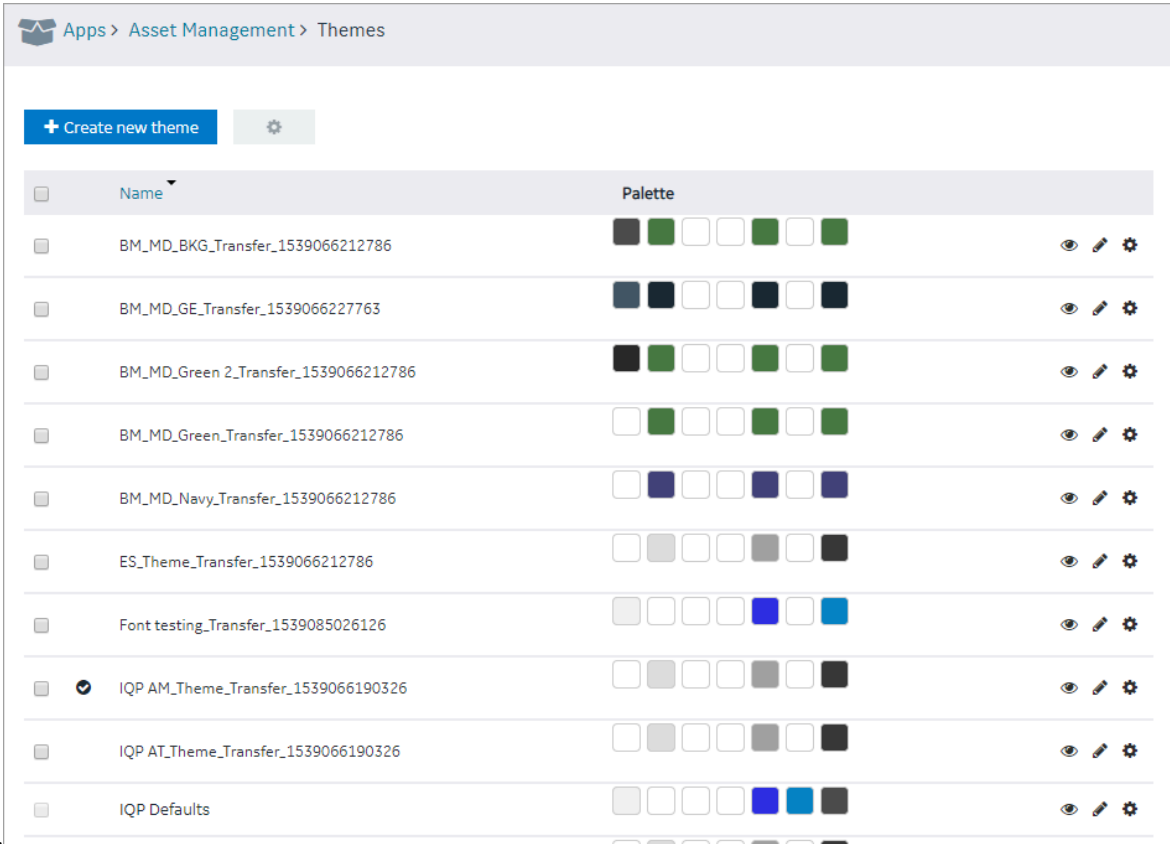


- In the **Name** column, select an application.  
The **PAGES** workspace appears.



- In the main navigation menu, select **THEME**.

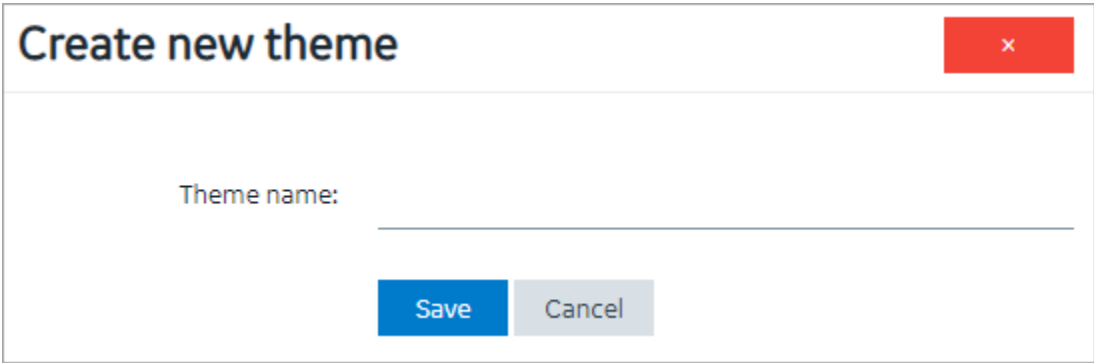
The **THEME** workspace



appears.

- 4. Select **Create new theme**.

The **Create new theme** window appears.



- 5. Enter a name for the theme, and then select **Save**. The name must contain at least one uppercase or lowercase letter.

The workspace for the theme appears, displaying the default settings for each attribute.

- 6. As needed, modify the settings, and then select **Save theme**.

A message appears, asking you to confirm that you want to use the theme for the application.

7. Select **Yes**.

The theme is created and used in the application.

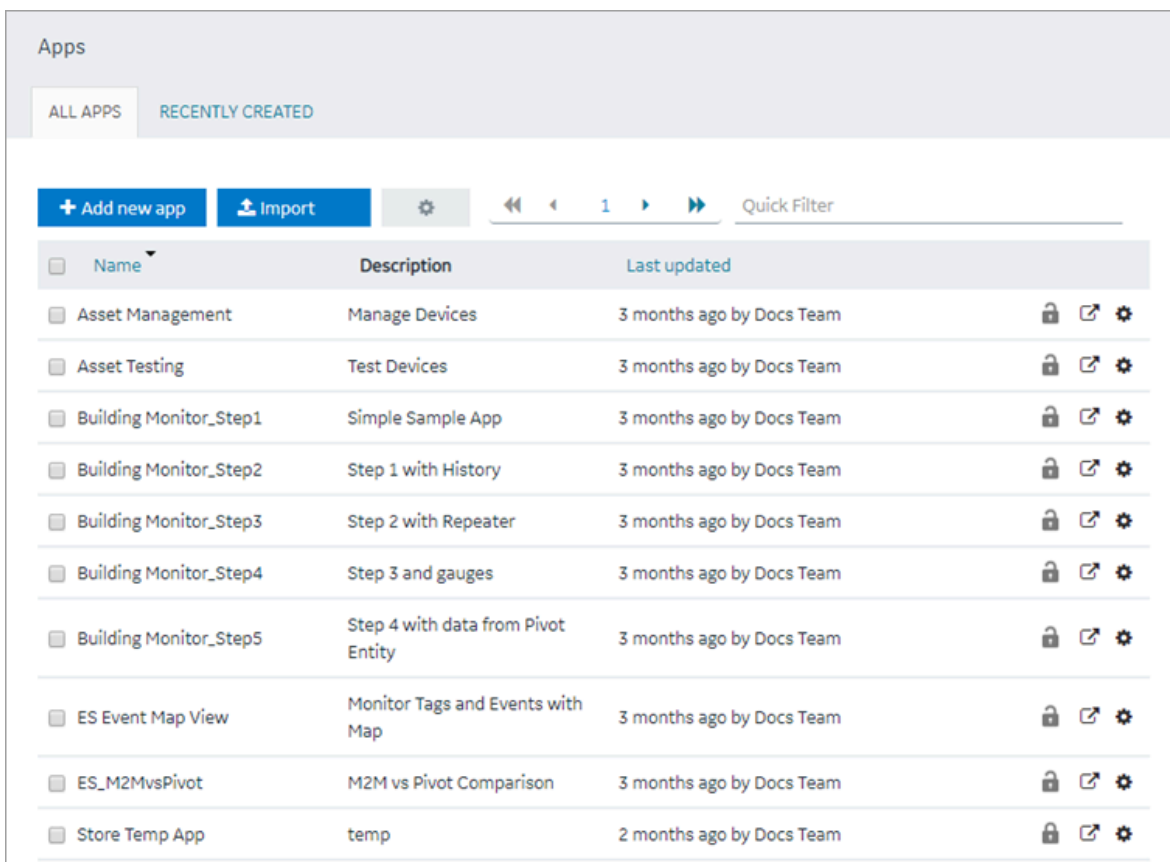
## Copy a Theme (Classic)

Steps for Operations Hub classic version.

Log in to Operations Hub.

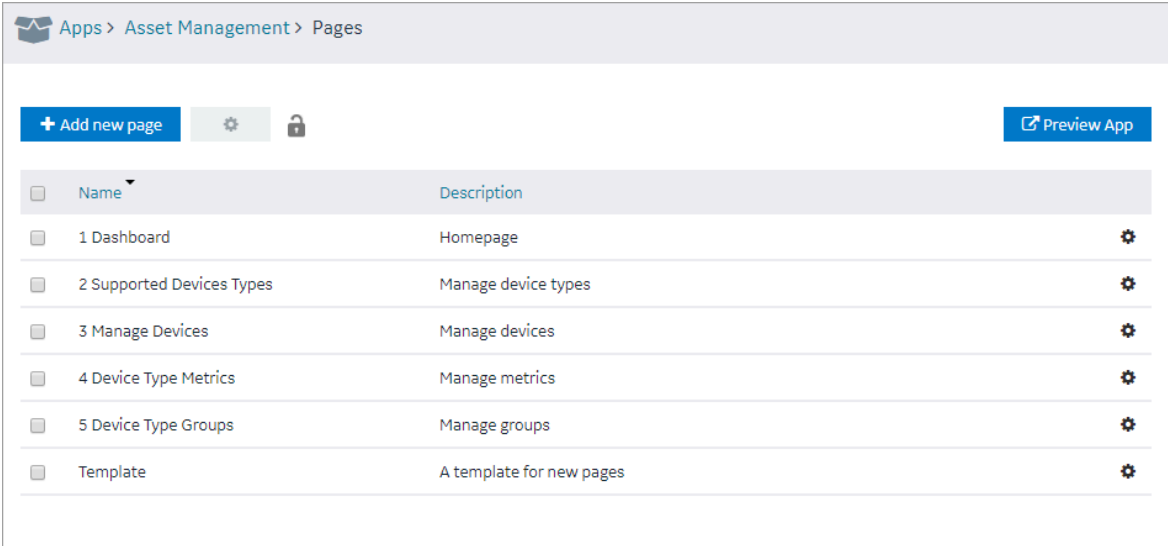
1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.

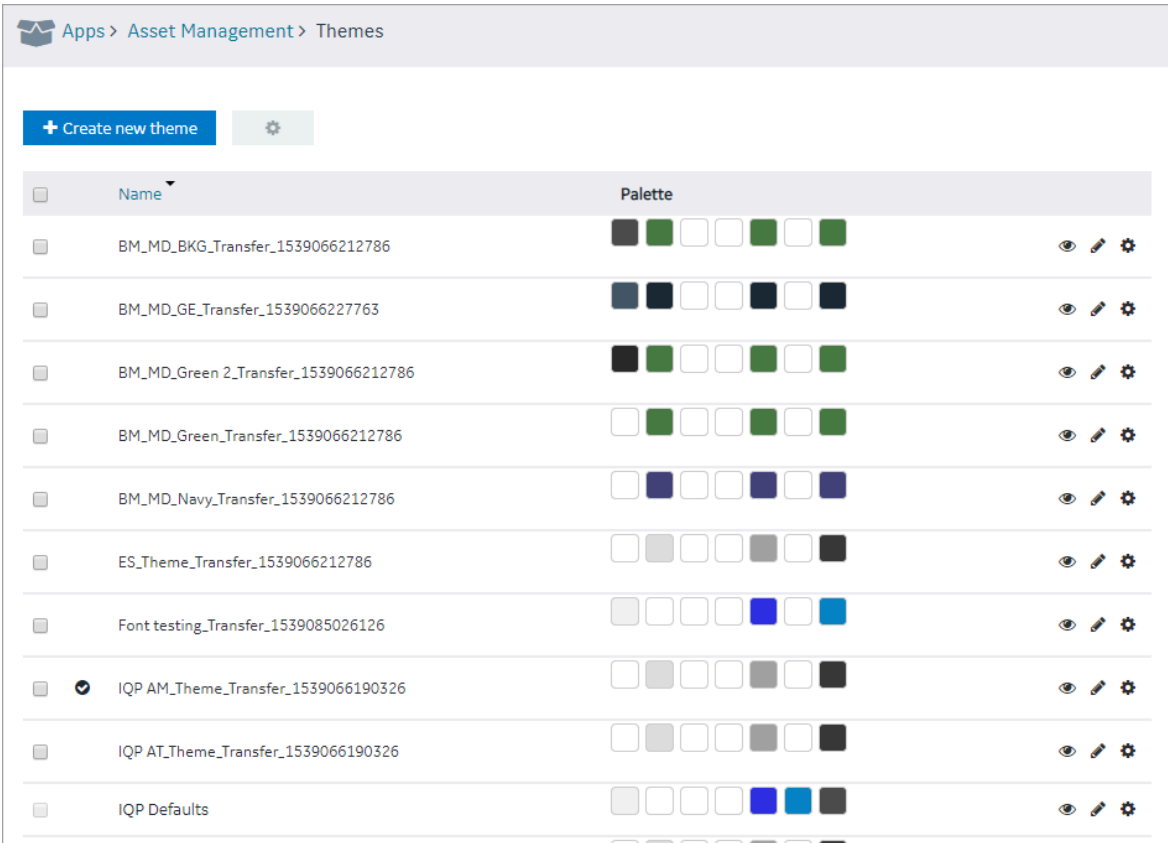



2. In the **Name** column, select an application.

The **PAGES** workspace appears.

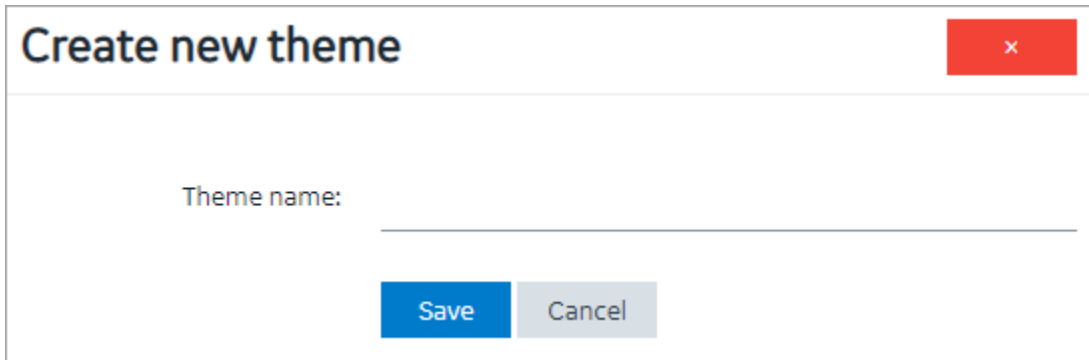


3. In the main navigation menu, select **THEME**.  
The **THEME** workspace appears.



4. In the row containing the theme that you want to copy, select , and then select **Duplicate theme**.

The **Create new theme** window appears, asking you to enter a name for the theme that you want to copy.



The screenshot shows a dialog box titled "Create new theme". It features a red close button in the top right corner. The main area contains a text input field with the label "Theme name:". Below the input field are two buttons: a blue "Save" button and a grey "Cancel" button.

5. Enter a name for the theme, and then select **Save**. The name must contain at least one uppercase or lowercase letter.

The theme is copied.

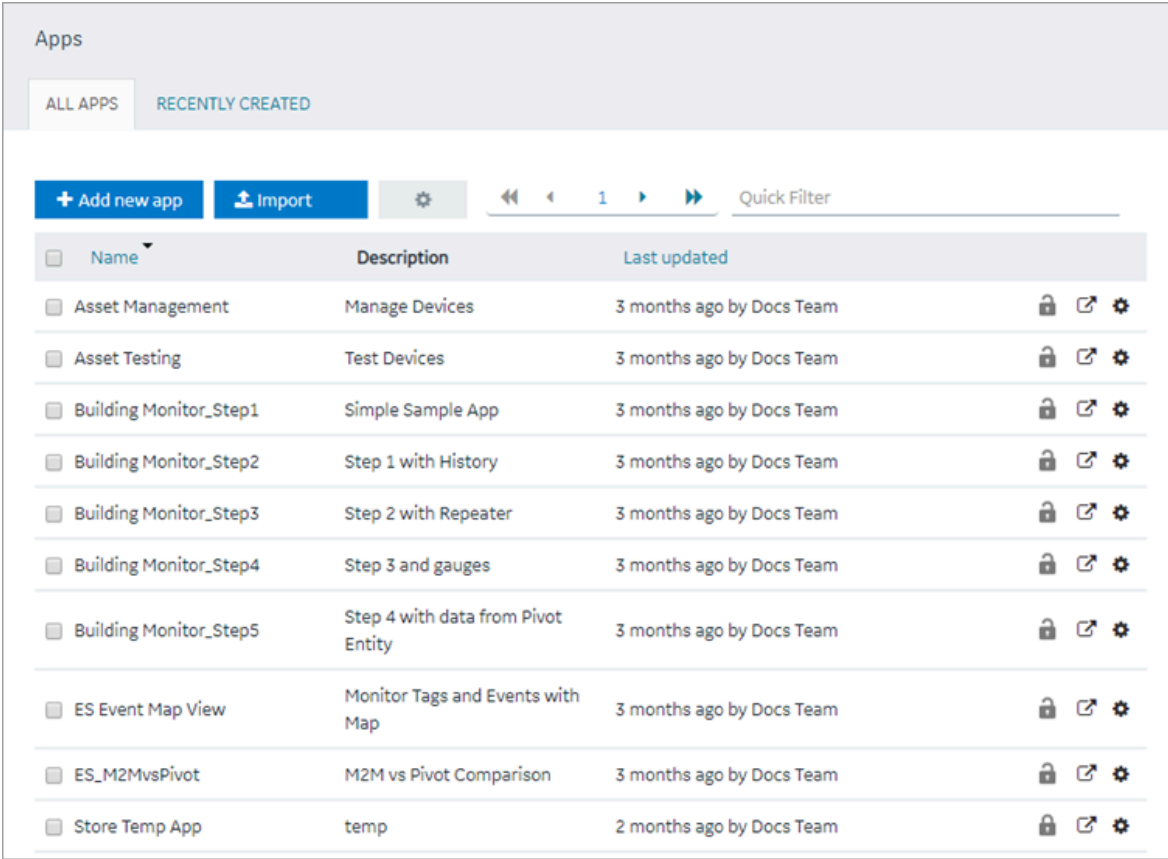
## Delete a Theme (Classic)

You cannot delete a baseline theme or a theme that is used in an application.

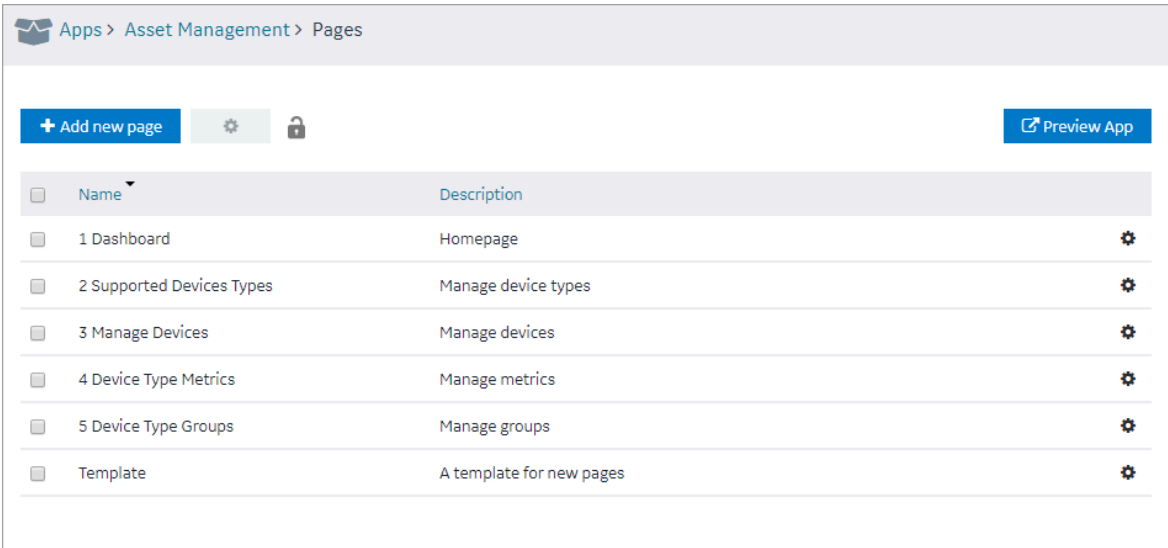
Log in to Operations Hub.

1. In the main navigation menu, select **APPS**.

The **APPS** workspace appears.















































- 2. In the **Name** column, select an application.  
The **PAGES** workspace appears.



- 3. In the main navigation menu, select **THEME**.  
The **THEME** workspace appears.

Apps > Asset Management > Themes

[+ Create new theme](#) 


<input type="checkbox"/>	Name	Palette	  
<input type="checkbox"/>	BM_MD_BKG_Transfer_1539066212786		  
<input type="checkbox"/>	BM_MD_GE_Transfer_1539066227763		  
<input type="checkbox"/>	BM_MD_Green 2_Transfer_1539066212786		  
<input type="checkbox"/>	BM_MD_Green_Transfer_1539066212786		  
<input type="checkbox"/>	BM_MD_Navy_Transfer_1539066212786		  
<input type="checkbox"/>	ES_Theme_Transfer_1539066212786		  
<input type="checkbox"/>	Font testing_Transfer_1539085026126		  
<input type="checkbox"/>	<input checked="" type="checkbox"/> IQP AM_Theme_Transfer_1539066190326		  
<input type="checkbox"/>	IQP AT_Theme_Transfer_1539066190326		  
<input type="checkbox"/>	IQP Defaults		  

4. In each row containing a theme that you want to delete, select the check box.

5. In the workspace heading, select , and then select **Delete themes**.

A message appears, asking you to confirm that you want to delete the themes. If, however, a theme is used in an application, a list of applications that use the theme appears, and you cannot delete the theme.

 **Tip:**

Alternatively, in each row containing a theme that you want to delete, select , and then select **Delete theme**.

6. Select **Delete**.

The themes are deleted.



# Settings

## About Settings

You can configure the following settings for an application:

- Display brief or detailed error information in the error messages
- Display or hide a button for accessing trace information
- Display or hide a busy indicator to indicate that a page is loading data from a query
- Display or hide the title of the application
- Display or hide the user pages, which are used to change the password of the user and access user settings from the application
- Automatically close error pop ups without manual intervention

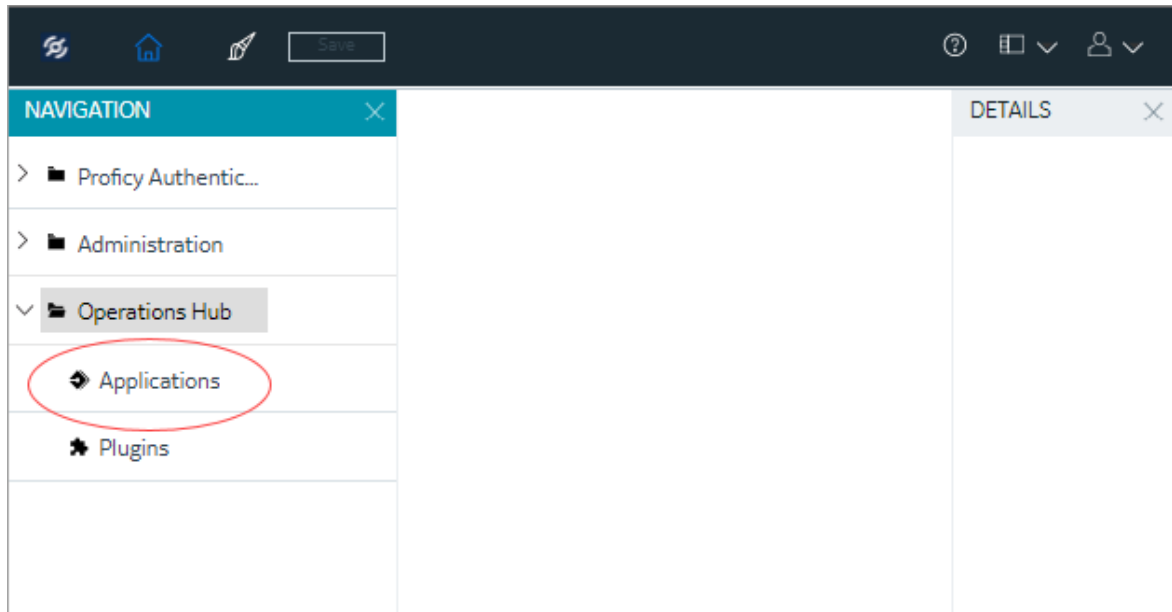
## Modify Settings

Steps to modify application settings in the latest version of Operations Hub.

Log in to Configuration Hub.

For steps to modify application settings in the Operations Hub classic version, refer to [Modify Settings \(Classic\)](#) (on page 491).


1. On the navigation panel, select **Operations Hub > Applications**.




The existing list of applications appear.

## 2. Select the application you want to modify.

The following fields appear under **GENERAL SETTINGS** on the details panel.

Field Name	Field Description
Show extended error information	Select this check box if you want detailed error information to appear in error messages. You can use this information to troubleshoot issues in the application.
Show trace button	Select this check box if you want to display a button that allows you to access information on the data retrieved from queries, functions, and global variables that are used in the application. It also includes data that is inserted or updated using queries. When you select this check box (and save your changes), a <b>Trace</b> appears in the application. You can select this button to view the trace information.
Hide loading in application	Select this check box if you do not want to display a busy indicator to indicate that a page is loading data from a query.
Hide application title	Select this check box if you do not want the title of the application to appear when you access the application.
Show User Pages	Select this check box if you want to display user pages in the application navigation menu. These pages are used to change the password of the user and access user settings using the application. If you select this check box, the option to access the user pages appears in the application title. If, however, the <b>Hide application title</b> check box is selected, the option is moved to the navigation menu of the application.
Auto-dismiss errors after 10 seconds	Select this check box to automatically dismiss error messages after 10 seconds if they pop up in the end application. Recommended for hands-free environments.
Show navigation icons for application history	<p>Select this check box to show  navigation icons on the banner of your application. The back/forward navigation icons work within the scope of an individual application.</p> <p>Use the navigation icons to <code>Go to previous page</code> or <code>Go to next page</code>. The icons are activated based on the entries for the current application session history.</p>

3. To enable the settings for an application, turn on the respective toggle switch.

DETAILS	
Title	Value
▼ GENERAL SETTINGS	
Show extended error inf...	<input type="checkbox"/>
Show trace button	<input type="checkbox"/>
Hide loading in applicati...	<input type="checkbox"/>
Hide application title	<input type="checkbox"/>
Show User Pages	<input type="checkbox"/>
Auto-dismiss errors afte...	<input checked="" type="checkbox"/>
Show navigation icons f...	<input type="checkbox"/>
▼ GROUPS 	

4. Select **Save** on the toolbar.

## Modify Settings (Classic)

Steps to modify application settings in the Operations Hub classic version.

Log in to Operations Hub.

For steps to modify application settings in the latest version of Operations Hub, refer to [Modify Settings \(on page 489\)](#).

1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import [Settings] [Navigation] 1 [Navigation] Quick Filter

Name	Description	Last updated	
Asset Management	Manage Devices	3 months ago by Docs Team	🔒 ↗ ⚙
Asset Testing	Test Devices	3 months ago by Docs Team	🔒 ↗ ⚙
Building Monitor_Step1	Simple Sample App	3 months ago by Docs Team	🔒 ↗ ⚙
Building Monitor_Step2	Step 1 with History	3 months ago by Docs Team	🔒 ↗ ⚙
Building Monitor_Step3	Step 2 with Repeater	3 months ago by Docs Team	🔒 ↗ ⚙
Building Monitor_Step4	Step 3 and gauges	3 months ago by Docs Team	🔒 ↗ ⚙
Building Monitor_Step5	Step 4 with data from Pivot Entity	3 months ago by Docs Team	🔒 ↗ ⚙
ES Event Map View	Monitor Tags and Events with Map	3 months ago by Docs Team	🔒 ↗ ⚙
ES_M2MvsPivot	M2M vs Pivot Comparison	3 months ago by Docs Team	🔒 ↗ ⚙
Store Temp App	temp	2 months ago by Docs Team	🔒 ↗ ⚙

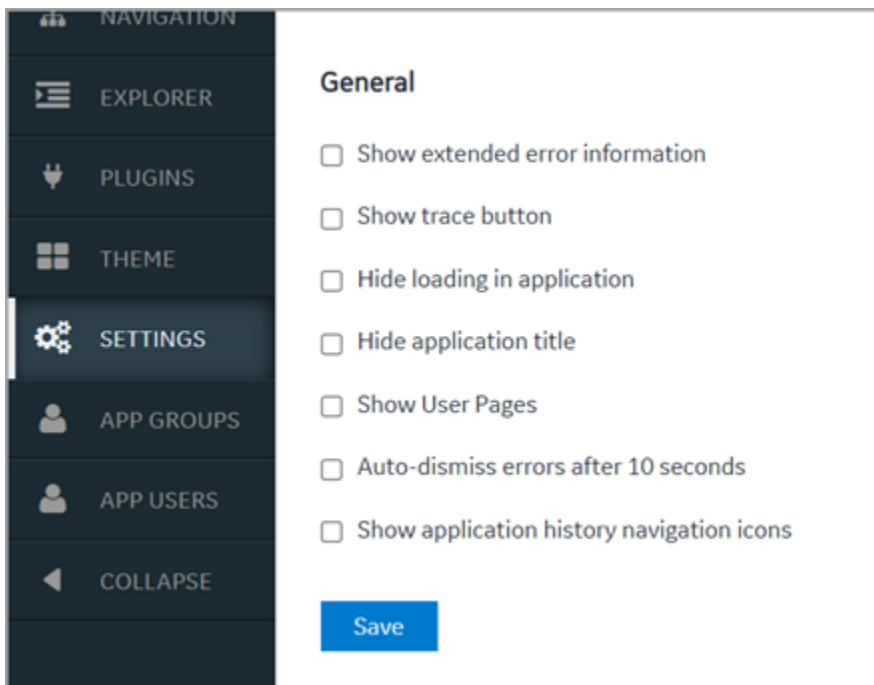
- In the **Name** column, select the application whose settings you want to modify.  
The **PAGES** workspace appears.

Apps > Asset Management > Pages

+ Add new page [Settings] 🔒 [Preview App]


Name	Description	
1 Dashboard	Homepage	⚙
2 Supported Devices Types	Manage device types	⚙
3 Manage Devices	Manage devices	⚙
4 Device Type Metrics	Manage metrics	⚙
5 Device Type Groups	Manage groups	⚙
Template	A template for new pages	⚙

- In the main navigation menu, select **SETTINGS**.  
The **SETTINGS** workspace appears.



4. As needed, modify values as described in the following table.

Field	Description
Show extended error information	Select this check box if you want detailed error information to appear in error messages. You can use this information to troubleshoot issues in the application.
Show trace button	Select this check box if you want to display a button that allows you to access information on the data retrieved from queries, functions, and global variables that are used in the application. It also includes data that is inserted or updated using queries. When you select this check box (and save your changes), a <b>Trace</b> appears in the application. You can select this button to view the trace information.
Hide loading in application	Select this check box if you do not want to display a busy indicator to indicate that a page is loading data from a query.
Hide application title	Select this check box if you do not want the title of the application to appear when you access the application.
Show User Pages	Select this check box if you want to display user pages in the application navigation menu. These pages are used to

Field	Description
	change the password of the user and access user settings using the application. If you select this check box, the option to access the user pages appears in the application title. If, however, the <b>Hide application title</b> check box is selected, the option is moved to the navigation menu of the application.
Auto-dismiss errors after 10 seconds	Select this check box to automatically dismiss error messages after 10 seconds if they pop up in the end application. Recommended for hands-free environments.
Show navigation icons for application history	<p>Select this check box to show  navigation icons on the banner of your application. The back/forward navigation icons work within the scope of an individual application.</p> <p>Use the navigation icons to <code>Go to previous page</code> or <code>Go to next page</code>. The icons are activated based on the entries for the current application session history.</p>

5. Select **Save**.

The settings are modified.

## Widgets

### About Widgets (Classic)

When you design a page for an application, you can add widgets to the page to display the required information.

## Native Widgets

INPUTS	DISPLAY	LAYOUTS	TOOLS
<ul style="list-style-type: none"> <li>• <a href="#">Check Box (on page 496)</a></li> <li>• <a href="#">Radio Button (on page 498)</a></li> <li>• <a href="#">Dropdown (on page 499)</a></li> <li>• <a href="#">Input (on page 501)</a></li> <li>• <a href="#">Slider (on page 504)</a></li> <li>• <a href="#">Toggle (on page 505)</a></li> <li>• <a href="#">Button (on page 506)</a></li> <li>• <a href="#">Camera (on page 508)</a></li> <li>• <a href="#">Text Area (on page 509)</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Text (on page 509)</a></li> <li>• <a href="#">Header (on page 510)</a></li> <li>• <a href="#">Image (on page 511)</a></li> <li>• <a href="#">Graph (on page 512)</a></li> <li>• <a href="#">Visualization (on page 515)</a></li> <li>• <a href="#">Big Data (on page 519)</a></li> <li>• <a href="#">Grid (on page 524)</a></li> <li>• <a href="#">Map (on page 526)</a></li> <li>• <a href="#">Table (on page 530)</a></li> <li>• <a href="#">List (on page 532)</a></li> <li>• <a href="#">Gauge (on page 532)</a></li> <li>• <a href="#">Html (on page 538)</a></li> <li>• <a href="#">Interactive Map (on page 549)</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">New Line (on page 552)</a></li> <li>• <a href="#">Separator (on page 552)</a></li> <li>• <a href="#">Container (on page 552)</a></li> <li>• <a href="#">Repeater (on page 553)</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Event Settings (on page 569)</a></li> <li>• <a href="#">Upload Excel (on page 570)</a></li> <li>• <a href="#">Upload Devices (on page 572)</a></li> </ul>

## Integration Plug-ins

Category	Widgets
INPUTS	<a href="#">Button (on page 575)</a> , <a href="#">Check Box (on page 577)</a> , <a href="#">Date Picker (on page 578)</a> , <a href="#">DateTime Range Picker (on page 581)</a> , <a href="#">Dropdown (on page 583)</a> , <a href="#">Radio Button (on page 586)</a> , <a href="#">Slider (on page 588)</a> , <a href="#">Text Area (on page 589)</a> , <a href="#">Text Input (on page 590)</a> , <a href="#">Toggle (on page 591)</a> .

Category	Widgets
CHARTS	Line Chart ( <a href="#">on page 592</a> ), Pie Chart ( <a href="#">on page 596</a> ), Bullet Graph ( <a href="#">on page 598</a> ), Histogram ( <a href="#">on page 601</a> ), Pareto Chart ( <a href="#">on page 607</a> ), Sparkline ( <a href="#">on page 609</a> ), Spider Chart ( <a href="#">on page 611</a> ), Timeline ( <a href="#">on page 614</a> ), Trend Card ( <a href="#">on page 619</a> ), Variwide Chart ( <a href="#">on page 642</a> ).
HMI	CIMPLICITY HMI Webpace ( <a href="#">on page 645</a> ), iFIX HMI Webpace ( <a href="#">on page 673</a> ), Alarm Card ( <a href="#">on page 685</a> ), Alarm Count ( <a href="#">on page 697</a> ), Mimic Card ( <a href="#">on page 697</a> ).
DISPLAY	DataGrid ( <a href="#">on page 715</a> ), Gauge Bar ( <a href="#">on page 723</a> ), Gauge Circular ( <a href="#">on page 725</a> ), Gauge Linear ( <a href="#">on page 727</a> ), Solid Gauge ( <a href="#">on page 734</a> ), Value Display ( <a href="#">on page 738</a> ), Pivot Grid ( <a href="#">on page 729</a> ), Image ( <a href="#">on page 743</a> ), Simple Indicator ( <a href="#">on page 745</a> ), Indicator ( <a href="#">on page 746</a> ), List ( <a href="#">on page 750</a> ), Text Display ( <a href="#">on page 751</a> ).
BATCH	Batch Menu ( <a href="#">on page 776</a> ), Batch List ( <a href="#">on page 777</a> ), Batch SFC ( <a href="#">on page 777</a> ), Batch Prompts ( <a href="#">on page 778</a> ), Batch Binding Prompts ( <a href="#">on page 779</a> ), Batch Alarms ( <a href="#">on page 780</a> ), Batch Phase Control ( <a href="#">on page 781</a> ), Batch Control ( <a href="#">on page 782</a> ), Batch Parameter ( <a href="#">on page 785</a> ), Batch Recipe Info ( <a href="#">on page 785</a> ), Batch Reports ( <a href="#">on page 785</a> ), Batch Step Control ( <a href="#">on page 786</a> ), Batch Step List ( <a href="#">on page 787</a> ).
GENERAL	Breadcrumb ( <a href="#">on page 756</a> ), Task Client ( <a href="#">on page 767</a> ), iFrame ( <a href="#">on page 765</a> ), Favorite Organizer ( <a href="#">on page 759</a> ), HTML Editor ( <a href="#">on page 763</a> ).

## Custom Plug-ins

Custom plug-ins can be added to Operations Hub through use of the Plug-in infrastructure. To learn more about plug-ins, refer to the [About Plug-ins \(on page 350\)](#) section.

## Native

### Inputs

#### Check Box

A check box widget is used to allow application users to choose between two mutually exclusive options. For example, you can use a check box to allow the application user to specify whether the user has read the license agreement. You can also use a check box to display or hide other widgets on the page. To use the new version, refer to [Check Box \(on page 577\)](#).



## Check Box Properties

When you use a check box widget, in addition to providing values for the default fields for a widget, you must define the following settings:

Field Name	Description
Target Data	If this check box only represents input to a single query, you can select the target input from the list of inputs to the queries that have been added in the <b>Page Data</b> section.
Source	Identifies the source of the check box value. You can specify one of the following types of sources: <ul style="list-style-type: none"> <li>• <b>Data</b>: Select the source of data from the list of outputs from the queries that have been added in the <b>Page Data</b> section.</li> <li>• <b>Manual</b>: Select this option if you want to set true and false as the check box options.</li> </ul>

## Use the Check Box to Display or Hide a Camera Button

To use a check box widget to display or hide a **Camera** button, perform the following steps:

1. Add the check box and camera widgets to the page.
2. In the **CHECKBOX PROPERTIES** section, enter values in the **Label** and **Id** boxes, and then select the **Global Data** check box.
3. In the **CAMERA PROPERTIES** section, select **Add conditions**.
4. In the **Camera Conditions** window, select **Add condition**, and then enter or select values as shown in the following image.

### Camera Conditions ✕

Home - CB ▼

= ▼

Manual ▼

True ▼

🗑️

+ Add condition

Done



### Note:

In this case, CB was the ID specified for the check box widget.

5. Select **Done**, and then save the application.

In the application, the **Camera** button appears only if you select the check box.

## Radio Button

A radio button is a graphical user interface element that allows a user to select one option out of a set of predefined options. Unlike check boxes, which allow multiple selections, radio buttons require that only one option is selected. To use the new version, refer to [Radio Button \(on page 586\)](#).

### Radio Button Properties

Field Name	Description
Target Data	The target data defines where the information will be sent.
Options	Radio buttons require multiple options that are mutually exclusive. Use these available options to create items for each radio button: <ul style="list-style-type: none"> <li>• Select <b>Hard Coded</b> to manually create items for radio buttons.               <ol style="list-style-type: none"> <li>1. Select <b>+ Add Option</b>.</li> <li>2. Enter <b>Option text</b>.</li> <li>3. Enter <b>Option value</b>.</li> </ol> </li> <li>• Select <b>Dynamic</b> to create items using queries.               <ol style="list-style-type: none"> <li>1. Select a <b>Value</b> from the database.</li> <li>2. Select the <b>Displaytext</b>.</li> </ol> </li> </ul>
Data	Select this option if you want to provide data by means of a query output or a global parameter.
Manual	Select this option if you want to manually provide data.
Submit on change	Select the check box if you want to submit the query whenever the input value is updated.

### Possible Uses

Radio buttons require only one selection out of multiple options. If there are only two options, a radio button is unlikely to be the best widget choice. One example could be selecting an answer on a questionnaire where the choices are: Agree, Neutral, and Disagree. Only one of these answers can be selected, because they are mutually exclusive.

#### **Example**

1. Add a radio button and a header on a page.
2. Specify the name in the **Id** box.
3. Select the **Global Data** check box to set the selected value to global.
4. In the **Options** box, select **Hard Coded**.
5. Select **+ Add Option** three times, and enter Agree, Neutral, and Disagree, and the corresponding values of 1, 2, 3.
6. For the header, in the **Data** box, select the global value of **RB** that was set in step 3.
7. Save the application, and preview it.

The corresponding values appear in the header.

## Dropdown

Allows to use standard features of a dropdown.

A dropdown is a graphical user interface element that allows a user to select one option out of a set of predefined options. Dropdowns are characterized by a wider set of options than that of a radio button. Radio buttons rarely have more than three options, while dropdowns can contain many more options. For advanced features, use the multi-feature [Dropdown \(on page 583\)](#).

### Dropdown Properties

Field Name	Description
Required	Select the check box to send the input to the query.
Target Data	The target data defines where the information will be sent.
Options	<p>Dropdowns require multiple options that are mutually exclusive. Use these available options to populate dropdown list items:</p> <ul style="list-style-type: none"> <li>• Select <b>Hard Coded</b> to manually enter and fill items for the dropdown. <ol style="list-style-type: none"> <li>1. Select <b>+ Add Option</b>.</li> <li>2. Enter <b>Option text</b>.</li> <li>3. Enter <b>Option value</b>.</li> </ol> </li> <li>• Select <b>Dynamic</b> to populate dropdown list items using queries. <ol style="list-style-type: none"> <li>1. Select a <b>Value</b> from the database.</li> <li>2. Select the <b>Display</b> text.</li> </ol> </li> </ul>
Data	Select this option if you want to provide data by means of a query output or a global parameter.

Field Name	Description
Manual	Select this option if you want to manually provide data.
Submit on change	Select the check box if you want to submit the query whenever the input value is updated.
First Option	By default, the first option in a dropdown is blank. It is recommended to manually enter option text such as <code>please select</code> , instead of a dropdown that appears empty. Enter its option value to be <code>none</code> .

## Possible Uses

Dropdowns are similar in nature to radio buttons in that they require a mutually exclusive selection. However, while radio buttons are generally used for options between only a few choices, dropdowns can include hundreds of choices. One example of a drop-down list box could be selecting a country of residence. Every country in the world will take up too much space if displayed as radio buttons, while in a drop-down list box, the information can be more elegantly contained. The information selected could be converted to other information depending on the target data. For example, the country could be changed to a telephone prefix by setting the value to be telephone prefix and the display as the country name.

**Example:** An entity named Wiki has been already defined to store the prefecture names in Japan. The direct option value entering of 47 prefecture names is not productive. This entity value usage is productive. The necessary steps are just to specify this entity in the property after allocating dropdown on a page. In this sample, an entity field called PREF is specified both for Display and Value, where the prefecture names are stored.

1. Drag-and-drop the dropdown widget to a container.
2. Select the dropdown widget in the container to access the **DROPDOWN PROPERTIES** tab
3. Under the **GENERAL** section, provide the details as specified in the table:

Field Name	Description
Label	Enter <code>Select an option</code> .

4. Under the **DATA** section, provide the details as specified in the table:

Field Name	Description
Target Data	Select a query.
Options	Select <code>Dynamic</code> .

Field Name	Description
Value	Select <small>PREF.</small>
Display	Select <small>PREF.</small>
Submit on change	Select the check box.

In the practical application, a query can be executed based on the option selection in dropdown and the facility or company status in the prefecture can be displayed on a map as markers.


## Input

The input widget is a graphical user interface element that contains a text box.

The input widget differs from a standard text box in that its purpose is to allow the end user to insert information into a database.

## Properties

Field Name	Description
Type	<p>There are several options for the type of data that can be added via an input widget. Depending on the data type set, the system will automatically validate and confirm specific data sets. For example, while a Text type can be anything written in the input, an email address may have specific requirements such as the use of an at sign character (@). If the data type is set for email, the user must include an at sign character (@). If not, an error message appears. The following options are available:</p> <ul style="list-style-type: none"> <li>• Text</li> <li>• Password</li> <li>• Number</li> <li>• Hidden</li> <li>• Date</li> <li>• Time</li> <li>• DateTime</li> <li>• URL</li> <li>• E-mail</li> </ul>

Field Name	Description
	 <b>Note:</b> This DateTime output is not compatible with Historian queries. Use <a href="#">Date Picker (on page 578)</a> instead.
Target Data	Check boxes can alter information in an entity via a query. Target Data indicates where this information will change and how depending on which query inputs are attached.
Source	The data source can be selected based on which queries have been added in the Page Data section. It is also possible to manually insert the data source or to use a formula.
Required	Specify if an input must be sent to the query.
Disabled	If selected, the data input is not allowed.

## Possible Uses

The input has a wide variety of uses. One basic example is that of a login or registration form. Such a form requires specific information to be stored in a database including data such as an email address, name, birthday, password, and other information. The input allows an end user to enter information in various forms in to a database.

In this example, we will create a simple input form using an entity and a query.

1. Add two input widgets to a page for address and name.
2. Add a button to indicate to add the information entered by the input widgets.
3. Create an entity named Wiki Form, and add the following entity fields: ADDR and NAME (data type: string).
4. Create an Insert query named Wiki Form Add to insert data into the entity, as shown in the following image.

Queries > Wiki Form Add

Query Name:

Description:

Query Type:  Get  
 Update  
 Insert  
 Delete

Source:  Entity

---

### Set Data

<input type="text" value="Wiki Form -&gt; ADDR"/>	Value: <input type="text" value="Input field"/>	Input Data Name: <input type="text" value="ADDR"/>	<input type="button" value="🗑"/>
<input type="text" value="Wiki Form -&gt; NAME"/>	Value: <input type="text" value="Input field"/>	Input Data Name: <input type="text" value="NAME"/>	<input type="button" value="🗑"/>

5. Add the query to the application in the **Data Page** section, as shown in the following image.

Container Properties | Page Data

Query

▼ Wiki Form Add

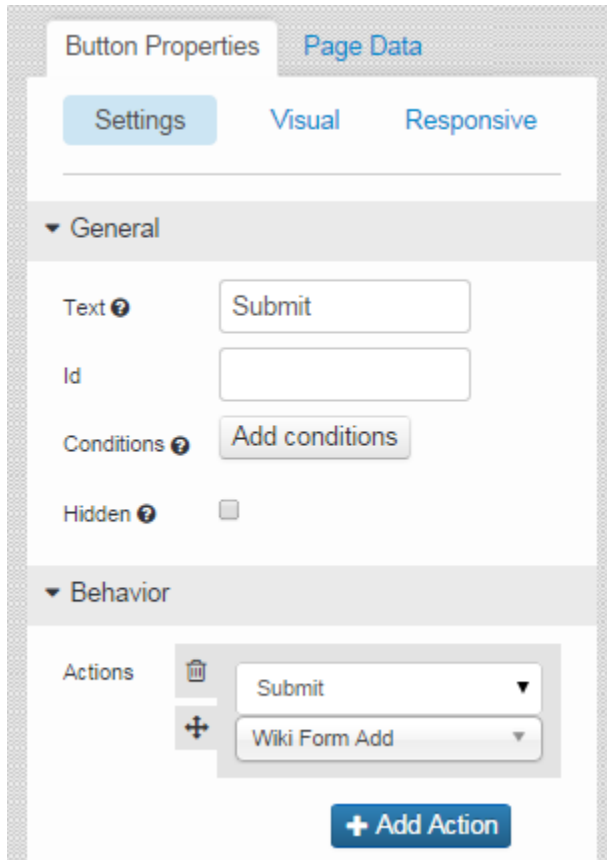
Auto submit (as soon as data is available)  
 Auto update  
 Auto submit on input change  
 Multiple result

Row Limit

**Inputs**

6. Drag and drop the query input fields to the connect them to the input widgets.

- In the Button Properties section for the button widget, specify the action to execute the insert query, as shown in the following image.



- Save the application, and preview it.

In the application, when you enter values and submit, the information is stored in the entity.

## Slider

A slider is a graphical user interface element that is used to indicate an amount or value by means of an indication hash marker that can move on a horizontal plane that has a value indication. To use the new version, refer to [Slider \(on page 588\)](#).

### Slider Properties

Field Name	Description
Source	The data source can be based on which queries have been added in the <b>Page Data</b> section. It is also possible to manually insert the data source or to use a formula.



Field Name	Description
Required	Specify if an input must be sent to the query.
Submit on Change	If selected, changing the value of the input submits the query to which this input is assigned.
Step	The spacing between variables on the horizontal plane of the slider.
Minimum	Sets the minimum variable on the horizontal plane of the slider. This number appears on the left side of the plane.
Maximum	Sets the maximum variable on the horizontal plane of the slider. This number appears on the right side of the plane.

## Possible Uses

A slider can be used for any of the following purposes:

- To provide a number selector.
- To indicate the volume on an audio recorder or a maximum/minimum price.
- To allow a user to select a price they would be willing to pay as part of a filter system for search results.

## Toggle

A toggle button contains two opposing, binary states based on Boolean logic. On/Off is the default for the button, because this is the most common use. To use the new version, refer to [Toggle \(on page 591\)](#).

## Toggle Properties

When you use a check box widget, in addition to providing values for the default fields for a widget, you must define the following settings.

Field Name	Description
Source	The data source can be based on which queries have been added in the <b>Page Data</b> section. It is also possible to manually insert the data.
Required	Specify if an input must be sent to the query.
Submit on Change	If selected, changing the value of the input submits the query to which this input is assigned.

Field Name	Description
True Label	There are two states on a toggle button. The <b>True Label</b> setting refers to the label of the active state.
False Label	There are two states on a toggle button. The <b>False Label</b> setting refers to the label of the inactive state.
Width	The width of the toggle button.

## Possible Uses

Toggle buttons are generally used for on/off actions. For example, if a setting or feature is active/inactive, this can be controlled with a toggle button.

This example describes the device on/off switching using a Toggle button.



### Note:

Without an actual device or a simulator, the real action result cannot be seen.

1. In the page designer, add a toggle widget and two input widgets.
2. In **Page Data** section, add a function to the page, such as IQAW Set Immobilizer State.
3. Drag the function parameters to connect to the input widgets and the toggle widget. Note that function (command) itself (IQAW Set Immobilizer State) should be connected to the toggle widget.

## Button

Buttons are used to start any action. By default, the text Submit appears on a button. It indicates that it is used to submit information that an application user provides using other widgets. To use the new version, refer to [Button \(on page 575\)](#).

Buttons can perform a variety of actions, and can even perform multiple actions. Each specific action has its own choices. For example, if the action of selecting a button is to go to a specific page, that page can be selected after the action is selected in the same grey box.

In addition, you can arrange actions in a sequence. For example, if the selecting a button will both hide a component and submit data entered by a user, the action can first hide the component, and then submit the data, or vice versa.

## Button Properties

Field Name	Description
<b>Submit</b>	Sends information to an entity.
<b>Go to page</b>	Redirects to a different page in the application (for example, from the home page to a different page in the navigation).
<b>Go to previous page</b>	Redirects to one page back in history based on the entries created for the current application session.  In the absence of previous session entries, the button does not redirect to any page.
<b>Go to next page</b>	Redirects to one page forward in history based on the entries created for the current application session.  In the absence of forward (next) session entries, the button does not redirect to any page.
<b>URL</b>	Redirects a user to a URL outside the application.
<b>Set global value</b>	If selected, the data here will be available globally. Global data means that an entity changed in one part of the application will change across the application.
<b>Show Component</b>	Displays a hidden component.
<b>Hide Component</b>	Hides a component.
<b>Toggle Show/Hide</b>	Some widgets are marked as shown or hidden and the <b>Toggle Show/Hide</b> action will switch between hidden and shown views of a component.

## Visual

Button types are design presets that can help create a better hierarchy and a better look and feel for an application. It is recommended to use button types to fit a button to its use. For example, a delete button might be a Negative type. The following button types are available:

- Primary
- Secondary
- Positive
- Negative
- Link

## Possible Uses

Buttons can be used for a variety of purposes. In general, buttons are used in conjunction with other widgets. For example, if a user makes a series of selections with drop-down list boxes, check boxes, and radio buttons, they can then select a **Submit** button that will record the user's choices in an entity. Buttons can also be used to refresh a page, send a user to another page, set a global value, or show/hide content depending on how the button is configured.

This example shows how to create a window.

1. Add a button widget in the page designer.
2. Add a container below the button widget, and provide an ID for the container.
3. In the container, add several input widgets, and set the display condition of the container to Hidden.
4. In the **Button Properties** section of the button, set the action of Show Component, and specify the container ID.
5. Save the application, and preview it.

In the application, if you select the button, the container appears.

## Camera

This widget is available only in Operations Hub Classic version.

The camera widget is a button that will open a default camera based on the device used by the application user. If a camera does not exist, you can select an image. For example, if you use an iPhone to access the application, and they select the camera button, the default iPhone camera options page appears. After you capture an image with the default camera, the image is held in the local memory of the application until you perform an action (such as linking the image display so the image appears in the application).

### Camera Properties

When you use a camera widget, in addition to the default settings, the following settings are available.

Field Name	Description
<b>Max Width</b>	The maximum width of the uploaded image in pixels. This setting is optional.
<b>Max Height</b>	The maximum height of the uploaded image in pixels. This setting is optional.

## Possible Uses

You can use the camera widget to allow an application user to add images to an application or database.

Example:

- If an application deals with selling goods, a user can upload an image of the goods that they want to sell.
- If an application deals with car rentals, a user can capture a photo to report a car accident, and then save it to the database. The rental agency can then view the image.

## Text Area

The text area widget allows a user to provide large amount of text using an application. This widget contains a scroll bar. To use the new version, refer to [Text Area \(on page 589\)](#).

### Text Area Properties

To use a text area widget, in addition to the default settings, the following settings are available.

Field Name	Description
<b>Source</b>	The source of data based on which queries have been added in the <b>Page Data</b> section. You can also enter the data source manually or use a formula.
<b>Required</b>	Identifies if an input must be sent to the query.
<b>Submit on Change</b>	If selected, changing the value of the input submits the query to which this input is assigned.

## Possible Uses

A standard text box can handle large amounts of text, but it may not be user-friendly because not all of the text can be seen or edited at once. If a user wants to submit a comment, for example, a text area allows them to write several sentences and view the text as a paragraph (for example, license agreement or privacy policy, which usually contains a large amount of text).

## Display

### Text

The text widget allows you to display text in an application. An application user can read the text, but cannot modify it. To use the new version, refer to [Text Display \(on page 751\)](#).

## Text Properties

To use a text area widget, in addition to the default settings, the following settings are available.

Field Name	Description
<b>Source</b>	The source of data based on which queries have been added in the <b>Page Data</b> section. You can also enter the data source manually or use a formula.
<b>Format</b>	You can select one of the following values: <ul style="list-style-type: none"> <li>• <b>Text</b>: Default value</li> <li>• <b>DateTime</b></li> <li>• <b>Date</b></li> <li>• <b>Time</b></li> </ul>

## Possible Uses

Since this widget can be connected to a query in the **Page Data** section, updated information can be displayed in the application. For example, if the application is used to display sports scores, the text box can be connected to an entity via a query that will display the score in a sport. The user can read the text, but cannot modify it.

## Using a Text Widget to Display the Current Date and Time

1. In the **Page Data** section, select **Global**.
2. In the **System Globals** section, select **Date time (Local)**, and then select **Add**. System globals are provided as standard functions.
3. Add a text widget, and enter an label.
4. Drag the system global that you have added to connect to the text widget. Or, select the system global in the **Data** box.
5. Save the application, and preview it.

The application displays the current date and time.

## Header

This widget is available only in Operations Hub Classic version.

Headers are generally larger amounts of text that are used to create titles to divide an application in to different areas depending on their content.

## Header Properties

To use a header widget, in addition to the default settings, the following settings are available.

Field Name	Description
Type	You can create three different sizes of headers: Header 1 (largest) to Header 3 (smallest) so that a hierarchy can be created based on text size.
Format	You can select one of the following values: <ul style="list-style-type: none"> <li>• <b>Text</b>: Default value</li> <li>• <b>DateTime</b></li> <li>• <b>Date</b></li> <li>• <b>Time</b></li> </ul>

## Possible Uses

If an application has several different areas, you can use a header to create order and hierarchy.

For example, a food application for a grocery store may divide food in to several categories such as dairy, meat, and produce. These larger topics (Header 1) can then be divided in to smaller parts. For example, the produce header can contain two smaller headers (Header 2) underneath for fruits and vegetables. Within the category of vegetables, there may be an additional category of root vegetables that may have a smaller sized header (Header 3) with a list of different root vegetables underneath.

## Image

Using the image widget, you can insert an image in to an application. Application users can see the image, but cannot manipulate it, since it is display-only. Images can be attached to the entities via queries and then shown to application users. To use the new version, refer to [Image \(on page 743\)](#).

## Image Properties

When you use an image widget, in addition to the default settings, the following setting is available:

Field Name	Description
Source	The data source can be based on which queries have been added in the <b>Page Data</b> section. It is also possible to provide a URL or select a file from the local machine.

## Possible Uses

You can add an image gallery in an application by adding several image widgets. Additionally, if application users use the camera widget, they can take an image, and then upload the image in to their application with a button. The button can send the image to an entity, and a query of that entity can use the image widget to display the picture.

Suppose you want to insert an image in an application, and want to direct the user to the home page when the image is selected. In that case, perform the following steps:

1. In the page designer, add an image widget to a page other than the home page.
2. Select the **File** option, and select **Choose File**.
3. Select the image that you want to insert in the application.
4. In the **Image Properties** section, in the **Actions** box, select the action to go to the home page.
5. Save the application, and preview it.

When you select the image, the home page appears.

## Graph

Graphs are data visualizations that you can add to display data in an application.

This widget is available only in Operations Hub Classic version.



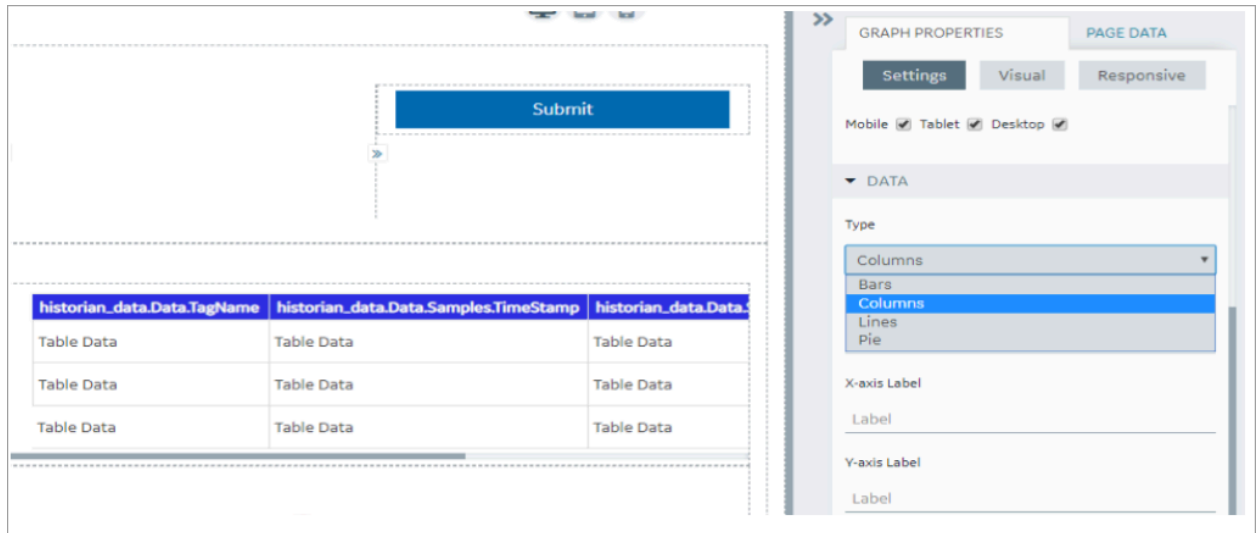
### Note:

You need external Internet access to use the graph widget.



## Graph Properties

To use a graph widget, in addition to the default settings, you must specify one of the following types of



graphs.

**Bars:** Bar graphs show comparison among categories vertically. Specify the following settings for a bar graph:

Field Name	Description
<b>X-axis Label</b>	Displayed below the graph horizontally.
<b>Y-axis Data</b>	The data source for the bars.
<b>Y-axis Label</b>	Displayed on the left side of the bar graph.
<b>Add All Fields</b>	This will add all the columns from the chosen entity. Each column can be labeled independently.
<b>Sort By</b>	Since an entity can contain several different types of data, it is possible to sort the data depending on the data in an entity.

**Columns:** Column graphs are similar to bar graphs but are shown vertically instead of horizontally. Specify the following settings for a column graph:


Field Name	Description
<b>X-axis Label</b>	Displayed below the graph horizontally.
<b>X-axis Data</b>	The data source for the columns.
<b>Y-axis Label</b>	Displayed on the left side of the graph.

Field Name	Description
<b>Add All Fields</b>	This will add all the columns from the chosen entity. Each column can be labeled independently.
<b>Sort By</b>	Since an entity can contain several different types of data, it is possible to sort the data depending on the data in an entity.

**Lines:** Line graphs show how data changes over specific intervals of time. Specify the following settings for a line graph:

Field Name	Description
<b>X-axis Label</b>	Displayed below the graph horizontally.
<b>X-axis Data</b>	The data source for the lines.
<b>Y-axis Label</b>	Displayed on the left side of the graph.
<b>Add All Fields</b>	This will add all the columns from the chosen entity. Each column can be labeled independently.
<b>Sort By</b>	Since an entity can contain several different types of data, it is possible to sort the data depending on the data in an entity.

**Pie:** In a pie graph, rather than axis points, there is a value that can be set to a query to post data on the pie graph. Specify the following settings for a pie graph:

Field Name	Description
<b>Value</b>	The output value from the data source.
<b>Title</b>	<p>The title of the graph widget is linked to a query tag property field, enabling the title to be dynamically generated based on data retrieved from the data source.</p> <div style="border: 1px solid #00a0e3; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b> This field is mandatory to generate a pie graph.</p> </div>
<b>Sort By</b>	Depending on the data, sorting may be necessary in order to highlight certain information. Once the sort feature has been selected, it is possible to select ascending or descending order.

## Possible Uses

Graphs are a way to show data visually. For example, if 50 students enrolled for a course, you can use a graph widget to show how their grades have changed over time or it may be beneficial to show what grades the students received by percent.

When you plot the data stored in the M2M Entities using a graph widget, timestamp values are displayed in the following format: hh:mm

## Downloading Data from a Graph

You can download data from an entity in a Microsoft Excel worksheet using a graph widget. To do so, in the **Graph Properties** section, select the **Allow Download** check box. The download button appears in the upper-right corner of the widget in the application.



### Note:

- Downloading occurs based on the query last executed as shown in the graph.
- If the query is executed for the specific date range using Input boxes, for example, data is downloaded based on the condition specified.
- The entity data connected to the graph is downloaded, not the graph itself.
- If multiple queries are connected to the graph, a separate Microsoft Excel worksheet is generated for each query, and it is downloaded in a single worksheet.
- In the `time_stamp` related fields of the M2M\_data Entity, the values of milliseconds are also stored. However, only hour, minute, and second values can be displayed when you use the graph widget.

## Visualization

This widget is available only in Operations Hub Classic version.

A visualization widget is a graph with additional features. The following features are available in a visualization widget:

- Line chart
- Area chart
- Bar chart
- Stacked bar chart
- Donut chart

- Multiple charts
- Additional y-axis
- Zooming in or out
- Grid lines
- Rotation
- Support of negative values
- Improved look and feel of tooltips
- Ability to focus on a specific field on the chart
- Grouping using a query field



**Important:**

Due to the format of the data returned by Historian REST calls, the Visualization widget cannot display data from Historian sources.

## Visualization Properties

When you use a visualization widget, in addition to the default settings of a widget, the following settings are available.

Field Name	Description
<b>Flow</b>	Select the query (from the ones added in the <b>PAGE DATA</b> section) that should be used to retrieve information in the graph.
<b>Switch Row/Column</b>	Select this check box if you want to switch the x-axis and y-axis data.
<b>X-axis</b>	Provide values in the following boxes for x-axis settings: <ul style="list-style-type: none"> <li>• <b>Data:</b> Select the query field whose data should be plotted on the x-axis.</li> <li>• <b>Label:</b> Enter a label for the x-axis.</li> <li>• <b>Rotate Ticks:</b> Select this check box to rotate ticks and avoid overlapping of data. The x-axis ticks might overlap if the data is large.</li> <li>• <b>Grid lines:</b> Select this check box if you want to show grid lines.</li> </ul>
<b>Y-axis</b>	Provides values in the following boxes for y-axis settings:

Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Label:</b> Enter a label for the y-axis.</li> <li>• <b>Grid Lines:</b> Select this check box if you want to show grid lines.</li> <li>• <b>Range:</b> Select whether the range of the y-axis should be set automatically or manually. If you select <b>Manual</b>, the <b>Min</b> and <b>Max</b> boxes appear, in which you must enter values.</li> </ul>
<b>Data</b>	<p>Provide values in the following boxes for the data settings:</p> <ul style="list-style-type: none"> <li>• <b>Name:</b> Enter the name of the graph.</li> <li>• <b>Type:</b> Select the type of the graph: Bars, Lines, Area, or Donut.</li> <li>• <b>Data:</b> Select the data source of the graph.</li> <li>• <b>Stacked:</b> Select this check box if the graph should be plotted as a stacked bar chart. This option is available only for a bar chart.</li> <li>• <b>Color:</b> Select whether the color of the graph should be selected automatically or manually.</li> </ul>
<b>Add Field</b>	Select this button if you want to plot another field on the graph.
<b>Add All Fields</b>	Select this button if you want to plot all the entity fields.

The screenshot displays a data visualization interface. On the left, a table with three columns is shown:

historian_data.Data.TagName	historian_data.Data.Samples.TimeStamp	historian_data.Data.Samples.Value
Table Data	Table Data	Table Data
Table Data	Table Data	Table Data
Table Data	Table Data	Table Data

Below the table is a combined bar and line chart. The bars are blue, and the line is red with circular markers. A mouse cursor is pointing at the first data point. To the right of the chart is a configuration panel with the following settings:

- Grid Lines:
- Range:  Automatic  Manual
- Group Data:
- Data** section:
  - Name:
  - Display Name:
  - Type:  (dropdown menu with options: Bars, Lines, Area, Donut)
  - Stacked:
  - Color:  Auto  Manual

## Using a Visualization Widget

Suppose you want to plot the following information on a graph:

- Sales amount for two branches - Tokyo and Tel Aviv, plotted as a line chart and an area chart, respectively.
- Sales amount for two products - V26 and V27, plotted as a stacked bar chart.
- Breakdown of sales amount per branch - plotted as a donut chart.

To do so, perform the following steps:

1. Create an entity to store the sales amount for the two branches and the two products.
2. Create a Get query to retrieve the sales amount.
3. In the page designer, in the **PAGE DATA** section of the container, add the query.
4. Add two visualization widgets to the container.
5. Add the following headers for the visualization widgets:
  - Lines/Area and Stacked
  - Donut
6. For the Lines/Area and Stacked chart, provide values as described in the following table for the x-axis.

Setting	Description
<b>Flow</b>	Select the query that you have created.
<b>Data</b>	Select the daily field of the query.
<b>Rotate Ticks</b>	Select the check box.
<b>Grid Lines</b>	Select the check box.

7. Select **Add Field**.

An additional **Data** section appears for the other y-axis.

8. Provide values as specified in the following table for the two y-axes.

Setting	Description for the First Y-Axis	Description for the Second Y-Axis
<b>Label</b>	Enter Amount.	Enter Product.
<b>Grid Lines</b>	Select the check box.	Not applicable
<b>Type</b>	Select <b>Lines</b> .	Select <b>Area</b> .
<b>Data</b>	Select the field that stores the sales amount for the Tokyo branch.	Select the field that stores the sales amount for the Tel Aviv branch.

Setting	Description for the First Y-Axis	Description for the Second Y-Axis
<b>Y-axis side</b>	Select <b>Left</b> .	Select <b>Left</b> .

9. Select **Add Field** twice. Two additional **Data** sections appear for the two y-axes.
10. Provide values as specified in the following table for the two y-axes.

Setting	Description for the First Y-Axis	Description for the Second Y-Axis
<b>Type</b>	Select <b>Bars</b> .	Select <b>Bars</b> .
<b>Data</b>	Select the field that stores the sales amount for the product V27.	Select the field that stores the sales amount for the product V26.
<b>Stacked</b>	Select the check box.	Select the check box.
<b>Y-axis side</b>	Select <b>Right</b> .	Select <b>Right</b> .

11. For the Donut chart, select Add Field twice, and provide values as specified in the following table.

Setting	Description
<b>Flow</b>	Select the query that you have created.
<b>Donut Title</b>	Enter Breakdown Per Branch.
<b>Type</b>	Select <b>Donut</b> for both the boxes.
<b>Data</b>	Select the field that stores the sales amount for V26 and V27, respectively.

12. Save the application, and preview it. The first graph displays a line chart and an area chart for the sales amount of Tokyo and Tel Aviv, respectively. It also displays a stacked bar chart for the sales amount of the two products, V26 and V27. The second graph displays a donut chart for the sales amount of V26 and V27.

## Big Data

This widget is available only in Operations Hub Classic version.

The big data widget is a visualization widget that supports big data. Compared to the visualization widget, the big data widget allows you to specify the range more accurately.



**Note:**

You cannot plot a donut chart or change the format of a date-time variable on x-axis for a big data widget.



**Important:**

Due to the format of the data returned by Historian REST calls, the Big Data widget cannot display data from Historian sources.

## Big Data Properties

When you use a big data widget, in addition to the default settings of a widget, the following settings are available.



▼ Data

Flow:

Switch

Row/Column

Stack Multiple

Bars

---

**X-axis**

Data

Label:

Data

Manual

Rotate Ticks

Grid Lines

Range  Automatic

Manual

Disable

Zoom

Tick Culling  Automatic  
 Manual

---

**Y-Axis**

Label:

Data

Manual

Grid Lines


Range  Automatic  
 Manual

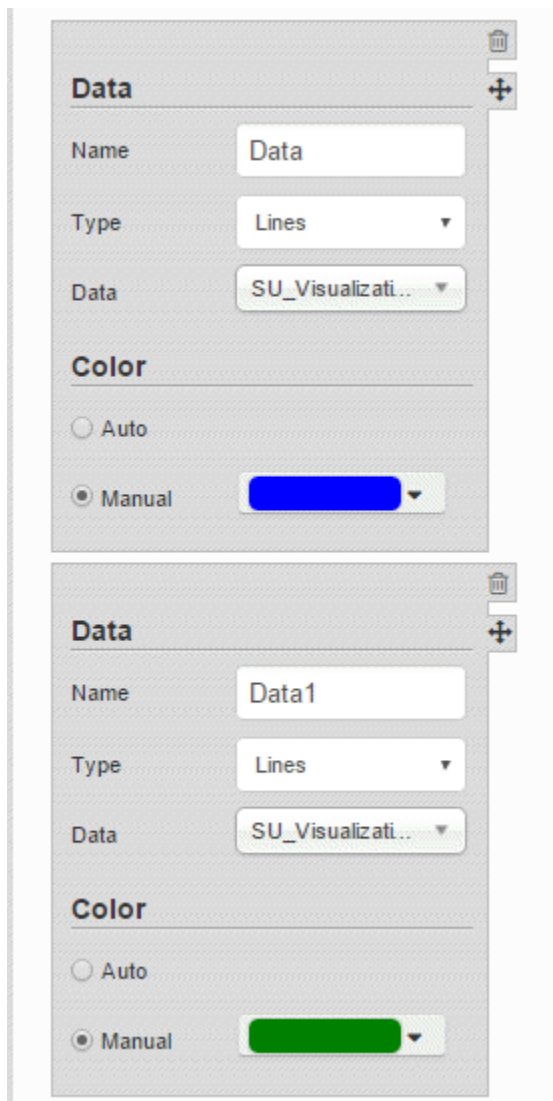
Disable

Zoom

Group Data

---

Second Y-axis 



For instructions on configuring these settings, refer to [Visualization \(on page 515\)](#).







### About Zooming In and Zooming Out

Since the data displayed using a big data widget is huge, you can zoom in a selected area on the graph. To do so, you must specify the area precisely by dragging the mouse pointer on the area.

You can drag the mouse pointer in horizontal, vertical, or diagonal directions.

- If you drag the mouse pointer in a horizontal direction, the zoom-in area is set for only the x-axis.
- If you drag the mouse pointer in a vertical direction, the zoom-in area is set for only the y-axis.
- If you drag the mouse pointer in a diagonal direction, the zoom-in area is set for both x-axis and y-axis.

You can perform the following actions to zoom in or zoom out the widget:

- Zoom in a selected area by selecting .
- Pan across the widget by selecting .
- Zoom in from the center of the widget by selecting .
- Zoom out from the center of the widget by selecting .
- View the complete range of the graph by selecting .
- Reset the zoom level by selecting .

## Grid


This widget is available only in Operations Hub Classic version.

A grid widget functions similar to a table widget. In addition, you can perform the following tasks:

- Change the width of a grid dynamically.
- Rearrange or remove the columns of a grid from an application.
- Export the data displayed in a grid to a .csv file. In addition, you can export data from selected columns.
- Sort the data displayed in a grid.
- View the data in a tree structure.
- Scroll till the end of the grid regardless of the number of rows the grid contains.

## Grid Properties

When you use a grid widget, in addition to the default settings of a widget, the following settings are available.

Field Name	Description
<b>Allow Export</b>	Select this check box if you want to provide an option to application users to export the data in the grid to a .csv file. <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <b>Note:</b> This option is not available on iOS.                     </div>

Field Name	Description
<b>Tooltips</b>	Select this check box if you want tooltips to appear in the application.
<b>Flow</b>	Select the query that should be used to retrieve information in the grid.
<b>Name</b>	Enter the name of the grid column.
<b>Data</b>	Select this option if you want data in the column to be retrieved from an entity field using a column, and then select the field in the drop-down list box.
<b>Formula</b>	Select this option if you want data in the column to be displayed based on a formula. For example, if an entity stores the marks scored by students for individual courses, you can create a formula to display the aggregate marks scored by each student.
<b>Show &lt;number&gt; rows at a time</b>	<p>Identifies the number of rows that should appear by default in the grid. By default, the value in this box is 10. After you enter a value, the following options are available:</p> <ul style="list-style-type: none"> <li>• <b>Load all:</b> If you select this option, the grid will contain all the rows on the same page. However, if you access the application on a mobile device, each page in the grid will contain the number of rows that you specify. You can navigate to the other pages to access the rest of the rows.</li> <li>• <b>Infinite scroll:</b> If you select this option, the grid will contain all the rows on the same page.</li> <li>• <b>Paging:</b> If you select this option, each page in the grid will contain the number of rows that you specify. You can navigate to the other pages to access the rest of the rows.</li> </ul>

## Using a Grid

Suppose you want to use a grid to display a list of managers in an organization and the employees reporting to each manager. To do so, perform the following steps:

1. Create an entity named Wiki Manager, add the fields Manager ID and Manager Name, and add the IDs and names of managers.
2. Create a Get query named Wiki Get All Managers to get all the records from the Wiki Manager entity.
3. Create an entity named Wiki Employee, add the fields Manager ID, Employee ID, and Employee Name, and add the respective details.

4. Create a Get query named Wiki Get Employee by Manager ID with settings as specified in the following image:
5. Create an application, and add a grid using the page designer.
6. In the **PAGE DATA** section, add the Wiki Get All Managers query, and connect all the fields to the grid.
7. Select the **Auto submit (as soon as data is available)** check box.
8. In the **GRID PROPERTIES** section, select the **Tree View** check box.
9. In the **Nested flow** box, select the Wiki Get All Employee by Manager ID query. Two boxes named **Row Limit** and **Manager ID** appear.
10. In the **Manager ID** box, select **Wiki Get All Manager.Manager ID**.
11. In the **Flow** box, select **Wiki Get All Managers**.
12. In the **Name** box, enter **Manager Name**.
13. In the **Data** box, select the field that stores the names of managers.
14. Select **Add Field**, and then provide values as specified in the following table.

Field Name	Description
<b>Name</b>	Enter Manager ID.
<b>Data</b>	Select this option, and then select <b>Wiki Manager</b> in the drop-down list box that appears.
<b>Mapping</b>	Select <b>Wiki Employee</b> .

15. Save the application, and preview it. A grid appears, displaying two sections. The first section contains a list of IDs and names of managers. The second section contains a list of employees that report to each manager.

## Map

This widget is available only in Operations Hub Classic version.

A map widget is used to display a map in an application. It uses the Google Maps feature. You can use the map widget to display the location of a place on a map (for example, the location of each site of a company).



### Note:



You need external Internet access to use the map widget.

To display asset locations on the map, you must [access the API key generated by Google \(on page 85\)](#).

## Map Properties

When you use a map widget, in addition to providing values for the default fields for a widget, you must define the following settings.


Field Name	Description
<b>Label</b>	Identifies the title of the map.
<b>Display</b>	Identifies the type of the map. You can select one of the following values: <ul style="list-style-type: none"> <li>• <b>Roadmap:</b> Displays the streets of an area. By default, this value is selected.</li> <li>• <b>Satellite:</b> Displays a satellite view of the Earth.</li> <li>• <b>Terrain:</b> Displays the geographical features of an area.</li> </ul>
<b>Layers</b>	Identifies the layer that you want to display on the map. You can select one of the following values: <ul style="list-style-type: none"> <li>• <b>Transit:</b> Displays the public transit network of an area.</li> <li>• <b>Traffic:</b> Displays real-time traffic information on the map.</li> <li>• <b>Bicycling:</b> Displays the bicycling paths of an area.</li> <li>• <b>None:</b> Does not display any layer.</li> </ul>
<b>CENTER</b>	Identifies the center point of the map. You can specify the center point using one of the following sources: <ul style="list-style-type: none"> <li>• <b>Data:</b> Select a query output or a global parameter whose value is the center point of the map.</li> <li>• <b>Manual:</b> Enter the address or the latitude and longitude details of the center point manually, separated by a comma (for example, 35.681168, 139.767059).</li> <li>• <b>User Location:</b> Select this option to specify that the location of the device used by the application user is the center point of the map. If you select this option, the <b>Update Center</b> check box appears. If you select this check box, the map center is automatically updated when the user moves.</li> </ul>

Field Name	Description
	<div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin-bottom: 10px;">  <b>Note:</b>                      If you select the <b>User Location</b> option, when you access the map for the first time in the application, a message appears, asking you to allow the application to access your location.                 </div> <ul style="list-style-type: none"> <li>• <b>Automatic by Markers:</b> Select this option to specify that the center point of the map is positioned such that all the markers are visible on the map. This option is enabled only after you add a marker.</li> </ul> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <b>Note:</b>                      The <b>Zoom</b> box contains a value that determines the zoom level of the map. This box is disabled when you select the <b>Automatic by Markers</b> option.                 </div>
<b>MARKERS</b>	Identifies the markers that should appear on the map. Select <b>Add Marker</b> , and then enter or select values in the following sections or boxes that appear. See <a href="#">Markers table (on page 528)</a> .
<b>SHAPES</b>	Identifies the circle that covers the area of a location. For example, if the map displays the locations of sensors that capture the radio signals within a radius of 1 km, you can add a shape to each marker to indicate the area covered by each sensor.  Select <b>Add Shape</b> , and then enter or select values in the following sections or boxes that appear. See <a href="#">Shapes table (on page 529)</a> .

**Markers:**


Field Name	Description
<b>Position</b>	Select one of the following options: <ul style="list-style-type: none"> <li>• <b>Data:</b> Select this option if you want to specify the position of the marker by means of a query or a global parameter.</li> <li>• <b>Manual:</b> Select this option if you want to specify the position of the marker manually, and then enter the address or the latitude and longitude details.</li> </ul>



Field Name	Description
<b>Label</b>	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• <b>Data</b>: Select this option if you want to specify the label of the marker by means of a query or a global parameter. This option is enabled only if you select <b>Data</b> in the <b>Position</b> section.</li> <li>• <b>Manual</b>: Select this option if you want to specify the label of the marker manually, and then enter the label.</li> </ul>
<b>Marker Icon</b>	Select the icon and color of the marker.
<b>Condition</b>	<p>Select <b>Add conditions</b>, and then specify the conditions for displaying the marker.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Tip:</b> You can add multiple markers. For example, if you want one marker to represent sites whose overall plant efficiency is above 95 percent and another marker to represent sites below 95 percent, you can add the two markers with the same position data, and specify the conditions appropriately on each one.</p> </div>
<b>Actions</b>	Select <b>Add Action</b> , and then specify the action that should be triggered when the marker is selected (for example, display more details about the location).

**Shapes:**

Field Name	Description
<b>Position</b>	<p>Select one of the following options:</p> <ul style="list-style-type: none"> <li>• <b>Data</b>: Select this option if you want to specify the position of the shape by means of a query or a global parameter.</li> <li>• <b>Manual</b>: Select this option if you want to specify the position of the shape manually, and then enter the address or the latitude and longitude details.</li> </ul>
<b>Radius</b>	Select one of the following options:

Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Data:</b> Select this option if you want to specify the radius of the shape by means of a query or a global parameter.</li> <li>• <b>Manual:</b> Select this option if you want to specify the radius of the shape manually, and then enter the radius in km.</li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <b>Note:</b> The radius can also be used as a visual indicator of other parameters, such as signal strength.         </div>
<b>Color</b>	Select the color of the shape. You can also specify the opacity.
<b>Condition</b>	Select <b>Add conditions</b> , and then specify the conditions. For example, if you want the marker to represent the signal strength received by a sensor, you can add multiple shapes with different colors and the same position data, and then specify different signal strength conditions on each shape.


## Table

This widget is available only in Operations Hub Classic version.

A table displays information, which can include text, links, and/or images. Each column in the table represents an entity field. The information that appears in a table cell is defined by selecting a query output or by using a formula.

### Table Properties

When you use a table widget, in addition to the default settings for a widget, the following settings are available.

Field Name	Description
<b>Allow Download</b>	Select this check box if you want to provide an option to application users to download the data displayed in the table. <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <b>Note:</b> The download feature is available only for entity data.           </div>
<b>Flow</b>	Select the query or function that should be used to retrieve information for the table. Without a flow, a table will not display any data.

Field Name	Description
<b>Name</b>	Enter the name of the table column.
<b>Data</b>	Select this option if you want data in the column to be displayed from an output field of the selected flow, and then select the field in the drop-down list box.
<b>Formula</b>	Select this option if you want data in the column to be displayed based on a formula. For example, if the data retrieved by a query represents a test score, you can use a formula to display the score as a percentage of the total score.
<b>Output data type</b>	Select the data type of the data displayed in the column.
<b>Add Action</b>	Select this button if you want an action to be performed when a user selects a cell in this column.
<b>Add Field</b>	Select this button if you want to add another column to the table.
<b>Add All Fields</b>	Select this button if you want to add columns for all the output fields from the selected flow.
<b>Load &lt;number&gt; rows at a time</b>	<p>Identifies the number of rows that should appear in the table. By default, the table displays all the rows retrieved by the query. If you select this check box, the <b>Paging</b> and "<b>Load more</b>" button options appear to allow the user to view more data.</p> <ul style="list-style-type: none"> <li>• <b>Paging</b>: If you select this option, each page in the table will contain the number of rows that you specify. You can navigate to the other pages to access the rest of the rows.</li> <li>• "<b>Load more</b>" button: If you select this option, the table will initially contain the number of rows that you specify. A <b>Load more</b> button appears in the application, which allows the application user to retrieve additional rows in the same page.</li> </ul>

## Possible Uses

Tables are a way to display information in an organized way. For example, if application users fill in their name and phone number in an application, a table can display the information in an easily understandable format. A more advanced example may be that employees in a company with a hundred employees enter the time they arrive and the time they leave each day. Each employee has a name, entry time, exit time, and ID in an entity. Using a table, you can display each employee's attendance record.

## List

A list is a representation of data in bulleted points. To use the new version, refer to [List \(on page 750\)](#).

### List Properties

When you use a list widget, in addition to the default settings of a widget, the following setting is available.

Field Name	Description
<b>Source</b>	<p>Identifies the source of the list values. You can specify one of the following types of sources:</p> <ul style="list-style-type: none"> <li>• <b>Hard Coded:</b> Select this option to enter the list items manually.</li> <li>• <b>Dynamic:</b> Select this option to generate the list items dynamically from a query output field.</li> </ul>

### Possible Uses

You can use a hard-coded list to display prerequisites to perform a task. You can use a dynamic list to display a list of asset IDs returned by a query.

### Using a List

Suppose you want to display a list of features available in an application by dynamically fetching the list from an entity. To do so, perform the following steps:

1. Create an entity named Features to store the list of features.
2. Create a query to get the list of features from the entity.
3. In the page designer, add a List widget.
4. In the **PAGE DATA** section, add the query that you have created.
5. In the **LIST PROPERTIES** section, in the **Source** box, select **Dynamic**.
6. In the **Value** box that appears, select the query output that fetches the list of features.
7. Save the application, and preview it.

The list of features stored in the entity appear in the application.

## Gauge

Using a gauge widget, you can plot data on a visual display. Some of the gauge widgets use a color-coded scale. The color of the reading indicates the risk level associated with the value.

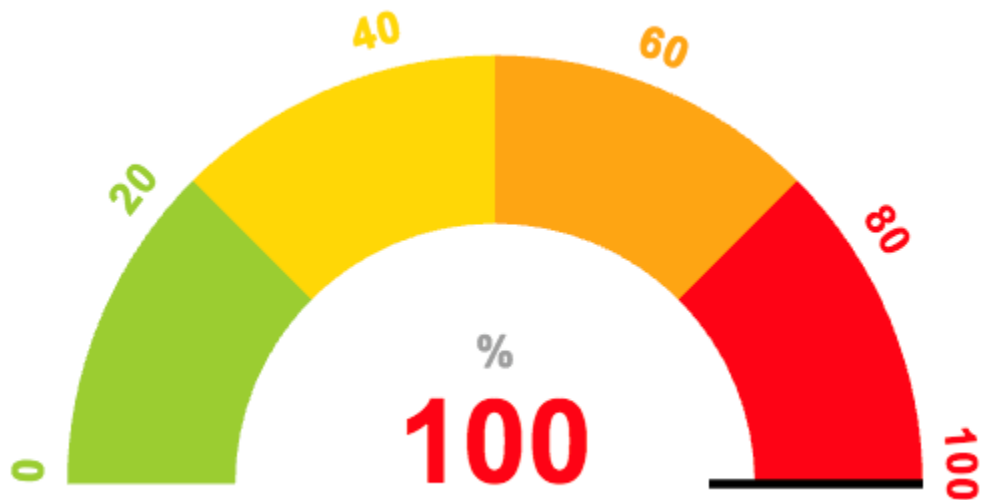
## Types of Gauge Widgets

The following types of gauge widgets are available:

- **Battery:** In this gauge type, the value is plotted on a horizontal scale. This is the default gauge type. For example, the following image can represent a gauge that plots the speed of a vehicle in kph. The color-coded scale highlights whether the speed of the vehicle is safe or risky.



- **Meter - Arc:** In this gauge type, the value is plotted on a curved scale. For example, the following image can represent the percentage of unplanned power outage events out of the total number of power outage events. The color in which the plotted value appears indicates whether the percentage is acceptable.



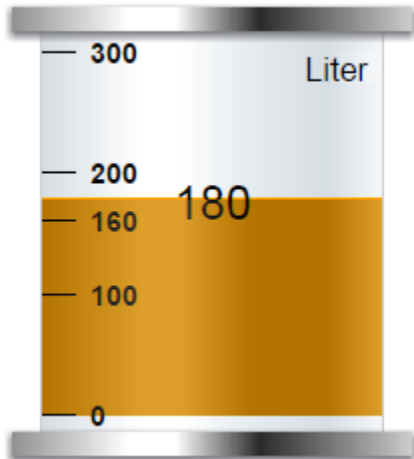
- **Meter - Radial:** In this gauge type, the value is plotted on a circular scale. The gauge can be an internal radial or an external radial depending on whether the scale appears inside the radial or outside. For example, the following image represents an external radial meter gauge that plots the temperature inside an engine combustion chamber.



The following image represents an internal radial meter gauge that plots the pressure inside an engine combustion chamber.



- **Tank:** In this gauge type, the value is plotted on a vertical scale. For example, the following image can represent the amount of remaining lubricant in a tank with a capacity 300 liters. The color in which the plotted value appears indicates whether the lubricant level is safe or risky.



Also refer to [Gauge Bar \(on page 723\)](#), [Gauge Circular \(on page 725\)](#), and [Gauge Linear \(on page 727\)](#).

## Gauge Properties

When you use a gauge widget, in addition to providing values for the default fields for a widget, you must define the following settings:

Field Name	Applicable Gauge Type	Description
Type	All gauges	Identifies the type of the gauge. You can select Battery, Meter, or Tank.
Style	Meter	Identifies the meter style. You can select one of the following values: <ul style="list-style-type: none"> <li>• <b>Internal radial:</b> This is the default option. If you select this style, the markings appear on the dial.</li> <li>• <b>External radial:</b> If you select this style, the markings appear outside the dial.</li> <li>• <b>Arc Meter:</b> If you select this style, the meter appears as a color-coded semi-circle (instead of a dial). In addition, the <b>Scale</b> and <b>Needle</b> settings appear.</li> </ul>

Field Name	Applicable Gauge Type	Description
Source	All gauges	<p>Identifies the source of the values plotted on the gauge. You can specify one of the following types of sources:</p> <ul style="list-style-type: none"> <li>• <b>Data:</b> Select a query or a global parameter whose output you want to plot on the gauge.</li> <li>• <b>Manual:</b> Enter a value manually that you want to plot on the gauge.</li> <li>• <b>Formula:</b> Enter a formula to calculate the value that you want to plot on the gauge.</li> </ul>
Sector	Battery, Tank, Meter - Arc	<p>Identifies the start position, color, and range for each sector in the gauge. See <a href="#">example (on page 537)</a>.</p>
Range	All gauges	<p>Identifies the minimum and maximum values of the widget range, and units of measure of the gauge. You can also specify the color for the first sector of the gauge. In the previous example, you will enter the values 0, 200, kph, and green in the <b>Minimum, Maximum, Units, and Default Color</b> boxes, respectively.</p>
Scale	Meter - Arc	<p>Indicates whether you want to show the marking for each sector or just the minimum and maximum markings of the gauge. In the Scale settings, select one of the following options:</p> <ul style="list-style-type: none"> <li>• <b>Full:</b> Select this option if you want to show the markings for each sector of the gauge. By default, this option is selected. In the previous example, if you select <b>Full</b>, the following markings appears: 0, 101, 161, 200</li> <li>• <b>Min/Max:</b> Select this option if you want to show only the minimum and maximum markings of the gauge. In the previous example, if you select <b>Min/Max</b>, the following markings appear: 0, 200</li> </ul>
Needle	Meter - Arc	<p>Indicates whether you want to show or hide the needle for the reading. By default, this check box is selected.</p>
Visual	All gauges	<p>Identifies the color for the markings and the background of the widget. The following settings are available:</p>



Field Name	Applicable Gauge Type	Description
		<ul style="list-style-type: none"> <li>• <b>Custom Colors:</b> Select this check box if you want to use custom colors for the markings and the background. If you select this check box, the <b>Color</b> and <b>Background Color</b> boxes appear.</li> <li>• <b>Color:</b> Select the color for the markings.</li> <li>• <b>Background color:</b> Select the background color of the widget.</li> <li>• <b>Palette:</b> Select the background color of the dial of the radial meter gauge. This box appears only if you want to use a meter gauge.</li> </ul>

**Example:** Suppose you want to plot the speed of a vehicle. You want to categorize the speed range as follows:

Speed Range (in kph)	Category
0 - 100	Acceptable
101 - 160	Slightly risky
161 - 200	Risky
200 - 260	Highly risky

In this case, you will create four sectors and define the following settings:

Sector number	Start position	Color	Label
1	0	Green	Acceptable
2	101	Yellow	Slightly risky
3	161	Orange	Risky
4	200	Red	Highly risky



**Tip:**

In the **Color** box, you can enter a color name or the hexadecimal code of the color.

## Html

Available in Operations Hub Classic only.

For the latest updated version, refer to [HTML Editor \(on page 763\)](#).

The html widget is used to provide html code to create an application. For example, to add a drop-down list box to an application, instead of using the [dropdown \(on page 499\)](#) widget, you can use html code, along with css code, to create the drop-down list box with a customized look and feel.






### Note:

The interaction of the html code can change based on how the responsive design works for some elements.

## Html Properties

When you use the html widget, in addition to the default properties of a widget, the following properties are available.

Field Name	Description
Flow	<p>Select the <a href="#">query (on page 314)</a> that should be used to retrieve information for the widget. Without a flow, the widget will not display any data.</p> <p>To populate values here, bind the html widget to a query on its <b>PAGE DATA</b> tab.</p>
Select Data	<p>Select an <a href="#">entity field (on page 301)</a>. Values in this drop-down list are populated based on the <a href="#">entities (on page 292)</a> available in the selected query. Using these fields, you can connect data to components that you create using the html widget.</p> <p>Next, select <b>+ Add Field</b> to add the selected entity field to the application for which you can add the html code.</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Tip:</b> You can select <b>+ Add All Fields</b> to add all the entity fields at once.</p> </div>
Name	Provide a name for the added entity field.
Data	Select this option if you want to retrieve information from an output field.

Field Name	Description
	<p>Next, select the output field from <b>Output data type</b>. This drop-down list contains the output fields available in your selected query.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b>  <b>Select Data</b> value must be set to <code>single</code> to update the output fields.</p> </div>
Manual	Select this option if you want to provide manual values to retrieve information. Enter the value.
Formula	Select this option if you want to retrieve information based on a formula. Build a formula.
Edit Code	<p>Select this button to access a code editor for html, css, and javascript. You can enter the custom code in the code editor.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Tip:</b>  The javascript code editor contains instructions on how to use the javascript API.</p> </div>
Scoped css?	<p>Indicates whether the css code must be applied only to the html widget or globally.</p> <ul style="list-style-type: none"> <li>• If you want the css code to be applied only to the elements in the html widget, select this check box.</li> <li>• If you want the css code to be applied globally, clear this check box.</li> </ul>

## Using the Html Widget

**Example 1:** Suppose you want to stream videos from YouTube based on values selected in a drop-down list box. To do so, perform the following steps:

1. When [designing application pages \(on page 450\)](#), drag-and-drop the html and dropdown widgets to a container.
2. Select the [dropdown \(on page 499\)](#) widget in the container to access the **DROPDOWN PROPERTIES** tab.

a. Under the **GENERAL** section, provide the details as specified in the table:

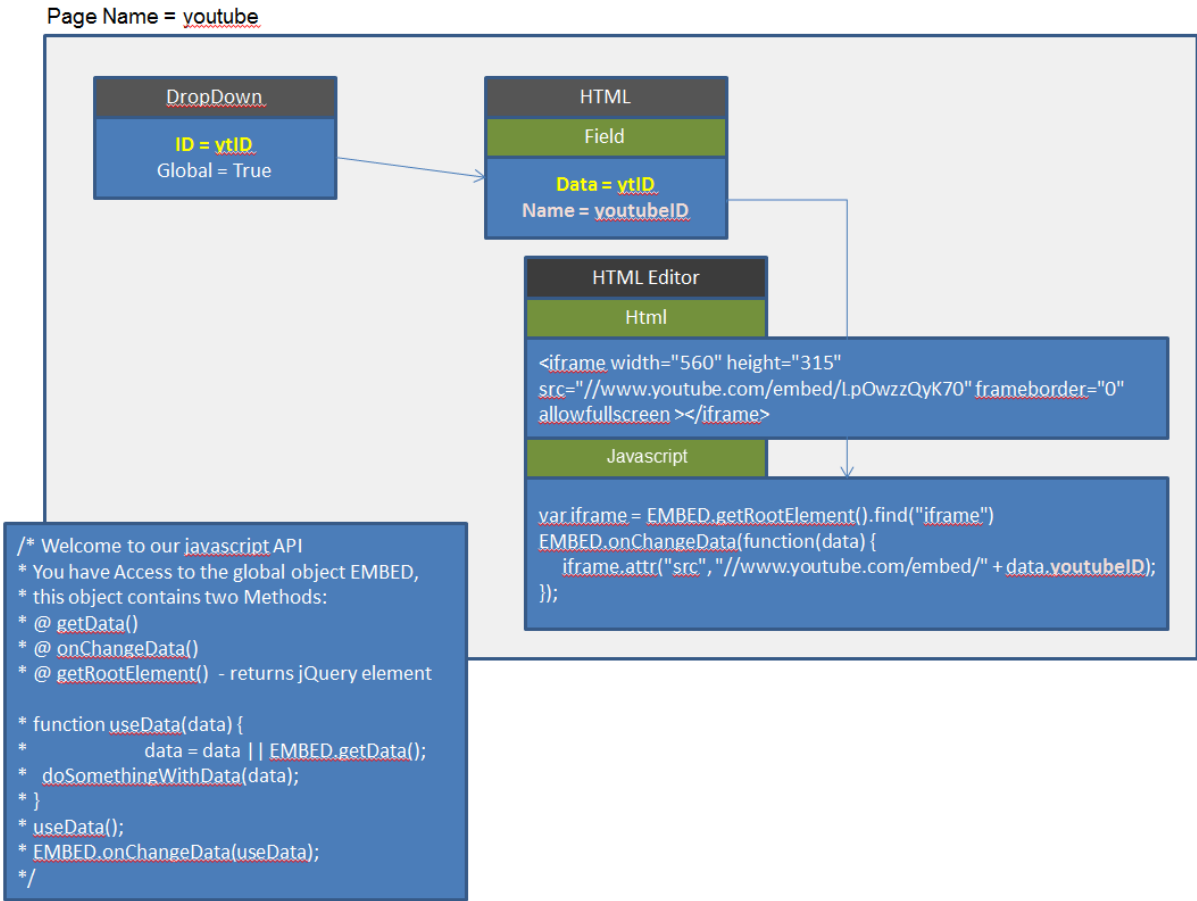
Field Name	Description
Label	Enter <code>Select an option</code> .
Id	Enter <code>ytID</code> .
Global Data	Select the check box.

3. Select the html widget in the container to access the **HTML PROPERTIES** tab.

a. Under the **DATA** section, provide the details as specified in the table:

Field Name	Description
Flow	Select a query.
Select Data	Select an entity field from the query, and do the following: <ul style="list-style-type: none"> <li>▪ <b>Name:</b> Enter <code>ytID</code>.</li> <li>▪ <b>Select Data.</b></li> <li>▪ <b>Output data type:</b> Select the global variable (<code>ytID</code>) that stores the drop-down list box values.</li> </ul>

A relationship is created between the dropdown and html widgets as shown in the following image.



**Example 2:** Suppose you want to create an application with the following pages:

- **Compass:** Displays a compass with the needle indicating the angle that an application user enters.
- **Stylish Header:** Displays text in a header with special effects.
- **Tiles:** Displays tiles of various colors.
- **Marquee:** Displays text that moves from one end to the other of the page.

To do so [create the application pages \(on page 450\)](#) for compass, stylish header, tiles, and marquee. Design the page layout for each as follows:

**For Compass:**

1. Add an [input \(on page 501\)](#) widget to a container, and provide **INPUT PROPERTIES** as specified in the table:

Field Name	Description
<b>General &gt; Label</b>	Enter <code>Enter Angle:</code>
<b>General &gt; Id</b>	Enter <code>direction</code>
<b>General &gt; Global Data</b>	Select the check box.

2. Add a html widget below the input widget, add a field, and provide values as shown in the image.

Field Name	Description
<b>General &gt; Id</b>	Enter <code>compass</code>
<b>Data &gt; Name</b>	Enter <code>angle</code>
<b>Data &gt; Select Data</b>	Select <code>compass - direction</code> from the list.
<b>Data &gt; Output data type</b>	Select <code>Text field</code> from the list.

3. Select **Edit Code** to access the code editor, and save these lines of code:

Html	<p>Enter these lines of code as shown in the following image:</p> <pre> &lt;div class="compass"&gt;   &lt;div class="compass-inner"&gt;     &lt;div class="north"&gt;N&lt;/div&gt;     &lt;div class="east"&gt;E&lt;/div&gt;     &lt;div class="west"&gt;W&lt;/div&gt;     &lt;div class="south"&gt;S&lt;/div&gt;     &lt;div class="main-arrow"&gt;       &lt;div class="arrow-up"&gt;&lt;/div&gt;       &lt;div class="arrow-down"&gt;&lt;/div&gt;     &lt;/div&gt;   &lt;/div&gt; &lt;/div&gt; </pre>
------	--

```
Html  Css  Javascript
1 <div class="compass">
2   <div class="compass-inner">
3     <div class="north">N</div>
4     <div class="east">E</div>
5     <div class="west">W</div>
6     <div class="south">S</div>
7     <div class="main-arrow">
8       <div class="arrow-up"></div>
9       <div class="arrow-down"></div>
10    </div>
11  </div>
12 </div>
```

Css

Enter the following lines of code:

```
compass {

width: 150px;

height: 150px;

font-size: 10px;

background-color: transparent;

border-radius: 100%;

position: relative;

margin: 0 auto;

font-family: 'Lobster Two', Comic Sans MS;

color: #2d2d2d;

} .compass-inner {

width: 85%;

height: 85%;

background-color: transparent;

border-radius: 100%;

position: relative;

left: 6.9%;

top: 6.9%;

border: 2px solid #2d2d2d;

} .main-arrow {
```

```
height: 100%;  
width: 7.5%;  
left: 46%;  
position: relative;  
padding-top: 3%;  
box-sizing: border-box;  
-webkit-transform: rotate(50deg);  
-moz-transform : rotate(50deg);  
-o-transform: rotate(50deg);  
-ms-transform: rotate(50deg);  
transform: rotate(50deg);  
} .arrow-up, .arrow-down {  
  
width: 0;  
height: 0;  
border-bottom: 57px solid red;  
border-left: 4px solid transparent;  
border-right: 4px solid transparent;  
position: relative;  
} .arrow-down {  
  
border-bottom-color: #2d2d2d;  
-webkit-transform: rotate(180deg);  
-moz-transform : rotate(180deg);  
-o-transform: rotate(180deg);  
-ms-transform: rotate(180deg);  
} .north {  
  
position: absolute;  
left: 45%;  
top: 2.5%;  
} .east { position: absolute;  
  
left: 88%;  
top: 44%;  
} .west {
```



```
position: absolute;

left: 7%;

top: 44%;

} .south {

position: absolute;

left: 45%;

top: 82%;

} @media (max-width: 600px) {

.compass {

width: 150px;

height: 150px;

font-size: 11px;

}

.arrow-up, .arrow-down {

border-bottom: 57px solid red;

border-left: 4px solid transparent;

border-right: 4px solid transparent;

} .arrow-down {

border-bottom-color: #2d2d2d;

} } @media (max-width: 769px) {

.compass {

width: 150px;

height: 150px;

font-size: 11px;

}


.arrow-up, .arrow-down {

border-bottom: 57px solid red;

border-left: 4px solid transparent;

border-right: 4px solid transparent;

} .arrow-down {
```

	<pre>border-bottom-color: #2d2d2d; } } @media (max-width: 400px) {  .compass {  width: 100px;  height: 100px;  font-size: 11px;  }  .arrow-up, .arrow-down {  border-bottom: 38px solid red;  border-left: 3px solid transparent;  border-right: 3px solid transparent;  } .arrow-down {  border-bottom-color: #2d2d2d;  } } </pre>
Javascript	<p>Enter the lines of code as shown in the following image:</p>  <pre> 11 *      doSomethingWithData(data); 12 * )) 13 */ 14 var data = EMBED.getData(); 15 16 var arrow = \$('main-arrow'); 17 18 doSomethingWithData(); 19 20 function doSomethingWithData() { 21   arrow.css({ 22     '-webkit-transform': 'rotate('+data.angle+'deg)', 23     '-moz-transform': 'rotate('+data.angle+'deg)', 24     '-o-transform': 'rotate('+data.angle+'deg)', 25     '-ms-transform': 'rotate('+data.angle+'deg)', 26     'transform': 'rotate('+data.angle+'deg)', 27   }); 28 } 29 30 } 31 32 EMBED.onChangeData( 33   function() { 34     data = EMBED.getData(); 35     // console.log('data: ' + data); 36     doSomethingWithData(); 37   }) 38 </pre>

4. Save the compass page.

**For Stylish Header:**

1. Add a html widget, select **Edit Code**, and save these lines of code:

Html	<p>Enter the following lines of code:</p> <pre>&lt;h1&gt;3d text effect&lt;/h1&gt;</pre>
Css	<p>Enter the following lines of code:</p> <pre>body{   text-align:center;   background:#dfdfdf; } h1{   text-transform:uppercase;   font-size:72px;   font-family:'Verdana';   padding:30px; }</pre>
Javascript	<p>Enter the following lines of code:</p> <pre>jQuery(document).ready(function(){   \$('h1').mousemove(function(e){     var rXP = (e.pageX - this.offsetLeft-\$(this).width()/2);     var rYP = (e.pageY - this.offsetTop-\$(this).height()/2);     \$('h1').css('text-shadow', +rYP/10+'px '+rXP/80+'px rgba(227,6,19,.8), '+rYP/8+'px '+rXP/60+'px rgba(255,237,0,1), '+rXP/70+'px '+rYP/12+'px rgba(0,159,227,.7)');   }); });</pre>

2. Save the stylish header page.

#### For Tiles:

1. Add a html widget, select **Edit Code**, and save these lines of code:

Html	<p>Enter the following lines of code:</p> <pre>&lt;div class="tile"&gt;&lt;/div&gt;</pre>
Css	<p>Enter the lines of code as shown in the following image:</p>

	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 5px;"> <span>Html</span> <span style="background-color: #333; color: white; padding: 2px 5px;">Css</span> <span>Javascript</span> </div> <pre style="background-color: #2e3436; color: #eeeeec; padding: 5px;"> 1 .tile{ 2 3   height:300px; 4   width:200px; 5 6   -moz-box-shadow: 3px 3px 5px 6px #888888; 7   -webkit-box-shadow: 3px 3px 5px 6px #888888; 8   box-shadow: 10px 10px 5px black; 9   text-align: center; 10 11 12   background: #f0b7a1; /* Old browsers */ 13 background: -moz-linear-gradient(top, #f0b7a1 0%, #8c3310 50%, #752201 51%, #bf6e4e 100%); /* FF3.6+ */ 14 background: -webkit-gradient(linear, left top, left bottom, color-stop(0%,#f0b7a1), color- 10 stop(50%,#8c3310), color-stop(51%,#752201), color-stop(100%,#bf6e4e)); /* Chrome,Safari4+ */ 15 background: -webkit-linear-gradient(top, #f0b7a1 0%,#8c3310 50%,#752201 51%,#bf6e4e 100%); /* Chrome10+,Safari15.1+ */ 16 background: -o-linear-gradient(top, #f0b7a1 0%,#8c3310 50%,#752201 51%,#bf6e4e 100%); /* Opera 11.10+ */ 17 background: -ms-linear-gradient(top, #f0b7a1 0%,#8c3310 50%,#752201 51%,#bf6e4e 100%); /* IE10+ */ 18 background: linear-gradient(to bottom, #f0b7a1 0%,#8c3310 50%,#752201 51%,#bf6e4e 100%); /* W3C */ 19 filter: progid:DXImageTransform.Microsoft.gradient( startColorstr='#f0b7a1', endColorstr='#bf6e4e',GradientType=0 ); /* IE6-9 */ 20 } </pre> </div>
--	---

2. Save the tiles page.

**For Marquee:**

1. Add a html widget, select **Edit Code**, and save these lines of code:

<p>Html</p>	<p>Enter the lines of code as shown in the following image:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 5px;"> <span>Html</span> <span style="background-color: #333; color: white; padding: 2px 5px;">Css</span> <span>Javascript</span> </div> <pre style="background-color: #2e3436; color: #eeeeec; padding: 5px;"> 1 &lt;marquee&gt;&lt;h1&gt;This text will scroll from right to left&lt;/h1&gt;&lt;/marquee&gt; 2 &lt;/br&gt; 3 &lt;marquee direction="up"&gt; 4   &lt;div class="up1"&gt;once upon a time&lt;/div&gt; 5   &lt;div class="up2"&gt;far far a way&lt;/div&gt; 6 &lt;/marquee&gt; </pre> </div>
<p>Css</p>	<p>Enter the lines of code as shown in the following image:</p>

```

1 h1,.up1,.up2{
2 padding:0px;
3 margin:0px;
4 text-shadow: 0 5px 0 #ccc,
5             0 2px 0 #c9c9c9,
6             0 3px 0 #bbb,
7             0 4px 0 #9b9b9,
8             0 5px 0 #aaa,
9             0 6px 1px rgba(0,0,0,.1),
10            0 0 5px rgba(0,0,0,.1),
11            0 1px 3px rgba(0,0,0,.3),
12            0 3px 5px rgba(0,0,0,.2),
13            0 5px 10px rgba(0,0,0,.25),
14            0 10px 10px rgba(0,0,0,.2),
15            0 20px 20px rgba(0,0,0,.15);
16
17 text-align: center;
18 width:70%;
19 }
20 marquee{
21 text-align: center;
22 width:70%;
23 }
24 .up1{
25 font-size: 400%;
26 }
27 .up2{
28 font-size: 200%;
29 }

```

2. Save the marquee page.

Save and preview the application. The application has four pages built using a html widget.

## Interactive Map

An interactive map widget is used to display interactive markers or icons on a static background (for example, an image representing an asset or a static map). The position of a marker on the image is defined by the offset from the top and left borders.

In addition, using an interactive map, you can create an application that will:

- Provide an overview of the current state of an asset.
- Allow you to access a page to view more information.
- Send a command to control the asset.

### Interactive Map Properties

To configure settings for an interactive map, you must add an image, and then configure the settings for each marker. To do so:

1. In the page designer, add the interactive map widget to the page.
2. Select **Upload Image**, and then select the background image file.

**Note:**

- If you want to change the background image, you can upload a new image without affecting any markers that you have added.
- Background image file name must not exceed 40 characters.

3. Double-click the image where you want to add a marker.

A marker is created at the position at which you clicked.

4. Select the marker.

The settings for the marker appear in the **INTERACTIVE MAP PROPERTIES** section. The coordinates are populated automatically; they identify the position of the marker.

**Tip:**

To fine-tune the position of the marker, you can drag the marker to the required position or modify the coordinates manually.

5. Select **Add Marker**, and then enter values as specified in the following table.

Field Name	Description
<b>Marker Type</b>	Identifies the type of the marker. You can select one of the following options: <ul style="list-style-type: none"> <li>◦ <b>Shape:</b> If you select this option, you can select one of the pre-defined shapes available in Operations Hub. By default, this option is selected.</li> <li>◦ <b>Image:</b> If you select this option, you can upload an image for the marker.</li> </ul>
<b>Color</b>	Identifies the color of the marker. This setting appears only if you have selected <b>Shape</b> in the <b>Marker Type</b> setting.
<b>Shape</b>	Identifies the shape of the marker. This setting appears only if you have selected <b>Shape</b> in the <b>Marker Type</b> setting. You can select one of the following options: <ul style="list-style-type: none"> <li>◦ <b>Round</b></li> <li>◦ <b>Square</b></li> </ul>

Field Name	Description
<b>Image</b>	<p>Identifies the image for the marker. This setting appears only if you have selected <b>Image</b> in the <b>Marker Type</b> setting.</p> <p>For example, if the marker identifies the position of a radiator fan, you can upload the image of a fan instead of using a predefined round or square shape for the marker.</p>
<b>Size</b>	<p>Identifies the multiplier for the marker shape or image size. For example, if you enter 2, the marker size is double the default size. By default, the value in this box is 1.</p>
<b>Label</b>	<p>Identifies the text for the marker label if you want to display the label.</p>
<b>Label Color</b>	<p>Identifies the color of the label as it appears in the application.</p>
<b>Data Label</b>	<p>Identifies the data that is associated with the marker.</p> <p>For example, suppose the interactive map plots the temperature of various components of a car. For a marker that identifies the position of a radiator fan in a car, you can map the data label with the output of the query that retrieves the temperature of the fan. When you access the application, the temperature value retrieved from the query is displayed for the radiator fan.</p> <p>You can select one of the following types of data labels:</p> <ul style="list-style-type: none"> <li>◦ <b>Data:</b> Select this option if you want to display the data retrieved by a query, and then select the query output that you want to display.</li> <li>◦ <b>Manual:</b> Select this option if you want to enter the data manually, and then enter the value.</li> <li>◦ <b>Formula:</b> Select this option if you want to display the data based on a formula.</li> </ul>
<b>Data Label Color</b>	<p>Identifies the color and opacity of the data label.</p>
<b>Conditions</b>	<p>Identifies the condition to show or hide the marker. For example, you can add a condition to show the marker only if the temperature of the component reaches 50 degrees Celsius.</p>
<b>Actions</b>	<p>Identifies the actions to be performed when the marker is selected.</p>



**Note:**

You can add multiple markers to a single position. Each marker can have a different shape, icon, or color to indicate different conditions. For example, if the temperature of a radiator fan in a car exceeds a certain limit, the green marker can be replaced with a red marker to indicate that the temperature is high. You can also configure a set of actions for each marker when selected.

## Layouts

### New Line

This widget is available only in Operations Hub Classic version.

A new line widget is used to add a line to separate the components of a page.

#### Possible Uses

If widgets are placed too close to one another, adding a new line creates a blank space between the widgets to enhance readability.

### Separator

This widget is available only in Operations Hub Classic version.

A separator widget is used to add a line between widgets, thus creating a better or clearer order between the widgets.

#### Possible Uses

If an application displays a questionnaire, you can use a separator to divide the individual questions. This will arrange and group the questions together.

### Container

This widget is available only in Operations Hub Classic version.

A container widget is a layout element that creates a specific area for widgets within an application. A container is similar to the div element used in html. It is used as a box (invisible in the application) that helps organize the widgets in the application.



## Container Settings

When you use a container widget, in addition to the default settings of a widget, the following settings are available.

Field Name	Description
Show/Hide	<p>You can show or hide a container from the application for each of the following device types:</p> <ul style="list-style-type: none"> <li>• Mobile</li> <li>• Tablet</li> <li>• Desktop</li> </ul>
Conditions	<p>When you specify conditions to a container, they are applied to all the widgets added to that container. For example, you can add a check box to the application to allow application users to show or hide the container.</p>
Performance	<p>By default, this check box is cleared, indicating that data within the container is loaded only when the container is shown in the application. If you select the check box, the data within the container is loaded, regardless of whether the container is shown or hidden. Selecting this check box can reduce the performance of the application.</p>

## Possible Uses

Containers are used for the following purposes:

- **Organization of content:** You can use containers to organize widgets in rows and columns. You can then set information on varying planes to indicate the importance or sequence of information provided by the individual widgets in the container.

For example, suppose you want to create an application to allow application users to enter their user account details. In that case, add a container with two columns. The first column can contain fields for the user's first name, last name, and phone number, whereas, the second column can contain fields for the user's email address and personal website address, along with a **Submit** button.

- **Conditional content:** You can use container to apply conditions to all the widgets in the container.

## Repeater

A repeater is a widget that is used to repeat the content layout for each item in a list returned by a query.

For example, if a query returns a list of assets, the repeater can display the state of multiple parameters associated with each asset type using a combination of different widgets. Using a repeater has the following advantages:

- You can create a dashboard-type application that monitors multiple assets at the same time.
- You can use different layouts and styles for each widget in the repeater to match the data type of an asset parameters and to enhance visibility.
- The layout of the content only needs to be defined once in the designer and it will be repeated for each item in the list that you want to monitor.
- The content that is repeated is automatically updated when the underlying query is updated (for example, new assets are added or the list of assets is updated by means of conditions in the query).

For example, if an entity stores the temperature recorded by assets, you can use a repeater to display not only the temperature recorded by each device, but also a gauge to indicate whether each value is in the acceptable range, as shown in the following image.

Device_ID	Latest Time Stamp	Measured Data	Gauge Display
TESTDev_0	2016/12/28 1:17:21.110	48.76	0 °C 50 100 °C
TESTDev_1	2016/12/28 1:17:21.211	61.57	0 °C 50 100 °C
TESTDev_2	2016/12/28 1:17:21.313	45.44	0 °C 50 100 °C
TESTDev_3	2016/12/28 1:17:21.415	37.36	0 °C 50 100 °C
TESTDev_4	2016/12/28 1:17:21.516	50.51	0 °C 50 100 °C
TESTDev_5	2016/12/28 1:17:21.616	38.63	0 °C 50 100 °C
TESTDev_6	2016/12/28 1:17:21.717	57.86	0 °C 50 100 °C
TESTDev_7	2016/12/28 1:17:20.808	55.65	0 °C 50 100 °C
TESTDev_8	2016/12/28 1:17:20.908	51.88	0 °C 50 100 °C
TESTDev_9	2016/12/28 1:17:21.008	38.15	0 °C 50 100 °C

This widget is available only in Operations Hub Classic version.

## Repeater Properties

When you use a repeater, in addition to providing values to the default fields for a widget, you must define the following settings.

Field Name	Description
Flow	Identifies the query to use to fetch data displayed in the repeater.

Field Name	Description
Multi-select	This setting is used in combination with a map or a graph widget. If you select this check box, a check box appears in each row of the repeater in the application, allowing the user to select which items should appear on the map or the graph. By default, this check box is cleared.
Checked	If you have configured the Multi-select setting, this setting indicates the initial state of the check box in each row of the repeater in the application. By default, this check box is cleared. If you select this check box, all the check boxes in the application are selected.
Action	<p>Identifies the action that should be performed when the repeater is selected. For example, suppose you want to allow the application users to select an asset, and then retrieve more information about the asset. In that case, select <b>Set global value</b>, and then select the global variable that stores the asset ID. The value set in this global variable is then used as an input to another query to retrieve data about the asset.</p> <p>You can add multiple actions.</p>
Load <number> rows at a time	<p>Identifies the number of rows that should appear by default in the repeater. By default, the value in this box is 10. If you select this check box, the <b>Paging</b> and <b>"Load more" button</b> options appear.</p> <ul style="list-style-type: none"> <li>• <b>Paging:</b> If you select this option, each page in the repeater will contain the number of rows that you specify. You can navigate to the other pages to access the rest of the rows.</li> <li>• <b>"Load more" button:</b> If you select this option, the repeater will initially contain the number of rows that you specify. A <b>Load more</b> button appears in the application, which allows the application user to retrieve additional rows in the same page.</li> </ul>
Item Horizontal Alignment	<p>Identifies the number of repeater instances that will appear horizontally next to one another before moving to the next row.</p> <p>For example, suppose you want to display the following information in the repeater.</p>

Field Name	Description																							
	<table border="0"> <thead> <tr> <th>De- vice ID</th> <th>Latest Time Stamp</th> </tr> </thead> <tbody> <tr> <td>Device 1</td> <td>2019/12/22 8:04:37:037</td> </tr> <tr> <td>Device 2</td> <td>2019/12/22 22:14:31:545</td> </tr> <tr> <td>Device 3</td> <td>2019/12/22 8:04:40:040</td> </tr> <tr> <td>Device 4</td> <td>2019/12/21 5:28:59:059</td> </tr> </tbody> </table> <p>If you enter 2 in this box, the table is split as follows in the repeater.</p> <table border="0"> <thead> <tr> <th>De- vice ID</th> <th>Latest Time Stamp</th> <th>De- vice ID</th> <th>Latest Time Stamp</th> </tr> </thead> <tbody> <tr> <td>Device 1</td> <td>2019/12/22 8:04:37:037</td> <td>Device 2</td> <td>2019/12/22 22:14:31.545</td> </tr> <tr> <td>Device 3</td> <td>2019/12/22 8:04:40:040</td> <td>Device 4</td> <td>2019/12/21 5:28:59:059</td> </tr> </tbody> </table>		De- vice ID	Latest Time Stamp	Device 1	2019/12/22 8:04:37:037	Device 2	2019/12/22 22:14:31:545	Device 3	2019/12/22 8:04:40:040	Device 4	2019/12/21 5:28:59:059	De- vice ID	Latest Time Stamp	De- vice ID	Latest Time Stamp	Device 1	2019/12/22 8:04:37:037	Device 2	2019/12/22 22:14:31.545	Device 3	2019/12/22 8:04:40:040	Device 4	2019/12/21 5:28:59:059
De- vice ID	Latest Time Stamp																							
Device 1	2019/12/22 8:04:37:037																							
Device 2	2019/12/22 22:14:31:545																							
Device 3	2019/12/22 8:04:40:040																							
Device 4	2019/12/21 5:28:59:059																							
De- vice ID	Latest Time Stamp	De- vice ID	Latest Time Stamp																					
Device 1	2019/12/22 8:04:37:037	Device 2	2019/12/22 22:14:31.545																					
Device 3	2019/12/22 8:04:40:040	Device 4	2019/12/21 5:28:59:059																					

Refer to the following examples on how to use a repeater:

- [Use Repeater for Basic Operation \(on page 556\)](#)
- [Use Repeater for Multi-Select Operation \(on page 563\)](#)

## Use Repeater for Basic Operation

The following steps are an example of using a repeater for a basic operation.

Suppose you want to use a repeater to display temperature recorded by multiple sensors, which is stored in the M2M\_data entity. In addition to displaying the temperature, you can use a gauge widget in the repeater to highlight whether the temperature is in the acceptable range, as shown in the following image.

Device_ID	Latest Time Stamp	Measured Data	Gauge Display
TESTDev_0	2016/12/28 1:17:21.110	48.76	0 °C 50 100 °C
TESTDev_1	2016/12/28 1:17:21.211	61.57	0 °C 50 100 °C
TESTDev_2	2016/12/28 1:17:21.313	45.44	0 °C 50 100 °C
TESTDev_3	2016/12/28 1:17:21.415	37.36	0 °C 50 100 °C
TESTDev_4	2016/12/28 1:17:21.516	50.51	0 °C 50 100 °C
TESTDev_5	2016/12/28 1:17:21.616	38.63	0 °C 50 100 °C
TESTDev_6	2016/12/28 1:17:21.717	57.86	0 °C 50 100 °C
TESTDev_7	2016/12/28 1:17:20.808	55.65	0 °C 50 100 °C
TESTDev_8	2016/12/28 1:17:20.908	51.88	0 °C 50 100 °C
TESTDev_9	2016/12/28 1:17:21.008	38.15	0 °C 50 100 °C

1. Create the following queries:

- a. GetDistinctDeviceIDs: To fetch a distinct list of device IDs from the M2M\_data entity. Enter or select values as shown in the following image.

Queries > GetDistinctDeviceIDs
🔒

Description:

Query Type:  Get  
 Update  
 Insert  
 Delete

Entity:

---

**Output Data**

Field	Function	Access	
<input type="text" value="M2M_data -&gt; device_id"/>	<input type="text" value="None"/>	<input type="text" value="All users"/>	<input type="button" value="🗑"/>

---

**Conditions**

<input type="text" value="Required"/>	<input type="text" value="M2M_data -&gt; metric"/>	<input "="" type="text" value="="/>	<input type="text" value="Fixed value"/>	<input type="text" value="String Temperature"/>	<input type="button" value="🗑"/>
---------------------------------------	--	-------------------------------------	--	---	----------------------------------

---

**Role Conditions**

---

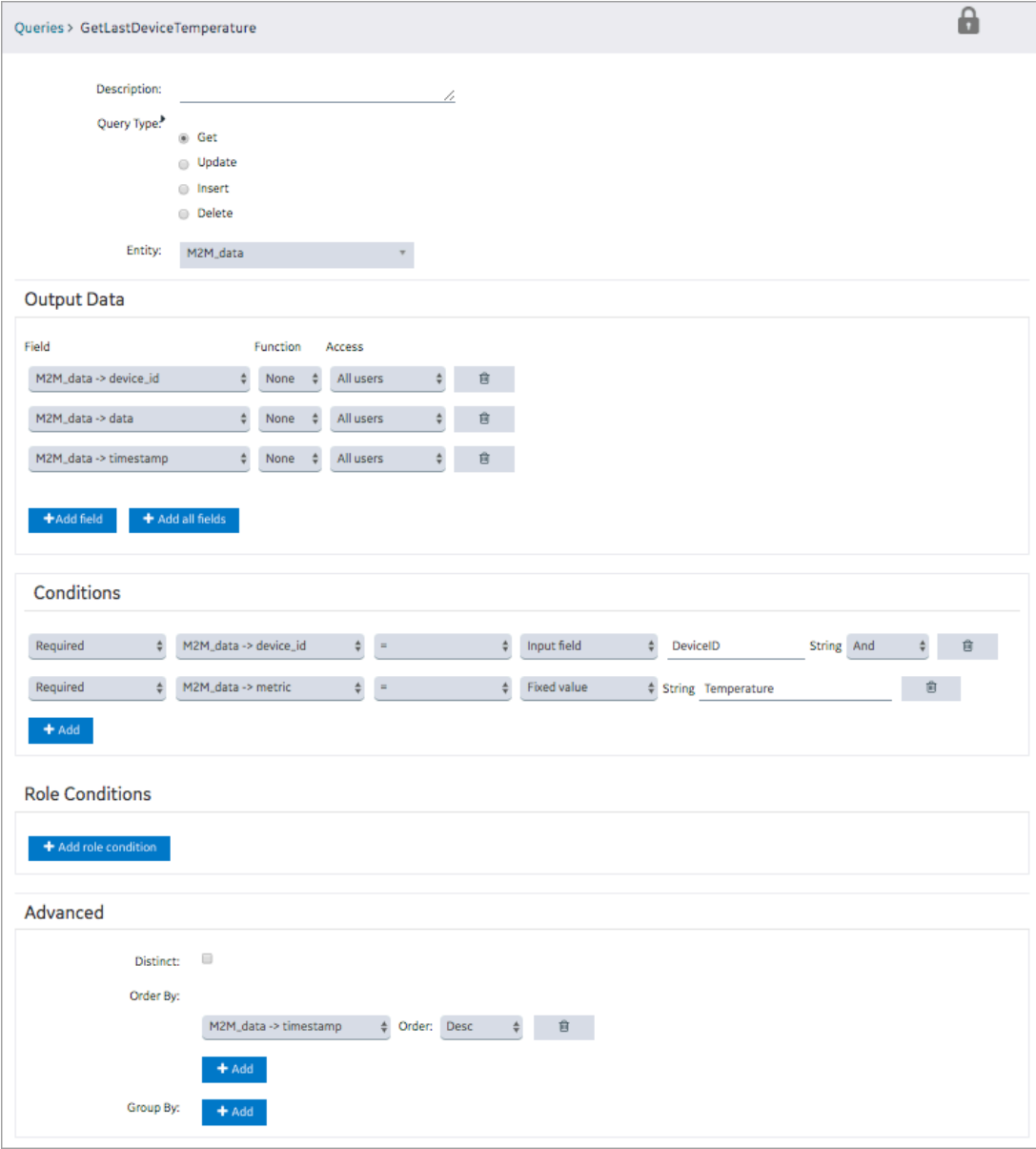
**Advanced**

Distinct:

Order By:  Order:

Group By:

b. GetLastDeviceTemperature: To fetch the measurement time (that is, time stamp) and the measured value of the temperature for each device. Enter or select values as shown in the following image.



- 2. Create an application, and then add a page.
- 3. Add a container to the page for the heading row, and perform the following steps:
  - a. Split the container into four columns.
  - b. In each column, add a header widget to contain the column headings.

c. Specify the following column headings:

- Device ID
- Last Reading
- Temperature
- Gauge

d. In the **Visual** section for each heading, select the **Custom Colors** check box, and in the **Color** box, select the white color.

4. In the **Visual** section, select the **Custom Colors** check box, and in the **Background Color** box, select the dark blue color.

5. Add a repeater for the data rows, and perform the following tasks:

- a. Split the repeater into four columns.
- b. In the first column, add a text widget and an input widget.
- c. In the second column, add a text widget.
- d. In the third column, add two text widgets.
- e. In the fourth column, add a gauge widget.

The widget appears as shown in the following

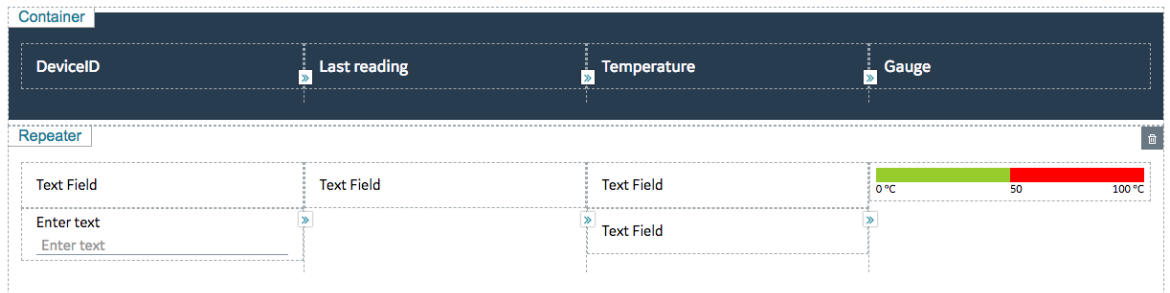


image.

6. Select **PAGE DATA**, and then perform the following steps:

- a. Add the two queries that you have created.
- b. For the GetDistinctDeviceIDs query, configure the settings as shown in the following image.



▼ GetDistinctDeviceIDs

Set different submission options for Mobile devices

Auto submit (as soon as data is available)

Auto update

Auto sync

Auto submit on input change

Multi-select input

Row Limit ⓘ

50

- c. For the GetLatestDeviceTemperature query, configure the settings as shown in the following image.

▼ GetLastDeviceTemperature

Set different submission options for Mobile devices

Auto submit (as soon as data is available)

Auto update

Auto sync

Auto submit on input change

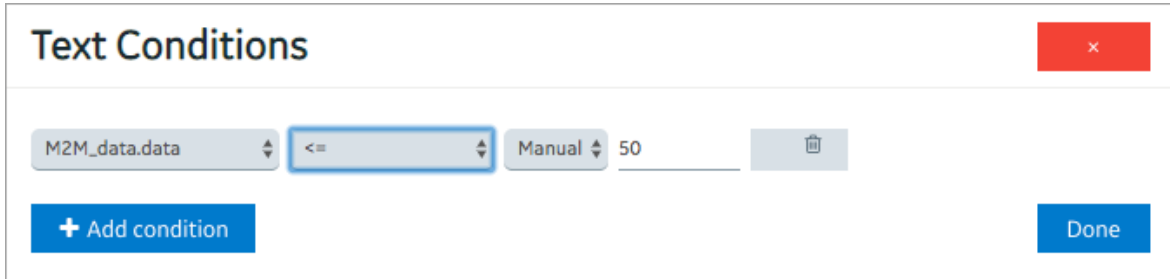
Multi-select input

Row Limit ⓘ

1

7. In the **REPEATER PROPERTIES** section, in the **Flow** box, select the query GetDistinctDeviceIDs.
8. In the **PAGE DATA** section, from the the GetDlstinctDeviceIDs query, drag M2M\_data.device\_id to the text widget and the input widget in the first column of the repeater.
9. In the **INPUT WIDGET PROPERTIES** section, select the **Disabled** and **Hidden** check boxes.
10. In the **PAGE DATA** section, from the GetLastDeviceTemperature query:
  - a. Drag DeviceID to the input widget in the first column of the repeater.
  - b. Drag M2M\_data.timestamp to the text widget in the second column of the repeater.
  - c. Drag M2M\_data.data to the two text widgets in the third column and the gauge widget in the fourth column of the repeater.

11. Select the text widget in the second column, and in the **TEXT PROPERTIES** section, in the **Format** box, select **DateTime**.
12. Select the first text widget in the third column, and in the **TEXT PROPERTIES** section, select **Add Conditions**, and then specify values as shown in the following image.



13. Select the second text widget in the third column of the repeater, and in the **TEXT PROPERTIES** section, perform the following steps:
  - a. In the **Visual** section, select the **Custom Colors** check box, and then in the **Color** box, select red.
  - b. Select **Add Conditions**, and then specify values as shown in the following image.



14. Select the gauge widget in the repeater, and in the **GAUGE PROPERTIES** section, perform the following steps:
  - a. Delete two of the color sections.
  - b. In the **Start Position** and **Label** boxes for the remaining color section, enter 50.
  - c. In the **Maximum** box, enter 100.
  - d. In the **Units** box, enter degrees Celsius.

The repeater widget appears as shown in the following

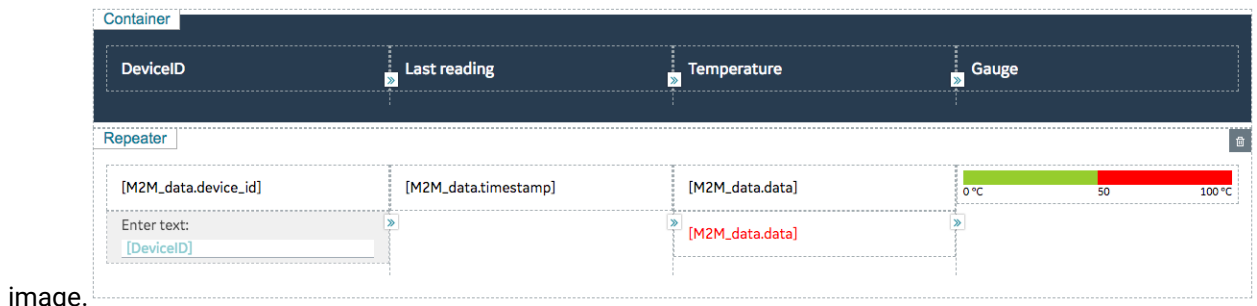


image.

15. Save the application, and preview it.

The application appears as shown in the following

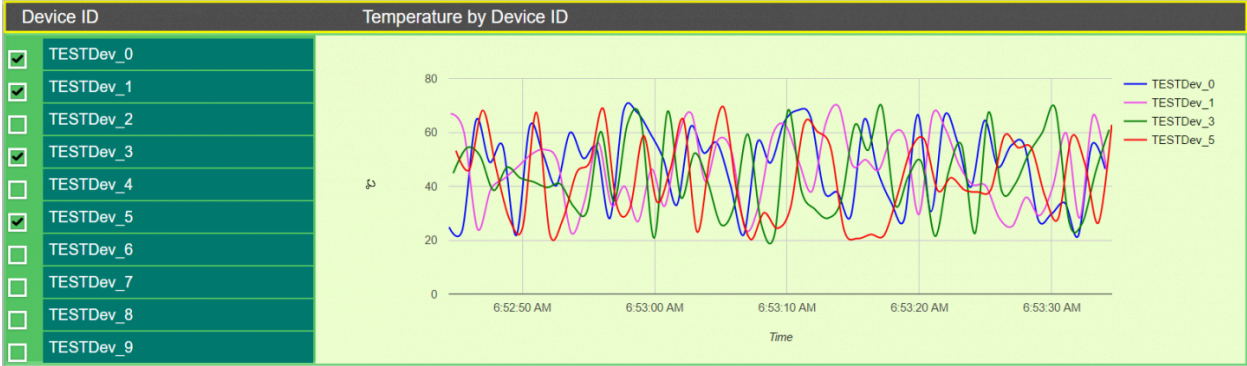
DeviceID	Last reading	Temperature	Gauge
ev1230	03/12/2019 06:10:58.295 pm	45.03	0 °C 50 100 °C
ev1231	03/12/2019 06:10:58.497 pm	44.16	0 °C 50 100 °C
ev1232	03/12/2019 06:10:58.703 pm	51.88	0 °C 50 100 °C
ev1233	03/12/2019 06:10:58.908 pm	55.7	0 °C 50 100 °C
ev1234	03/12/2019 06:10:59.112 pm	52.65	0 °C 50 100 °C
ev1235	03/12/2019 06:10:59.318 pm	45.53	0 °C 50 100 °C
ev1236	03/12/2019 06:10:59.521 pm	57.99	0 °C 50 100 °C
ev1237	03/12/2019 06:10:59.727 pm	42.5	0 °C 50 100 °C
ev1238	03/12/2019 06:10:59.930 pm	43.5	0 °C 50 100 °C
ev1239	03/12/2019 06:11:00.134 pm	47.32	0 °C 50 100 °C

image.

### Use Repeater for Multi-Select Operation

The following steps are an example of using repeater for a multi-select operation.

Suppose you want to use a repeater to plot a trend graph of temperature recorded by selected devices. You want to allow application users to select the devices whose temperature you want to plot in real time, as shown in the following image.



1. Create the following queries:

- a. GetDistinctDeviceIDs: To fetch a distinct list of device IDs from the M2M\_data entity. Enter or select values as shown in the following image.

Queries > GetDistinctDeviceIDs
🔒

Description:

Query Type:  Get  
 Update  
 Insert  
 Delete

Entity:

---

**Output Data**

Field	Function	Access	
<input type="text" value="M2M_data -&gt; device_id"/>	<input type="text" value="None"/>	<input type="text" value="All users"/>	<input type="button" value="🗑"/>

---

**Conditions**

<input type="text" value="Required"/>	<input type="text" value="M2M_data -&gt; metric"/>	<input "="" type="text" value="="/>	<input type="text" value="Fixed value"/>	<input type="text" value="String Temperature"/>	<input type="button" value="🗑"/>
---------------------------------------	--	-------------------------------------	--	---	----------------------------------

---

**Role Conditions**

---

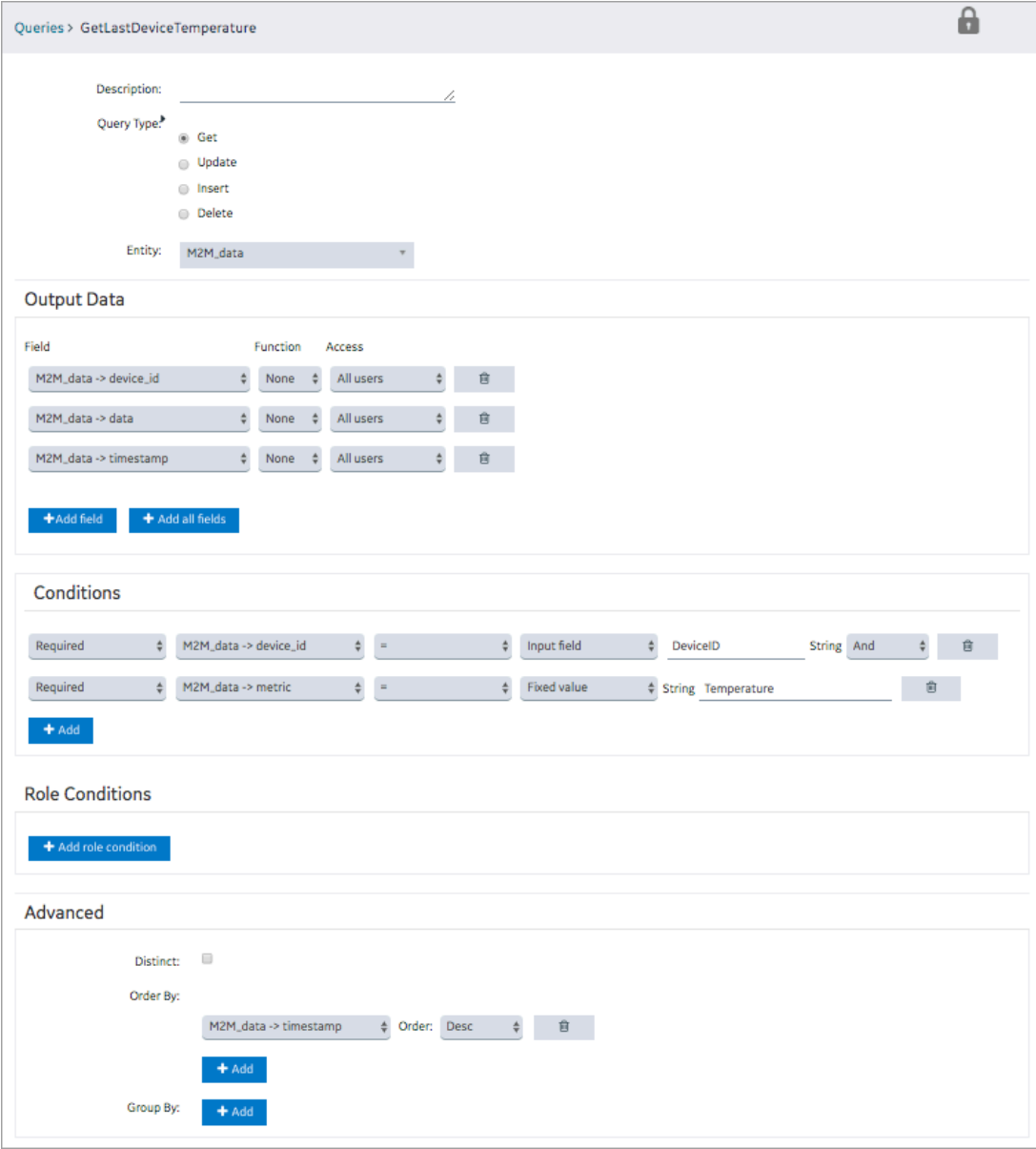
**Advanced**

Distinct:

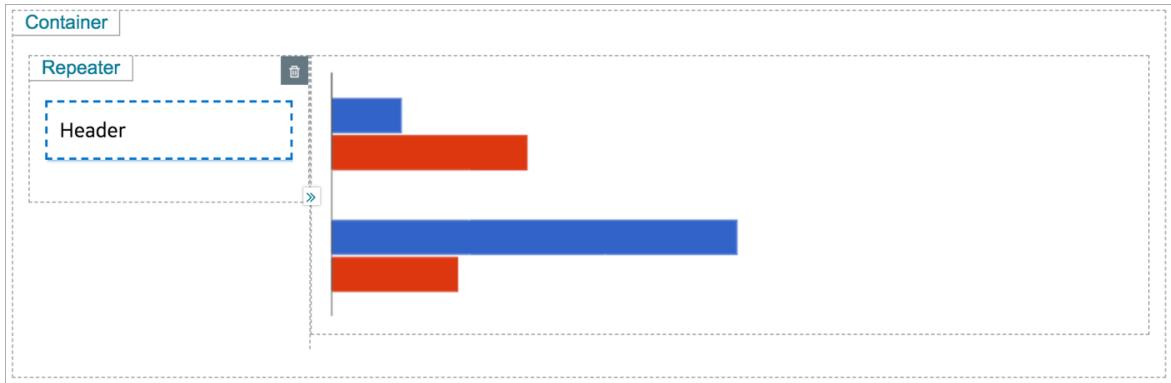
Order By:  Order:

Group By:

b. GetLatestDeviceTemperature: To fetch the measurement time (that is, time stamp) and the measured value of the temperature for each device. Enter or select values as shown in the following image.



- 2. Create an application, and then add a page.
- 3. Add a container with six columns.
- 4. Except for the first column, merge the other five columns.
- 5. Add a repeater and a graph widget to the container, and add a header widget to the repeater, as shown in the following image.



- The repeater provides a list of devices that the application users can select.
  - The graph plots the temperature recorded by the selected devices.
6. Select **PAGE DATA**, and perform the following steps:
- Add the two queries that you have created.
  - For the GetDistinctDeviceIDs query, configure the settings as shown in the following image.

The screenshot shows the configuration for the 'GetDistinctDeviceIDs' query. The settings are as follows:

- Set different submission options for Mobile devices
- Auto submit (as soon as data is available)
- Auto update
- Auto sync
- Auto submit on input change
- Multi-select input

Row Limit: 50


- c. For the GetLatestDeviceTemperature query, configure the settings as shown in the following image.

The image shows a configuration panel for the 'GetLastDeviceTemperature' query. The panel has a title bar with a close button. Below the title bar, there are several settings:

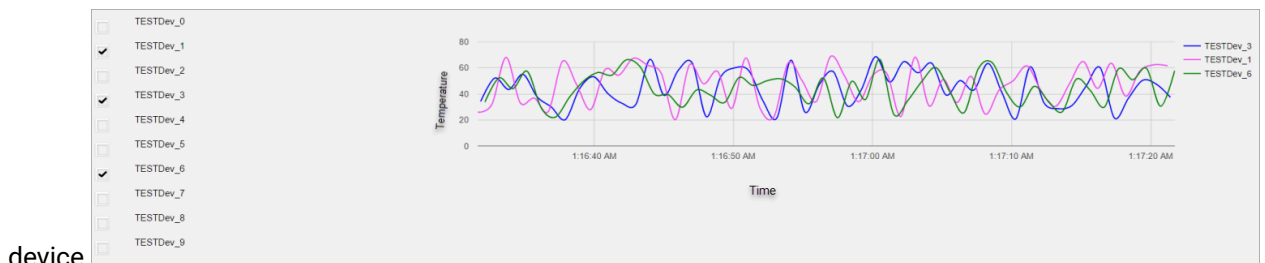
- Set different submission options for Mobile devices
- Auto submit (as soon as data is available)
- Auto update
- Interval: 2
- Units: Seconds (selected from a dropdown menu)
- Auto sync
- Auto submit on input change
- Multi-select input
- DeviceID (selected from a dropdown menu)
- Row Limit: 50 (with an information icon to the right)

7. In the **REPEATER PROPERTIES** section, in the **Flow** box, select the query GetDistinctDeviceIDs, and then select the **Multi-select** and **Checked** check boxes.
8. In the **GRAPH PROPERTIES** section:
  - a. In the **Type** box, select **Lines**.
  - b. In the **X-axis Data** box, select M2M\_data.timestamp from the GetLatestDeviceTemperature query.
  - c. In the **X-axis Label** box, enter Time.
  - d. In the **Y-axis Label** box, enter Temperature.
  - e. In the **Data** box, select M2M\_data.data from the GetLatestDeviceTemperature query.

f. In the **Label** box, select M2M\_data.device\_id from the GetLatestDeviceTemperature query.

9. In the **GRAPH PROPERTIES** section, in the **Responsive** subsection, set the height to 50 percent.
10. Select the header widget, and then in the **HEADER PROPERTIES** section, select **Data**, and then select M2M\_data.device\_id from the GetDistinctDeviceIDs query.
11. Select **PAGE DATA**, and then perform the following steps:
  - a. For the GetDistinctDeviceIDs query, point to the row containing M2M\_data.device\_id, and then select . This will create a global variable for the ID.
  - b. For the GetLatestDeviceTemperature query, drag the input DeviceID to the global variable that you have created.
12. Save the application, and preview it.

The application appears as shown in the following image. You can use the check boxes to display or hide the temperature curve for each



device.



## Tools

### Event Settings

An event settings widget is used to allow users to turn on or off event notifications using the application.

This widget is available only in Operations Hub Classic version.

#### Using the Event Settings Widget to Control an Event

Suppose you want to trigger an event to send email notifications when the temperature recorded by a device reaches a certain limit, and you want users to specify the limit using the application. To do so, perform the following steps:

1. Create an email template named `Temperature_Warning`, which you will use to send email notifications.
2. Create an event named `Temperature_Warning`. In the event:
  - Create a trigger based on a device.
  - Create an action to send an email using the email template that you have created.

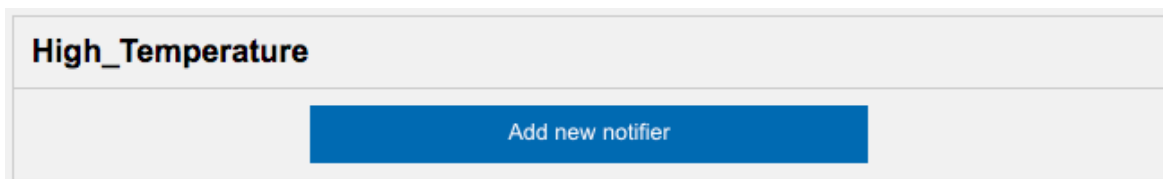


**Tip:**

For information on creating an event, refer to the [Events \(on page 362\)](#) section of the documentation.

3. Using the page designer, add the event settings widget to the relevant page of the application.
4. In the **EVENT SETTINGS PROPERTIES** section, in the **Event** box, select the event **High\_Temperature**.
5. Save the application, and then access it.

The event settings widget appears in the application.



6. Select **Add new notifier** to add an instance of the event.

The **Event notifier** section appears, displaying the settings that you have configured.

### High\_Temperature

**Event notifier**
 OFF

MaxTemp

Create
Cancel

Add new notifier

7. Change the settings as needed, switch the **ON** toggle, and then select **Create**.

The event is now active and will be triggered when the temperature reaches the specified limit.

## Upload Excel

The upload excel widget is used to upload data from a Microsoft Excel workbook. This data is used to update an entity that has been created in Operations Hub.

This widget is available only in Operations Hub Classic version.

When you use an upload excel widget, in addition to providing values for the default fields for a widget, you must define the settings as described in the table below.



### Important:

Only workbooks with a single worksheet are supported in the upload excel widget.

## Upload Excel Properties

Field Name	Description
<b>Label</b>	Identifies the name of the button that users will select in the application to upload data (for example, Upload Employee Data). By default, the value in this box is <b>Upload Excel</b> .
<b>Entity</b>	Identifies the entity to be updated with the data from the Microsoft Excel workbook. When you select the entity, the entity fields appear along with a check box next to each field. These check boxes are selected by default, indicating that the data for the corresponding fields will be included in the Mi-

Field Name	Description
	Microsoft Excel workbook. If you do not want to include data for a field, clear the corresponding check box.
<b>Actions</b>	Identifies the actions to be performed after the data is uploaded. For example, you can add a table to the application to display the data that has been uploaded, and then use a submit query action to update the table.

## Updating Data of Sales Representatives

Suppose you want to update the data of sales representatives that is stored in the SalesRep entity. It contains the following fields:

- Rep\_Code
- Rep\_Name
- Department
- Car\_No

To update the entity using the upload excel widget, perform the following steps:

1. Create a Microsoft Excel workbook with the data that you want to update. It is recommended that the column names match the field names in the entity.
2. Using page designer, add the upload excel widget to the application.
3. In the **Upload Excel Properties** section:
  - a. In the **Label** box, enter Upload Sales Rep Data.
  - b. In the **Entity** box, select **SalesRep**.
4. Save the application, and preview it.


A button labeled **Upload Sales Rep Data** appears in the application.

5. Select **Upload Sales Rep Data**, and then select the workbook that you created.

The **Select Column Mapping** window appears.

6. Enter or select values as specified in the following table.

Setting	Description
<b>Use Header</b>	Select this check box if you want to use the names specified in the heading row in the workbook. When you select this check box, the <b>Header Row Number</b> box appears.
<b>Row Names</b>	

Setting	Description
<b>Header Row Number</b>	Enter the row number that contains the column names. Suppose the column names appear in the first row of the workbook. In that case, enter 1.
<b>Import data from row &lt;number&gt; to row &lt;number&gt;</b>	Enter the starting and ending rows in the workbook whose data you want to upload. Suppose the data for the four fields that you want to upload appears in the first four rows in the workbook. In that case, enter 1 and 4.
	<div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Tip:</b> If you want to import data in all the rows in the workbook, leave the <b>to row</b> box blank.</p> </div>
<b>Append Data to existing data</b>	Select this option if you want data from the workbook to be appended to the existing data in the entity. By default, this option is selected.
<b>Overwrite existing data</b>	Select this option if you want data from the workbook to overwrite the existing data in the entity.
<b>Specify Column Mappings</b>	For each field in the entity, select the column name in the workbook that you want to map. Suppose you want to map the Rep_Name field in the entity with the Representative Name column in the workbook. In that case, select <b>Representative Name</b> in the box that appears next to <b>Rep_Name</b> .

7. Select **Import**.

The SalesRep entity is updated with the data from the workbook.

## Upload Devices

Using the upload devices widget, you can upload a list of assets to Operations Hub. This data is stored in the baseline M2M entities.

This widget is available only in Operations Hub Classic version.

To use an upload devices widget, save the asset data in a CSV file with the following columns.

Column Heading	Purpose	Usage	Mapped to Entity	Mapped to Entity Field
device_unique_name	Identifies the unique ID of the	This column is required.	device_gateway	device_id

Column Heading	Purpose	Usage	Mapped to Entity	Mapped to Entity Field
	device gateway or asset. This is the ID that the device will use when sending data using REST APIs or MQTT APIs.		M2M_groups_device_thing	gateway_thing_id
device_type	Identifies the type of the device gateway or asset.	This column is required.	device_gateway supported_device_gateway	device_type device_type
unique_address	Identifies the unique address of the device gateway (for example, imei number, mac address, unit ID).	If there is no unique address, enter None. This column is required if the url column is blank.	device_gateway	unique_address
url	Identifies the URL for the device gateway.	If there is no URL, enter None. This column is required if the unique_address column is blank.	device_gateway	url
thing_unique_name	This parameter is obsolete.	This column is required and must be blank.		
thing_type	This parameter is obsolete.	This column is required and must be blank.		
group_name	Identifies the name of the device group. If the group does not exist in	This column is required. If devices are not grouped, we recommend	M2M_groups M2M_groups_device_thing	group_name group_name

Column Heading	Purpose	Usage	Mapped to Entity	Mapped to Entity Field
	Operations Hub, it will be created.	that you enter the same value as in the device_type column.		
group_type	Identifies the group type. The supported group type is gateway.	This column is required.	M2M_groups	group_type

In addition, the CSV file can contain the following columns:

- Columns mapped to the `device_gateway` entity:

- `device_location`
- `device_altitude`
- `device_latitude`
- `device_longitude`
- `device_latlong`
- `device_username`
- `device_password`
- `device_firmware_ver`
- `device_description`
- `device_generic_1`
- `device_generic_2`

- Columns mapped to the `supported_device_gateway` entity:

- `supported_description`
- `supported_manufactor`
- `supported_product_code`
- `supported_generic_1`
- `supported_generic_2`

- Columns mapped to the `M2M_groups` entity:

- `group_generic_1`
- `group_generic_2`
- `group_description`

## Integration

### Integration Overview

The integration plugins are distributed under the following categories:

- [Inputs \(on page 575\)](#)
- [Charts \(on page 592\)](#)
- [HMI \(on page 644\)](#)
- [Display \(on page 714\)](#)
- [General \(on page 756\)](#)
- [Batch \(on page 773\)](#)

You can also use a list of [native widgets \(on page 494\)](#) available in Operations Hub.

## Inputs

### Inputs Overview

The following list of widgets are available under the inputs category:

- [Button \(on page 575\)](#)
- [Check Box \(on page 577\)](#)
- [Date Picker \(on page 578\)](#)
- [DateTime Range Picker \(on page 581\)](#)
- [Dropdown \(on page 583\)](#)
- [Radio Button \(on page 586\)](#)
- [Slider \(on page 588\)](#)
- [Text Area \(on page 589\)](#)
- [Text Input \(on page 590\)](#)
- [Toggle \(on page 591\)](#)

## Button

Use a button to trigger an action in your application.

To use the old version, refer to [Button \(on page 506\)](#).

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
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Operations Hub Classic Lay-  
out

Refer to [About Widgets \(Classic\) \(on page 494\)](#)

## Button Properties

Field Name	Description
BEHAVIOR > Click Event	<p>Provide an action for the button plugin. For example, if you select <code>Go to next page</code>, the button will lead to the specified page in the end application. To add more actions, select <b>+Add Action</b>.</p> <p>You can choose from these available actions:</p> <ul style="list-style-type: none"> <li>• <code>Submit</code>: This action submits the data to the selected entity.</li> <li>• <code>Go to page</code>: This action leads to the specified page within the application.</li> <li>• <code>Go to previous page</code>: Use this action to navigate between historical entries created for the current application session. In the end app, selecting the button leads to a previously visited page from history. If there is no previous history, then the button remains idle.</li> <li>• <code>Go to next page</code>: Use this action to navigate between historical entries created for the current application session. In the end app, selecting the button leads to the next page. In the absence of next session entries, the button remains idle.</li> <li>• <code>URL</code>: This action leads to the specified (external) URL.</li> <li>• <code>Set global value</code>: This action enables the data to be available globally.</li> <li>• <code>Show Component</code>: This action displays a hidden component in the end app.</li> <li>• <code>Hide Component</code>: This action hides a component.</li> <li>• <code>Toggle Show/Hide</code>: This action allows to switch between hidden and shown views of a component.</li> </ul>
Label	The label name that appears on the button.
Icon	If you want to use an icon for your button, choose icons from DevExtreme or Font Awesome icon libraries.



Field Name	Description
Label Styling	Formats the label: <b>Font Family</b> , <b>Font Size</b> , and <b>Font Color</b> formats the label text. <b>Background Color</b> adds a color to the label background. <b>Background Hover Color</b> appears when you move your mouse over the label.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .


## Check Box

To use the old version, refer to [Check Box \(on page 496\)](#).

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Check Box Properties

Field Name	Description
Target > Output Value	Selecting the check box in the end app sends value to the target. Use a query or a global to specify the target data source.
Source > Input Value	Provides input for the check box from a data source.
Source > Label (unchecked)	This is the label that appears when the check box is not selected.
Source > Label (checked)	This is the label that appears when the check box is selected.
Label Styling	Formats the label: <b>Font Family</b> , <b>Font Size</b> , and <b>Font Color</b> formats the label text.
Check State Colors	Select colors that appear in the background of the check box.

Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Unchecked Background Color:</b> This color appears when the check box is not selected.</li> <li>• <b>Checked Background Color:</b> This color appears when the check box is selected.</li> </ul>
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

## Date Picker

Add a calendar to display date and time in a variety of formats.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

The calendar allows you to select specific date and time to use with queries and other data in the end application. All time related queries can make use of the date and time selection.




Specify these plug-in properties:





### Note:

When configuring input targets for plug-ins, ensure that no other binding exists for the target query input. To remove a binding from the query input, select the unlink icon next to the binding.

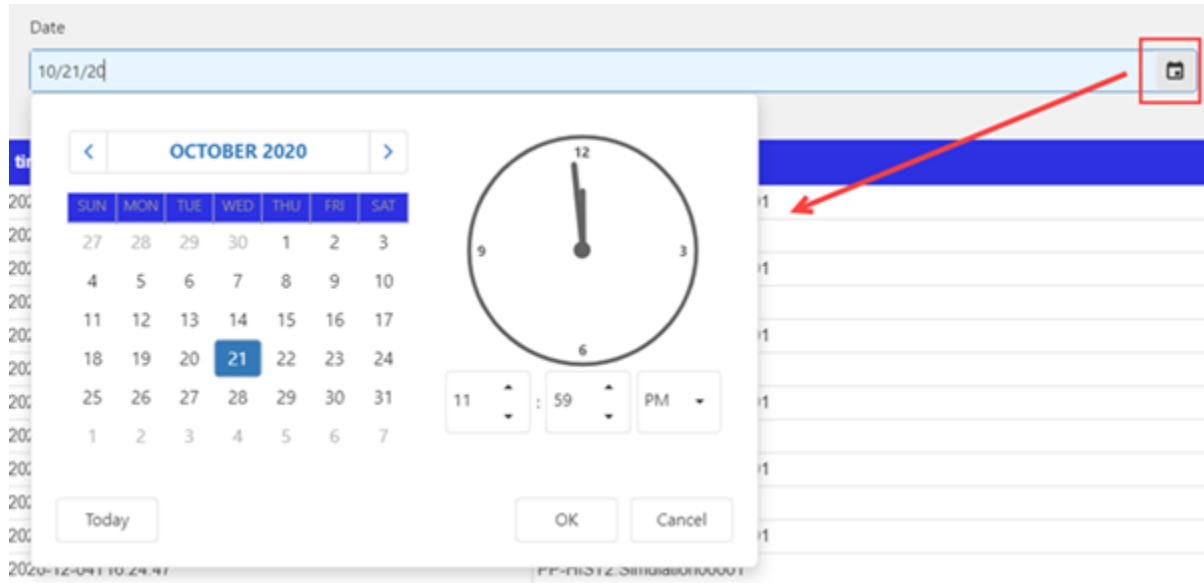
## DatePicker Properties

Field Name	Description			
Title	Provide the text that appears as a label above the plug-in in the end application.			
Type	<p>Select from these options for display in the end application:</p> <ul style="list-style-type: none"> <li>• <code>date</code>: displays only date</li> <li>• <code>time</code>: displays only time</li> <li>• <code>datetime</code>: displays both date and time</li> </ul>			
Display Format	<p>Select the format for the date and time display.</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b> If date picker output is used as an input for any of the <a href="#">extension type queries (on page 314)</a>, then choose only these display formats:</p> <ul style="list-style-type: none"> <li>• <code>yyyy-MM-dd HH:mm:ss</code> (24 hour)</li> <li>• <code>yyyy-MM-dd hh:mm aa</code> (12 hour)</li> </ul> </div>			
Custom Display Format	Use this option to define any specific date format. Enter a format string that defines the pattern for displaying the date.			
Output Format	<p>Choose from:</p> <ul style="list-style-type: none"> <li>• ISO: The selected date is formatted as per the ISO 8601 standard, which follows the pattern "YYYY-MM-DD". For example, if the selected date is May 18, 2023, the formatted output will be "2023-05-18".</li> <li>• Match Display Format: The selected date is formatted in the same way as it is displayed in the date picker. For example, if the date picker display format is "MM/DD/YYYY", and the selected date is May 18, 2023, the formatted output will be "05/18/2023".</li> </ul> <table border="1" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 33%;"></td> <td style="width: 33%; text-align: center;"><b>Local</b></td> <td style="width: 33%; text-align: center;"><b>UTC</b></td> </tr> </table>		<b>Local</b>	<b>UTC</b>
	<b>Local</b>	<b>UTC</b>		

Field Name	Description		
	<b>ISO</b>	<ul style="list-style-type: none"> <li>• Appends <b>z</b> and time shift to UTC by DatePicker</li> <li>• No time shift by the Operations Hub Server</li> </ul>	<ul style="list-style-type: none"> <li>• Appends <b>z</b> and time shift to UTC by DatePicker</li> <li>• No time shift by the Operations Hub Server</li> </ul>
	<b>Match Display Format</b>	<p>This is the recommended setting to avoid time shift by the DatePicker.</p> <ul style="list-style-type: none"> <li>• Sent “as is”</li> <li>• No time shift by the Operations Hub Server when the SQL query <b>Convert Datetime</b> is unchecked.</li> </ul>	<ul style="list-style-type: none"> <li>• Time shift to UTC by DatePicker</li> <li>• No time shift by the Operations Hub Server when the SQL query <b>Convert Datetime</b> is unchecked.</li> </ul>
<p>Refer to <a href="#">Create SQL Query (Classic)</a> (on page 332).</p>			
Timezone	<p>Select the timezone as local or UTC. This property works in conjunction with the output format options (ISO, Match Display Format). It determines whether the selected date will be converted to your local time zone (or) if it will be converted to UTC, which is a standardized global time reference.</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;">  <p><b>Note:</b> For Historian sources, use 'local' for timezone.</p> </div>		
Source Input Value	<p>Set this value to allow the plug-in to start displaying a specific date and/or time when it loads in the end application.</p>		
Input Target	<p>This is the value the plug-in provides as an output in the end application. For example, you can choose a date/time/datetime that is passed to the query, which requires a date time.</p>		
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b></p>		

Field Name	Description
	column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

### Date Picker at Runtime





### DateTime Range Picker

Use preset date ranges or create your own custom ranges for the calendar.

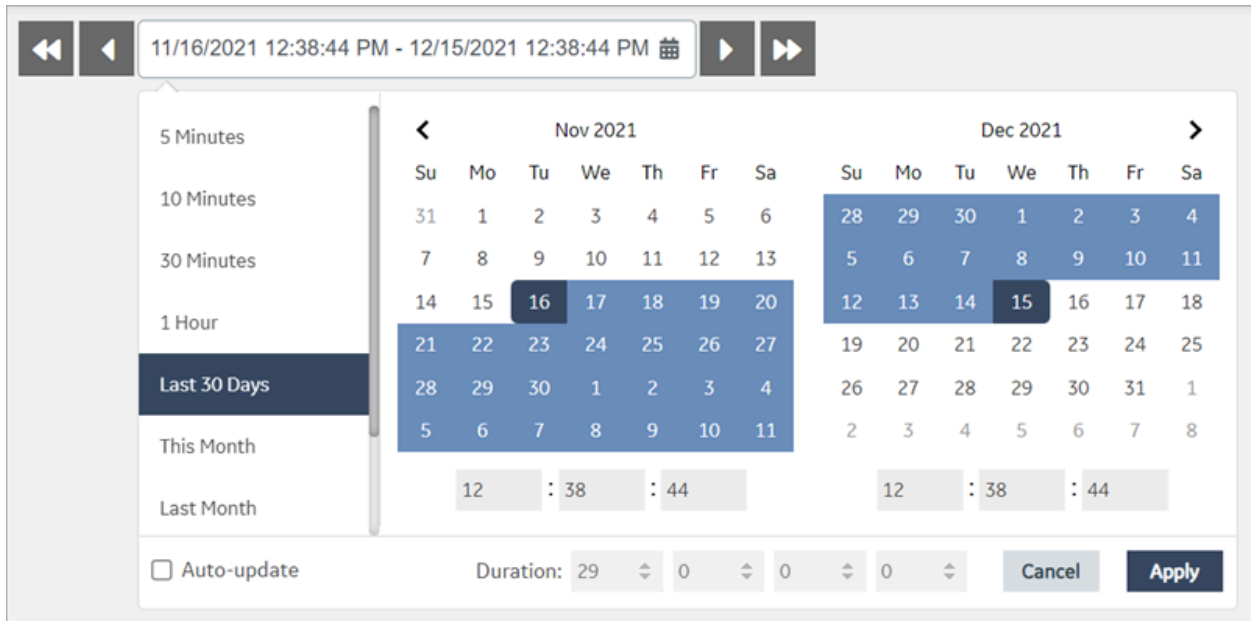
Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

### DateTime Range Picker Properties

Field Name	Description
Label	Enter a label name for the datetime range picker.
Default Duration	This is the default date range set for the widget.
Preset Ranges	These are pre-defined datetime ranges. Select the check box of the range to add to your calendar.

Field Name	Description
Auto update at startup	<p>Select the check box to allow the datetime range picker to automatically update the value of an input element it's attached to at initialization and when the selected dates change.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> Selecting the auto-update option disables datetime selection in the calendar.</p> </div>
Custom Ranges	Create one or many customized datetime ranges to add to the calendar.
Write datetimes to targets at startup	<p>If the check box is selected:</p> <ul style="list-style-type: none"> <li>• At runtime when you open the app, it automatically displays data based on the default date range.</li> </ul> <p>If the check box is blank:</p> <ul style="list-style-type: none"> <li>• At runtime when you open the app, initially no data is displayed.</li> <li>• To display data, manually select a date range using the date picker.</li> <li>• Once you choose a date range, the data is fetched and displayed accordingly.</li> </ul>
Data Targets	<p>Configure one or more target outputs to receive values from the widget.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> For Historian queries, format data target values as <code>StartLocalISO</code> and <code>EndLocalISO</code> for Start Time and Stop Time respectively.</p> </div>
Data Sources	Configure one or more data sources to get values for the widget.
Show Scroll Buttons	Select the check box to allow scrolling through the dates.

### Datetime Range Picker at Runtime



### Dropdown

Allows for multi-select, search, and select values.

Use this widget to select between multiple choices, search through a large list of choices, perform multiple selections, include a header, etc. For a simpler version, use a standard [Dropdown \(on page 499\)](#).

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>





### Dropdown Properties

Field Name	Description
Source - Dropdown Data	Use any of these options to provide values from a data source to populate the dropdown.

Field Name	Description
	<ul style="list-style-type: none"> <li>• Select the <b>Query</b> tab. Choose a query that can return dropdown values as output. Add as many output fields as required. Here's a sample query response:           <pre> { "status": { "success": true, "code": 0, "reason": "Ok" },   "result": [     { "State       Data.value": "dd-historian://       \${his1}/KALYANMR2_Simulation.Simulation00002", "State Data.key": "graduate" },     { "State       Data.value": "dd-historian://       \${his1}/KALYANMR2_Simulation.Simulation00003", "State Data.key": "school" }   ], "more": false} </pre> </li> <li>• Select the <b>Global</b> tab. Choose an output field value that is available as a global parameter.</li> <li>• Select the <b>Manual</b> tab. In the text field, enter the output field value you want to pass.</li> <li>• Select the <b>Formula</b> tab.       <ul style="list-style-type: none"> <li>◦ Select <b>Add Formula &gt; Add text</b>.</li> <li>◦ Enter the output field value in the text field.</li> <li>◦ Select <b>Done</b> to save and add the formula to the dropdown widget.</li> </ul> </li> </ul> <p>These are the two basic formats to manually enter values for a dropdown.</p> <pre> [   { "key1": "abc", "value1" : "1" },   { "key2": "def", "value2": "2" }, ] </pre> <p>(OR)</p> <pre> [ { "key1": "value1" }, { "key2": "value2" } ] </pre>
Dependency (Optional)	<p>This property is useful to create cascading drop-downs, where the options in one drop-down depend on the selection in another drop-down.</p> <p>For example, if your application has 2 drop-downs listing countries and cities. You can set the city drop-down's dependency to be the country drop-</p>



Field Name	Description
	<p>down. When a user selects a country, the city drop-down is dynamically updated to show only cities from the selected country.</p> <p>You can use a global to define dependencies between drop-down widgets.</p>
Preselect	<p>You can predefine or preselect a default value in the dropdown menu when it is initially displayed or loaded.</p> <ul style="list-style-type: none"> <li>• <i>None</i>: No default selection.</li> <li>• <i>First</i>: Selects the first item in the dropdown list.</li> <li>• <i>Data</i>: Use <b>Data Source</b> selection options to specify a preselect value. You can specify a string that matches the <b>Value</b> configured for the dropdown. This allows the dropdown plug-in to automatically preselect the corresponding option based on the provided string value.</li> </ul> <p>When using a dropdown with a data source:</p> <ul style="list-style-type: none"> <li>• If it returns a single value, that value is used for both display and output.</li> <li>• If it returns two values, the first is used for display and the second for output. For example, if the value array is {"One", "1"}, the dropdown shows "One" and returns "1" when selected.</li> <li>• If it returns two values, you can change the default order by setting alias for the two fields to "value" or "display" (case insensitive) to define which field maps to the display and value in the dropdown.</li> </ul>
Target - Dropdown Target	<p>Use any of these options to specify the target source for a dropdown value. At runtime, when you select a value from the dropdown, the value gets assigned to the target specified in this property.</p> <ul style="list-style-type: none"> <li>• Select the <b>Query</b> tab. Choose a query input value as target.</li> <li>• Select the <b>Global</b> tab. Add or choose a global value as target.</li> </ul>
Output Format	Specify whether the output value should be an array or string format.
Manual Input	<p>You can also use this property instead of using options in <b>Dropdown Data</b> property.</p> <p>Manually create values for a dropdown widget:</p>

Field Name	Description
	<ol style="list-style-type: none"> <li>1. Select <b>+Add Item</b> to add a dropdown item.</li> <li>2. Enter <b>Display Name</b> and <b>Value</b>.</li> <li>3. Add as many items as required.</li> <li>4. Use  and  to rearrange the items order of display in a dropdown.</li> <li>5. To delete an item, select  next to it.</li> </ol> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> If you configured both <b>Manual Input</b> and <b>Dropdown Data</b> properties for the widget, then the dropdown is populated with a list of combined values. Make sure to validate and rectify your data to avoid duplicates in the dropdown.</p> </div>
Label	Enter a label name that appears above the dropdown widget. For example, <code>Choose an item</code>
Dropdown Placeholder	Enter the placeholder text that appears in the dropdown. For example, <code>-Select-</code>
Dropdown height (px)	Set a height for the dropdown list in pixels.
Multiple selection	Allows to select multiple values from a dropdown. If you select this property, specify the <b>Output Format</b> and <b>Output Separator</b> .
Max Selections	Specify the maximum number of values that can be selected from the dropdown.
Enable search	Select the check box to enable a search option for dropdown values.
Output Separator	By default, multiple values are separated by a comma. You can also use other symbols like semicolon.
Width (px) (0 equals Dynamic)	Enter a width for the dropdown. If set to 0, the widget occupies 100% of its container, and fills the area in the application.



## Radio Button

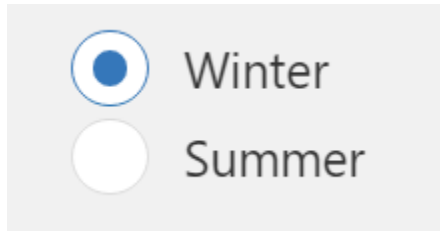
The radio button UI component allows users to select a single option from a set of mutually exclusive choices.

To use the old version, refer to [Radio Button \(on page 498\)](#).

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Radio Button Properties

Field Name	Description
Label	A label name that appears as a header for the radio button.
Selected Item	Select a <b>Query</b> or a <b>Global</b> to specify the target data source, wherein data is updated based on the radio button user selection. <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> The data types of both these properties must match to ensure proper functionality - Static Items and Selected Item.</p> </div>
Selection	Specify the input data source to receive values for the radio button, which generates the available choices for the user. See <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .
Static Items	Use this property if the radio button items are fixed choices. Select <b>+Add</b> to add multiple items. For each item, specify a display text and value.
Dynamic Items	Use this property to specify a query and dynamically generate items for the radio button. The options are not pre-defined or hardcoded. During runtime based on user inputs, data is retrieved from a data source.
Sort Items	Select the check box to arrange the radio button options/choices in ascending or descending order.
Label Styling	Formats the label: <b>Font Family</b> , <b>Font Size</b> , and <b>Font Color</b> formats the label text. <b>Background Color</b> adds a color to the label background.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .




## Slider

To use the old version, refer to [Slider \(on page 504\)](#).

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

### Slider Properties

Field Name	Description
Label	A label name that appears as a header for the slider.
Source > Input Value	Provide the input data source to receive values for the slider. See <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .
Minimum Value	Sets the minimum scale value.
Maximum Value	Sets the maximum scale value.
Use Raw Format	Select the check box to display numbers in raw format.  For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.
Number of decimals	This option appears if you do not want to display numbers in raw format.  In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.
Target > Output Value	Provide the target data source to send information.
Label Styling	Formats the label: <b>Font Family</b> , <b>Font Size</b> , and <b>Font Color</b> formats the label text.

Field Name	Description
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .



## Text Area


Use this plug-in to create a text area to include large text.

To use the old version, refer to [Text Area \(on page 509\)](#).

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Text Area Properties

Field Name	Description
Target > Output Value	Provide the target data source to send information.
Source > Input Value	Provide the input data source to receive values for the text area.
Use Raw Format	Select the check box to display numbers in raw format.  For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.
Number of decimals	This option appears if you do not want to display numbers in raw format.  In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.
Height (px, %, etc)	Enter the size of the text area in pixels.

Field Name	Description
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .


## Text Input

Use this plug-in to add a text box in your application.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Text Box Properties

Field Name	Description
Target > Output Value	Provide the target data source to send information.
Source > Input Value	Provide the input data source to receive values for the text box.
Use Raw Format	Select the check box to display numbers in raw format.  For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.
Number of decimals	This option appears if you do not want to display numbers in raw format.  In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.  The decimals will apply to <b>Input Value</b> , <b>Minimum Value</b> , and <b>Maximum Value</b> properties.
Display Mode	Specify the input type for the text box, whether password, email or URL.
Enable Clear Field Action	Select the check box to add a delete option in the end app to clear any data in the text box.


Field Name	Description
Label Styling	Formats the text: <b>Font Family</b> , <b>Font Size</b> , and <b>Font Color</b> formats the text entered in the text box.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

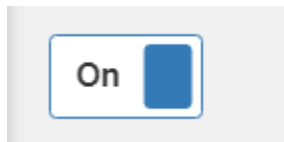
## Toggle

To use the old version, refer to [Toggle \(on page 505\)](#).

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Toggle Properties

Field Name	Description
Label	A label name that appears as a header for the toggle.
True State	The text that appears when the toggle is in true state. For example, <code>on</code> .
False State	The text that appears when the toggle is in false state. For example, <code>off</code> .
Target > Output Value	Provide the target data source to send information.
Source > Input Value	Provide the input data source to receive values for the toggle.
Label Styling	Formats the toggle text: <b>Font Family</b> , <b>Font Size</b> , and <b>Font Color</b> formats the label text and true/false state text.
Toggle Width	Enter a width for the toggle.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .



## Charts

### Charts Overview

The following list of widgets are available under the charts category:

- [Line Chart \(on page 592\)](#)
- [Pie Chart \(on page 596\)](#)
- [Bullet Graph \(on page 598\)](#)
- [Histogram \(on page 601\)](#)
- [Pareto Chart \(on page 607\)](#)
- [Sparkline \(on page 609\)](#)
- [Spider Chart \(on page 611\)](#)
- [Timeline \(on page 614\)](#)
- [Trend Card \(on page 619\)](#)
- [Variwide Chart \(on page 642\)](#)

### Line Chart

In a line chart, data points are connected by a line to help visualize the changes in data trends over a period a time.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>


### Line Chart Properties

Field Name	Description
Line Type	Select from the available list of chart line types.
Source > Data Source	Provide the input data source to receive values for the chart.
Use Raw Format	Select the check box to display numbers in raw format.



Field Name	Description
	For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.
Number of decimals	<p>This option appears if you do not want to display numbers in raw format.</p> <p>In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.</p>
Title	Title name for the chart.
Subtitle	Subtitle name for the chart.
Y Axis Title	Title name for y-axis.
Y Axis Limits	<p>Select the check box for <b>Enable Limits</b> if you want to define a data range for the Y-axis of a line chart.</p> <p>By setting the minimum (Min) and maximum (Max) values for the Y-axis, you can ensure that the line chart shows data within that range, which can be useful for highlighting specific trends or patterns within the data. Enter values for the following fields:</p> <ul style="list-style-type: none"> <li>• <b>Min</b></li> <li>• <b>Max</b></li> </ul>
X Axis Title	Title name for x-axis.
X Axis Mode	<p>Format the x-axis:</p> <ul style="list-style-type: none"> <li>• <b>Standard</b>: Uses the standard format.</li> <li>• <b>Stagger</b>: Staggers the labels on the x-axis.</li> <li>• <b>Rotate</b>: Rotates the labels on x-axis.</li> </ul>
X Axis Rotation	If you choose to rotate labels, enter the degree of rotation.
Enable Line Limits	<p>Select/Clear the check box to show/hide line limits.</p> <p>If you choose to show line limits at runtime, then enter the HiHi, Hi, Lo, LoLo limit values.</p>
Labels External	Enables external labels for the limits.
HiHi Label	Enter a label name for HiHi limit.

Field Name	Description
HiHi	Use the available options to configure the <a href="#">source values (on page 595)</a> . Refer to <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .
HiHi Color	Select a HiHi line color.
Hi Label	Enter a label name for Hi limit.
Hi	Use the available options to configure the <a href="#">source values (on page 595)</a> . Refer to <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .
Hi Color	Select a Hi line color.
Lo Label	Enter a label name for Lo limit.
Lo	Use the available options to configure the <a href="#">source values (on page 595)</a> . Refer to <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .
Lo Color	Select a Lo line color.
LoLo Label	Enter a label name for LoLo limit.
LoLo	Use the available options to configure the <a href="#">source values (on page 595)</a> . Refer to <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .
LoLo Color	Select a LoLo line color.
Legend	Select the <b>Visible</b> check box if you want to show the chart legend.  You can also use the vertical/horizontal options to position the legend in the chart.
Crosshair	Select the check box if you want to show the crosshairs in the chart.
Show Points	Select the check box if you want to show data points in the chart.
Point Symbol	Select from the available list of symbols to represent the points in the chart.
Stacking	<ul style="list-style-type: none"> <li>• Stacked: Lines do not intersect in this chart.</li> <li>• Full Stacked: Lines reach a total of 100% of the axis range at each point.</li> <li>• None: No stacking.</li> </ul>
Truncate X-Axis	Select the check box to truncate the x-axis labels.

Field Name	Description
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

## Configuring Source Values for Line Charts

When configuring a line chart using an extension query, the data retrieved from the data source is automatically arranged in the following manner: first, the **Timestamp**, followed by the **Value**, and then the **Name**.

Similarly, a line chart configured with an SQL query also requires these three essential fields in the exact order specified:

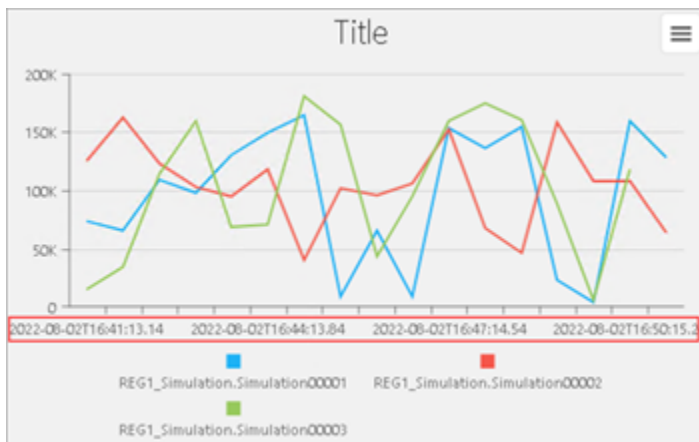
- **Timestamp:** This data is used for the X-axis.
- **Value:** This data is used for the Y-axis.
- **Name:** This data is used for legend labels.

For example, if you create a stored procedure, it should return a result set with these three fields:

- Timestamp/Week for the X-axis
- Value for the Y-axis data
- Name for the legend

## Chart Line at Runtime

For timestamps to appear in an ascending order (oldest datetime comes first, latest comes last), the [extension query \(on page 344\)](#) **Sort By** parameter should contain **+** for timestamp.



For timestamps to appear in a descending order (latest datetime comes first, oldest comes last), the [extension query \(on page 344\)](#) **Sort By** parameter should contain `-` for timestamp.

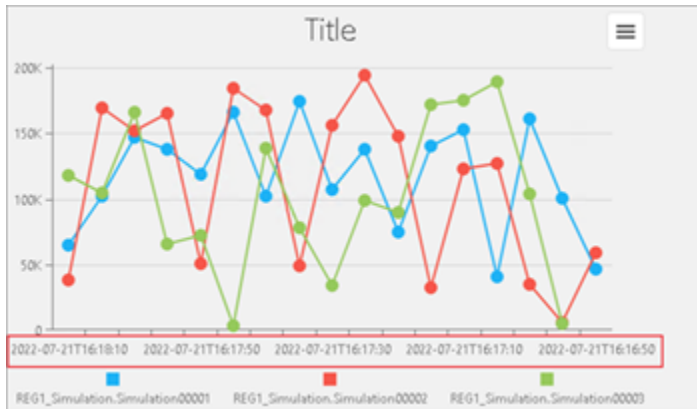
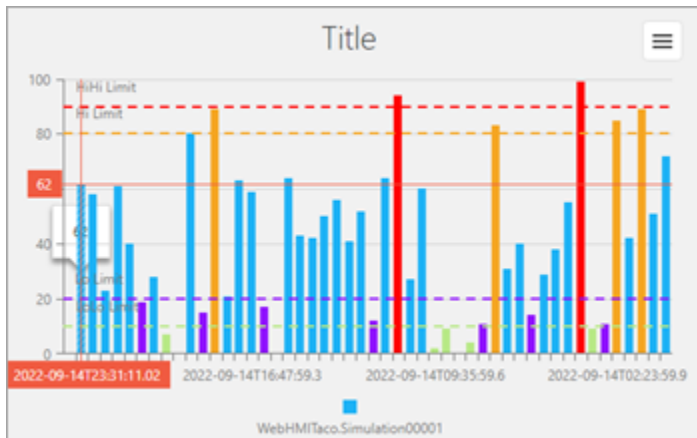



Chart showing line limits:





 **Note:**  
When exporting a chart to JPEG or PDF at runtime, make sure your browser's zoom is set to 100% or above.

## Pie Chart

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Pie Chart Properties

Field Name	Description
Pie Type	Select from the available list of pie charts.
Source > Data Source	<p>Provide the input data source for the chart either manually or through data binding.</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p> <b>Note:</b> If configuring data source manually, ensure that the first output field is always a 'value' and the second is a 'string'.</p> </div> <p>If binding data through drag-and-drop method, you don't need to do anything. The order of the fields is automatically handled.</p>
Title	Title name for the chart.
Subtitle	Subtitle name for the chart.
Legend	Select the <b>Visible</b> check box if you want to show the chart legend. You can also use the options to position the legend in the chart.
Show Labels	Select the check box if you want to show labels in the chart.
Show Tooltips	Select the check box if you want to show tool tips in the chart.
Show Name	Select the check box if you want to show label name.
Show Value	Select the check box if you want to show values in the tooltip.
Show Percentage	Select the check box if you want to show percentages in the tooltip.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .



### Note:

When exporting a chart to JPEG or PDF at runtime, make sure your browser's zoom is set to 100% or above.

## Bullet Graph

Use bullet graphs to compare the performance of any two values.



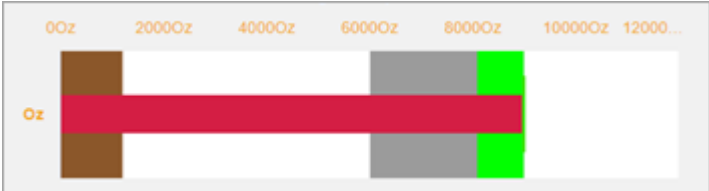
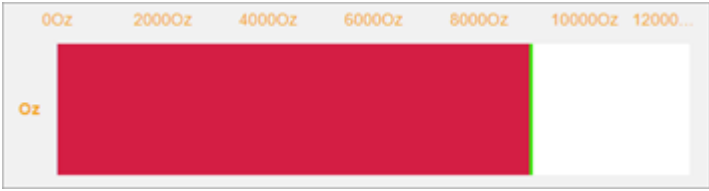
The horizontal bar in a bullet graph represents the actual value, while the vertical line represents the target value. You can add color-coded range limits to visualize the progression status of the actual value to the target value.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>


### Bullet Graph Properties

Field Name	Description
Title	Enter a title name for the bullet graph. This name appears at runtime.
Engineering Unit	Enter the unit of measurement for values.
Display Engineering Unit On Graph	If you select the check box, the specified unit appears next to the horizontal bar that represents the actual value in the graph. Clear the check box to hide the unit.
Target Value	<p>Use any of these options to specify the target and actual values in the graph:</p> <ul style="list-style-type: none"> <li>• <b>Query:</b> Allows to select a query.</li> <li>• <b>Global:</b> Allows to select a global parameter.</li> <li>• <b>Manual:</b> Allows manual entry of values.</li> <li>• <b>Formula:</b> Allows to create data formulas.</li> </ul> <p>The bullet graph always compares only a single value against the target value. To compare multiple values, create multiple graphs.</p> <p>When you drag and drop a query on the bullet graph, only the source value field gets updated. By default, the source target is set to 500.</p>
Min	Enter the minimum axis value for the graph.
Max	Enter the maximum axis value for the graph.
Variant	You have an option to use a bar graph instead of the bullet graph.

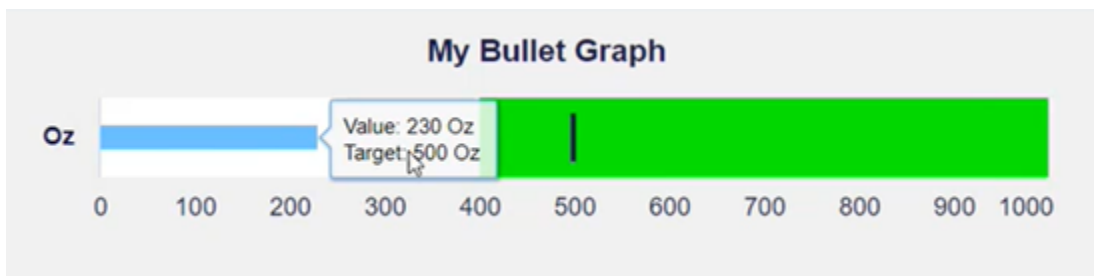
Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Bullet:</b> The default bullet graph displays a background progress bar.</li> <li>• <b>Bar:</b> Displays a single bar graph.</li> </ul>
Number Of Decimals	<p>Enter the number of decimal places to format actual and target values in the graph. The decimals do not apply to ticks.</p> <p>For example, enter <u>1</u> to round off value to the nearest tenths, <u>2</u> to round off value to the nearest hundredths, so on.</p>
Width (px) - 0 equals dynamic	<p>Enter the width of the graph in pixels. For example, <u>600</u>.</p> <p>If set to <u>0</u>, the bullet graph widget occupies 100% of its container.</p>
Height (px) - 0 equals dynamic	<p>Enter the height of the graph in pixels. For example, <u>130</u>.</p>
Orientation	<ul style="list-style-type: none"> <li>• <b>Horizontal:</b> This is the default display orientation for the graph.</li> <li>• <b>Vertical:</b> If you select a vertical orientation, re-adjust the width and height of the graph.</li> </ul>
Display EGU on Axis Ticks	<p>Select the check box if you want the engineering unit to appear next to each tick mark value.</p>
Display Axis Ticks On Opposite Side	<p>Select the check box if you want the tick marks to appear above the graph.</p> <p>By default, ticks appear below the graph.</p>
Ticks	<p>Choose how to display the tick marks on the graph scale.</p> <ul style="list-style-type: none"> <li>• <b>Dynamic:</b> Dynamically selects the tick mark range to display.</li> <li>• <b>Min/Max:</b> Displays only min and max tick mark values.</li> <li>• <b>Hidden:</b> Hides the tick marks.</li> </ul>
Font Color	<p>Select a font color for the graph text.</p>
Color	<p>Select a color for the horizontal bar in the graph that represents the actual value.</p>
Target Color	<p>Select a color for the vertical line in the graph that represents the target value.</p>
Color Background	<p>Select a color to apply as a background for the graph.</p>

Field Name	Description						
Custom Limit(s)	<p>Select <b>(+Add Item)</b> to set up custom range limits and add plot bands to your bullet graph. The plot bands appear in the background providing a visual display of performance status.</p> <ol style="list-style-type: none"> <li>1. Choose a <b>Plot Band Option</b>.</li> </ol> <table border="1"> <tr> <td>Manual</td> <td>Select this option if you want to enter <b>from</b> and <b>to</b> values to set up a range limit.</td> </tr> <tr> <td>Percentage of Total</td> <td>To set up a range limit, calculates the percentage of the total value (maximum axis value) provided in the bullet graph.</td> </tr> <tr> <td>Percentage of Target</td> <td>To set up a range limit, calculates the percentage of the target value provided in the bullet graph.</td> </tr> </table> <ol style="list-style-type: none"> <li>2. Select a unique color to help identify the range in the graph.</li> <li>3. Use  and  to re-arrange the order of the range limits.</li> </ol> <p>The order of the custom range limit impacts the graph. In the example figure, the green band represents the first applied range limit (90 -100 % target) followed by the rest of the range limits as per the order.</p>  <p>In bar variant graphs, whenever the value satisfies a specified range (plot band), the horizontal bar will reflect the color set for that range.</p> 	Manual	Select this option if you want to enter <b>from</b> and <b>to</b> values to set up a range limit.	Percentage of Total	To set up a range limit, calculates the percentage of the total value (maximum axis value) provided in the bullet graph.	Percentage of Target	To set up a range limit, calculates the percentage of the target value provided in the bullet graph.
Manual	Select this option if you want to enter <b>from</b> and <b>to</b> values to set up a range limit.						
Percentage of Total	To set up a range limit, calculates the percentage of the total value (maximum axis value) provided in the bullet graph.						
Percentage of Target	To set up a range limit, calculates the percentage of the target value provided in the bullet graph.						
Historian REST Options	Use this property to configure Historian REST queries. You can define which index of the result set to use as input data. The default <b>Result Set</b>						



Field Name	Description
	<p><b>Index</b> is 0, wherein the widget uses the first tag data from the query result set. Enter 1 to consider the second tag data, 2 for third, so on.</p> <p>Select the <b>Reverse Sorting Order</b> check box to reverse the query result set. The bottom record value is provided as input to the widget. Clear the check box to provide the top record value as input to the widget.</p>
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a>.</p>

### Bullet Graph at Runtime



### Histogram

This plug-in provides a graphical representation of the distribution of numerical data.

See [Configuring Histogram \(on page 602\)](#).

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

### Histogram Properties

Field Name	Description
Source > Default Sampling Mode	Set a default sampling mode for histogram. Use any of these options to get values from a data source:


Field Name	Description
	<ul style="list-style-type: none"> <li>• Select a query output.</li> <li>• Select a global parameter.</li> <li>• Enter source data manually.</li> <li>• Add a formula.</li> </ul>
Source > Height	Set the height of the histogram chart.
Source > Chart Title	Provide a title name for the histogram chart. The value must be a text string.
Source > Show Header Controls	Specify a boolean value. <code>True</code> shows chart header controls. <code>False</code> hides chart header controls.
Source > Scroll Percentage	Configure the scroll percentage based on the total time range.
Background Color	Adds a background color to the histogram chart.
Show Border	Select the check box to add a border to the histogram chart.
Border Color	If you choose to add a border, then set a color for the border.
Source > Logging Level	Applies to log messages. You can control the level of data logged to the browser console. The default value is <code>info</code> . Other valid values are <code>step</code> , <code>trace</code> , <code>debug</code> , <code>warning</code> , <code>error</code> , and <code>none</code> .
Source > Historian Legend	Specify whether to show/hide legend by default.
Number of Bins	Enter the default number of bins to appear on histogram.
Bins Color	Set a default color for the bins.
Normalized Curve Color	Set a default color for the normalized curve.

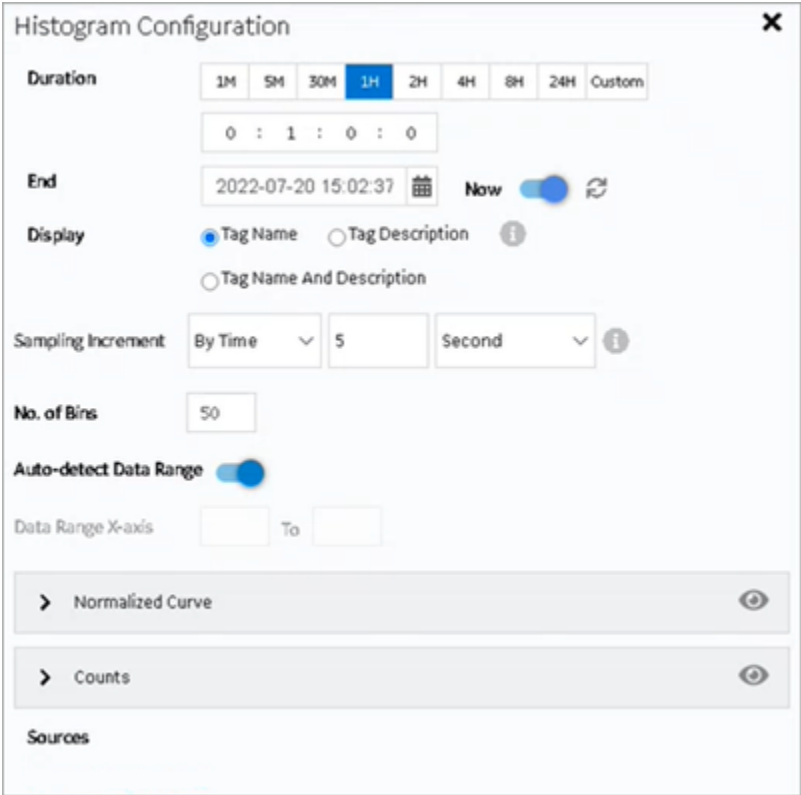
## Configuring Histogram

This topic describes how to configure a histogram chart at runtime.


You need a Historian data source. See [Create a Data Source \(Classic\) \(on page 421\)](#).




1. Run the histogram application.

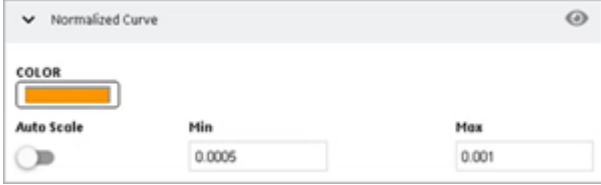
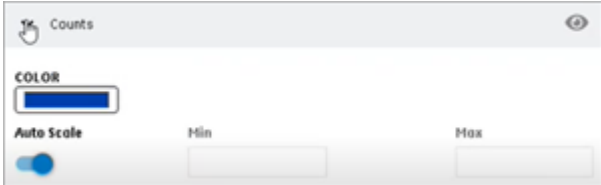
2. From the toolbar menu, select  to access the **Histogram Configuration** settings.




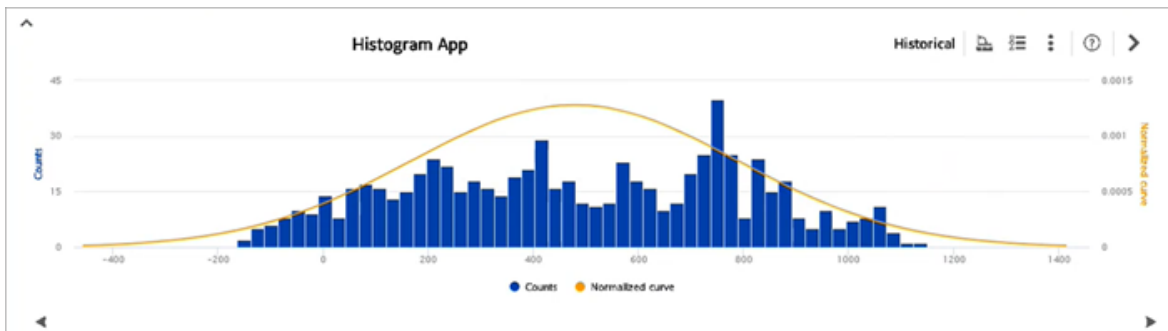
3. Use these settings to configure your Histogram chart:

Setting	Description
Duration	<p>Specify a duration to plot the data. This duration is subtracted from the specified <b>End</b> time. You can go back in time in minutes, hours, or provide a customized duration for the histogram chart. Choose from any of these options:</p> <ul style="list-style-type: none"> <li>◦ 1, 5, or 30 minutes</li> <li>◦ 1, 2, 4, 8, or 24 hours</li> <li>◦ Select <b>Custom</b> to enter a different duration in the time format text box.</li> </ul>
End	<p>You have the option to either choose a custom datetime using the calendar, (or) set the current system datetime.</p> <p>Select  <b>DatePicker</b> to set a custom end date and time for data.</p>
Now	<p>Use this option to update the <b>End</b> time to your current system data and time. The toggle is enabled by default. Choosing a different end date and time (using calendar) automatically disables the toggle.</p>







Setting	Description
	Select  to refresh charts set to 'Now'. The refresh option instantly updates the end time to current time.
Display	Use this option to set a display style for the tag added to the histogram chart. You can choose any of these display styles: <ul style="list-style-type: none"> <li>◦ <b>Tag Name:</b> Displays only tag name.</li> <li>◦ <b>Tag Description:</b> Displays only tag description. Lengthy descriptions are truncated with an ellipsis. Move your cursor over ... to reveal the complete description. In the absence of a description, tag name is displayed by default.</li> <li>◦ <b>Tag Name and Description:</b> Displays both tag name and description.</li> </ul>
Sampling Increment	Select whether you want to increment the sampling data based on time or count, and then specify the time or count, respectively. <div style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;"> <p>Sampling Increment <span style="background-color: #007bff; color: white; padding: 2px 5px; border-radius: 3px;">By Time</span> <input style="width: 40px;" type="text" value="5"/> <span style="border: 1px solid #ccc; padding: 2px 5px;">Second</span> <span style="font-size: 0.8em;">▼</span> <span style="float: right; font-size: 0.8em;">i</span></p> <p>Notes <span style="background-color: #f0f0f0; padding: 2px 5px; border-radius: 3px;">By Count</span></p> </div> <div style="border: 1px solid #00a0c0; border-radius: 10px; padding: 10px; margin-top: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b> The sampling increment may not always be honored. The maximum number of data points plotted on the histogram chart is 3000 when sampling by time, and 8000 when sampling by count. You can zoom in to view more accurate data.</p> </div>
No. of Bins	Indicates the default number of bins to appear on a histogram chart. You have the option to increase/decrease the bin count at runtime. <div style="border: 1px solid #00a0c0; border-radius: 10px; padding: 10px; margin-top: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b> You can add any number of bins from 1 to 200.</p> </div>
Auto-detect Data Range	If auto-detect is enabled, the X-axis values are automatically populated from the tag added to histogram. You have the option to modify the auto-detected value range for the chart.

Setting	Description
	To disable auto-detect, turn off the toggle and enter manual <b>Data Range X-axis</b> values. The histogram chart is updated to show the data analysis based on the newly specified X-axis values.
Normalized Curve	<p>Use this option to format the normalized curve (bell curve) in a histogram chart.</p> <ul style="list-style-type: none"> <li>◦ Apply a color to the curve.</li> <li>◦ If auto scale is enabled, the Y-axis values on the right side of the graph are automatically populated from the tag added to histogram. You can disable the auto scale option to enter specific <b>Min</b> and <b>Max</b> values.</li> <li>◦ To show or hide the curve on the histogram chart, select the eye icon in settings, (or) the <b>Normalized Curve</b> label on the chart.</li> </ul> 
Counts	<p>Use this option to format histogram counts that appear on the left Y-axis of the graph.</p> <ul style="list-style-type: none"> <li>◦ Apply a color to the bins.</li> <li>◦ If auto scale is enabled, the Y-axis counts on the left side of the graph are automatically populated from the tag added to histogram. You can disable the auto scale option to enter <b>Min</b> and <b>Max</b> count values. In case, the counts range is reduced, then less number of bins appear on the chart even if the default is set to a higher number.</li> <li>◦ To show or hide the bins on the chart, select the eye icon in settings, (or) the <b>Counts</b> label on the chart.</li> </ul> 
Sources	Select <b>Add Tag for Histogram</b> to browse the Proficy Historian data source, and select a tag to add to histogram.

Setting	Description
	<div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px;">  <b>Note:</b> You can add only one tag.                 </div>



4. Use the toolbar menu options to achieve the following tasks:

Task	Procedure
Show/Hide legend	Select  to show or hide the histogram chart legend.
View statistics	Select  to show/hide the statistical data for Historian tags. The statistics appear below the chart.
Export data	Select  and then select <b>Export</b> to export and save the histogram chart data to a CSV file.
Print data	Select  and then select <b>Print</b> . Enter the title and print. <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <b>Note:</b> The x-axis and y-axis scale values may change when printing the histogram. However, the graph remains functionally accurate.                 </div>
Reset histogram chart	Select  and then select <b>Reset</b> . Any changes made to the duration, start time, axis preferences, and properties are reverted.

Task	Procedure
Zoom in/out	<p>Mouse-click and drag anywhere on the chart to zoom in.</p> <p>Select <b>Reset zoom</b> to zoom out.</p>

## Pareto Chart

Plot a pareto chart for qualitative analysis of your data.

You can use this widget to run a pareto analysis on your data. A pareto chart is a combination of columns/bars and a line graph. The columns/bars represent individual values, and are arranged in a descending order. The pareto line represents the cumulative total of the values. This visual arrangement helps to identify the most important factors in a given dataset in order to make critical decisions.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Pareto Chart Properties

### Title Configuration


Field Name	Description
Name	Enter a title name for the pareto chart. This name helps to identify the pareto chart at runtime.
Font Size (px)	Set the font size for the title text in pixels.
Font Color	Select a font color for the pareto chart text.
Width (px) - 0 equals dynamic	If set to 0, the pareto chart occupies 100% of its container.
Height (px)	Set a height for the pareto chart in pixels.

### Label Configuration

Field Name	Description
Y-Axis Label	Enter a label name for the y-axis.

Field Name	Description
X-Axis Label	Enter a label name for the x-axis.
X-Axis Rotation	Enter the degree of rotation for the x-axis labels.
Axis Label Font Size (px)	Enter the font size for the axis labels.


### Line Configuration

Field Name	Description
Width (px)	Enter a value that defines the thickness of the pareto line in the chart.
Color	Select a color for the pareto line.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

### Series Configuration

Field Name	Description
Variant	Both variants are used to compare two or more values, wherein the length of the column/bar is proportional to the data value. Select between: <ul style="list-style-type: none"> <li>• Column: Inserts vertical columns to represent data in the chart. Use this variant for larger data sets.</li> <li>• Bar: Inserts horizontal bars to represent data in the chart. Use this variant if your chart titles are long.</li> </ul>
Color	Select a color for the columns/bars in the chart.
Align Tick Marks	Select the check box if you want to align the tick marks on the chart. So, even if the data being plotted on the right axis (secondary y-axis) exceeds 100%, it will not be displayed above 100%. Instead, the values will be capped at 100%.  If you clear the check box, the tick marks on the left axis (primary y-axis) will allow the right axis (secondary y-axis) to be above 100%. In other words, the right axis (secondary y-axis) will not be tied to the size of the bars on the left axis (primary y-axis).



Field Name	Description
Source - Data Source	<p>To provide values for the pareto chart, select the <b>Query</b> tab to choose from queries that return output fields for the x-axis and y-axis data:</p> <ol style="list-style-type: none"> <li>1. Reason (String)</li> <li>2. Frequency/Occurrence (number)</li> </ol> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <b>Note:</b> Currently you can pass values to the widget using a query only. </div>

## Sparkline

Generate simple sparkline charts to visualize data trends.


Use the sparkline widget to create compact and easy to understand line charts. Configure sparkline properties to insert inline lightweight charts.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Sparkline Properties

Field Name	Description
Title	Enter a title name for the sparkline. This name helps to identify the sparkline chart at runtime.
Engineering Unit	Enter the engineering unit of measurement for values.
Height - 0 equals 100%	Set the height in pixels. If set to 0, the sparkline chart occupies 100% of its container.
Font Color	Select a font color for the title name, current value, and engineering unit.
Font Size (px) (0 equals Dynamic)	Set the font size in pixels. If set to 0, the font size becomes dynamic, which means the font is resized based on the height of the widget.
Line Color	Select a color for the line.

Field Name	Description
Line Width	Enter a value in pixels that defines the thickness of the line in the chart.
Number of decimals	<p>Enter the number of decimal places to format values.</p> <p>For 1 decimal place, the value is rounded off to the nearest tenths; for 2 decimal places, the value is rounded off to the nearest hundredths, so on.</p>
Source - Value	<p>Select any of these options to provide values from a data source. The only output field should be Value.</p> <ul style="list-style-type: none"> <li>• <b>Query:</b> Allows to select a query that returns Value as output.</li> <li>• <b>Global:</b> Allows to select an output field value that is available as a global parameter.</li> <li>• <b>Manual:</b> Allows to enter the value (to feed the plug-in) in the text field.</li> <li>• <b>Formula:</b> Allows to build a formula that returns a Value as output.</li> <li>• <b>Fetch Data Property:</b> Is activated when you <a href="#">drag and drop (on page 140)</a> tag data on the plug-in.</li> </ul>
Result Set Index	<p>This property is applicable for Historian REST queries only. It allows to define which index of the result set the widget should use as input data. Default is 0.</p> <p>For example, consider a Historian REST query that returns data for three tags.</p> <ul style="list-style-type: none"> <li>• If you want the widget to use the first tag data from the query result set, then set the index value as <b>0</b>.</li> <li>• To direct the widget to use the second tag data, enter the index value as <b>1</b>.</li> <li>• Similarly, you can set index values as 2, 3, 4, etc. based on the data to provide as input to the widget.</li> </ul>
Reverse Sorting Order	<p>This property is applicable for Historian REST queries only. It helps to reverse the query result set.</p> <p>Select the check box to provide the bottom record value as input to the widget.</p> <p>Clear the check box to provide the top record value as input to the widget.</p>

Field Name	Description
	<p>When you apply this property to REST queries that return more than one record for each input tag, the records of the selected tag (use <b>Result Set Index</b> to select the tag) are reversed.</p> <p>For example, consider a Historian REST query with two input tags (tag1 and tag2); each with 100 records as result. Set the <b>Result Set Index</b> as <b>0</b> and verify the following:</p> <ul style="list-style-type: none"> <li>• If you selected the <b>Reverse Order</b> check box, then the 100th record (last) value of tag1 is displayed on the sparkline.</li> <li>• If you cleared the <b>Reverse Order</b> check box, then the first record value of tag1 is displayed on the sparkline.</li> </ul>
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a>.</p>

## Spider Chart

Use spider charts to compare and analyze multiple data sets.


With the spider chart widget, you can:

- Create visually appealing spider graphs.
- Apply unique color coding for efficient comparison of data.
- Analyze values that change over a period of time.
- Use the resultant information for better decision-making.

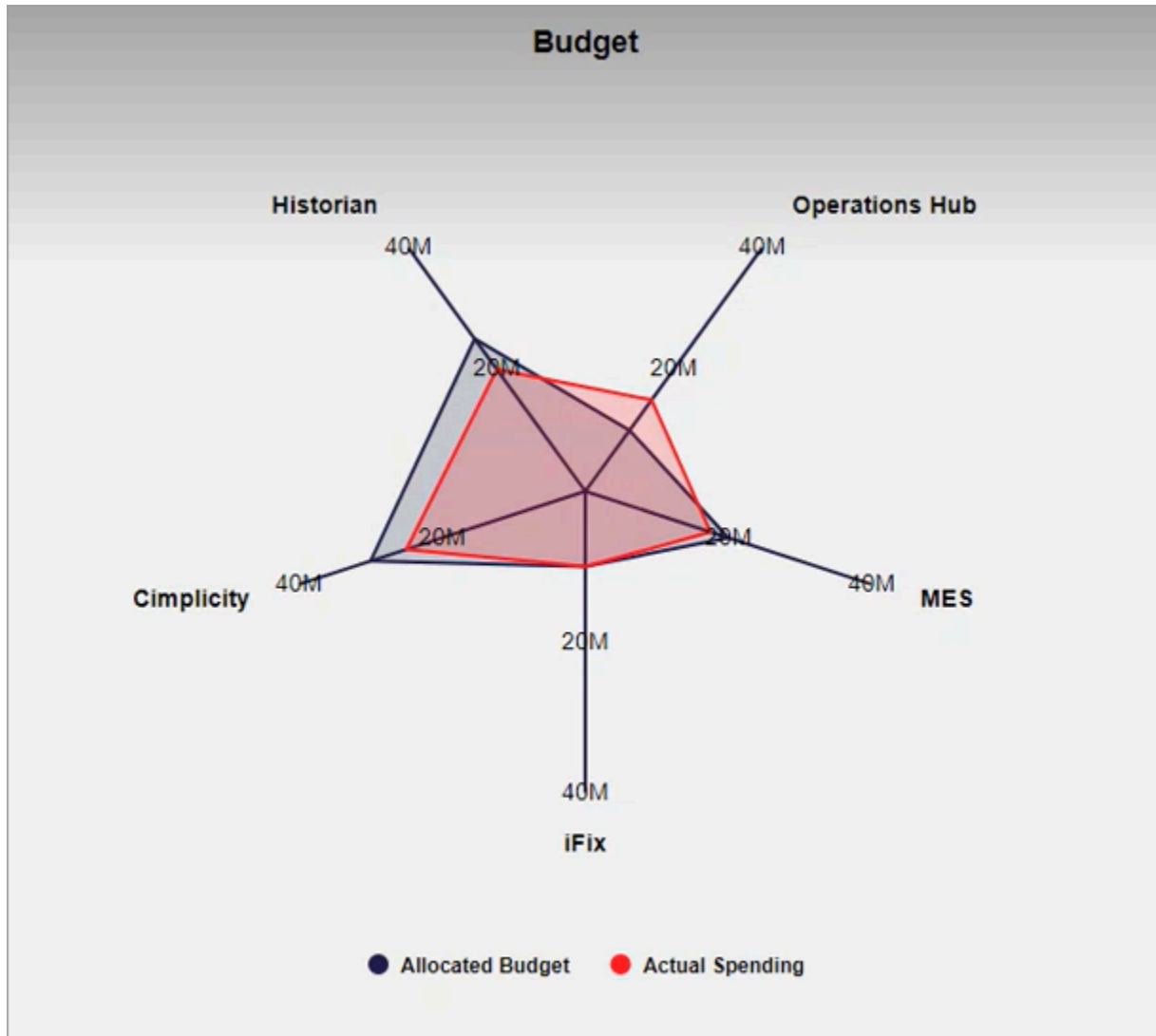
Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Spider Chart Properties

Field Name	Description
Title	Enter a title name for the spider chart. The title appears at runtime.
Font Color	Select a font color (on page 831) for the spider chart text.
Line Color	Select a line color (on page 831) for the spider chart axes.
Default Min	Enter the minimum axis value. <ul style="list-style-type: none"> <li>• This value is set as default.</li> <li>• Applies to all the available axes on the spider chart.</li> </ul>
Default Max	Enter the maximum axis value. <ul style="list-style-type: none"> <li>• This value is set as default.</li> <li>• Applies to all the available axes on the spider chart.</li> </ul>
Legend	Select: <ul style="list-style-type: none"> <li>• <b>Bottom:</b> Legend appears at the bottom of the chart.</li> <li>• <b>Right:</b> Legend appears on the right side of the chart.</li> <li>• <b>None:</b> Hides the legend.</li> </ul>
Max-width	Enter the maximum width the spider chart can occupy in an application.
Axis Labels	Add items to create multiple axes in a spider chart. Enter the following information for each item (axis): <ul style="list-style-type: none"> <li>• <b>Label:</b> A label name to identify the axis.</li> <li>• <b>Alt. Min:</b> Alternate minimum axis value if you want to override the <b>Default Min</b> value.</li> <li>• <b>Alt. Max:</b> Alternate maximum axis value if you want to override the <b>Default Max</b> value.</li> </ul>
Series	Add items to set up a data series for the spider chart. <ul style="list-style-type: none"> <li>• <b>Name:</b> Enter a name for the data set.</li> <li>• <b>Color:</b> Select a line color (on page 831) for the data set.</li> <li>• <b>Fill:</b> If you select the check box, the data set area is filled with the series color.</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Source Value:</b> To get values for the data set, choose any of these options:               <ul style="list-style-type: none"> <li>◦ <b>Query:</b> Select a query to get output values from a data source.</li> <li>◦ <b>Global:</b> Select a global value that returns an array as output.</li> <li>◦ <b>Manual:</b> Enter semicolon separated values.</li> </ul> </li> <li>• <b>Reverse Sorting Order:</b> This property applies to Historian REST queries only. It helps to reverse the query result set.               <ul style="list-style-type: none"> <li>◦ If you select the check box, the bottom record value is taken as input.</li> <li>◦ If you clear the check box, the top record value is taken as input.</li> </ul> </li> </ul>
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a>.</p>

### Spider Chart at Runtime



### Timeline

Use the timeline widget to visually monitor the progress of your events.



Generally used for time-based events, the timeline widget can monitor the status of a machine and update the events that occurred over a time period. It can capture data on how long a machine was running, or remained in an idle state. To visualize multiple events against a single time period, add multiple timelines aligned to the same X-axis on a chart.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
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Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>
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## Timeline Properties





Field Name	Description
<b>BEHAVIOR &gt; Event Selected</b>	Trigger actions on the timeline selected event.
Title	Enter a title to help identify the timeline at runtime.
Font Color	<a href="#">Select a font color (on page 831)</a> for the widget text.
Show Border	Select the check box to add a border to the timeline widget. A border frames the widget and provides a clean look.
Border Color	<a href="#">Select a color (on page 831)</a> for the border.
Show X-axis Labels	Select the check box to show the X-axis ticks on the widget at runtime. Clear the check box to hide the ticks.
Width	Enter a width for the timeline widget.
Height	Enter a height for the timeline widget.
Event Table Datasource	<p>The event table helps to match the colors and labels. It enables the widget to assign a specific color and label to an incoming event.</p> <p>When a <a href="#">value from the result set (on page 616)</a> matches a value from the event table, then the configured color and label applies to that entry. You can configure an event table either <a href="#">manually (on page 616)</a>, or get data from a data source.</p> <p>Select the output fields in this order:</p> <ul style="list-style-type: none"> <li>• Value</li> <li>• Label</li> <li>• Color</li> </ul> <p>Use any of these options to get data from a data source:</p> <ul style="list-style-type: none"> <li>• Select a query output.</li> <li>• Select a global parameter.</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>• Enter source data manually.</li> <li>• Add a formula.</li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;">  <b>Note:</b> Currently, we only support the option to use a query output to retrieve data.         </div>
Point Primary Color	Serves as the first color in the zebra striped color pattern. <a href="#">Select a primary color (on page 831)</a> to apply to the timeline event table if not retrieving values from a datasource.
Point Secondary Color	Serves as the second color in the zebra striped color pattern. <a href="#">Select a secondary color (on page 831)</a> to apply to the timeline event table if not retrieving values from a datasource.
Event Table Manual	<p>You can create event table entries manually. In the absence of an <b>Event Table Datasource</b>, these entries are used for retrieving data for the timeline events.</p> <ul style="list-style-type: none"> <li>• Select <b>+Add Item</b> to create an event table entry.</li> <li>• For each event table entry, enter these details:             <ul style="list-style-type: none"> <li>◦ <b>Value</b></li> <li>◦ <b>Label</b></li> <li>◦ <b>Color</b></li> </ul> </li> </ul> <p>Events that do not match an entry from the event table are assigned the <b>Point Primary Color</b> or <b>Point Secondary Color</b>.</p>
Datasource Values	<p>Configure one or more data sources to get values for the timeline widget. When you add multiple data sources, you get a single view for multiple timelines all aligned to the same X-axis. It allows you to compare data at different time intervals. To configure a data source:</p> <ol style="list-style-type: none"> <li>1. Select <b>+Add Item</b>.</li> </ol> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;">  <b>Note:</b> You must add an item even if you want to drag and drop the data to bind to the widget.         </div>

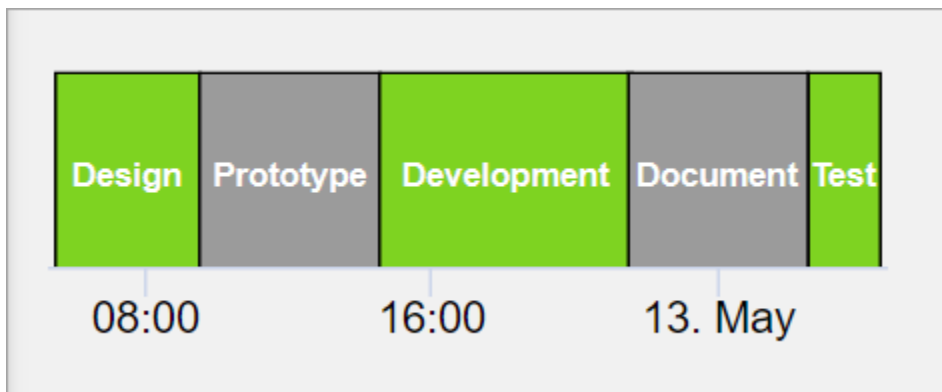


Field Name	Description
	<p>2. Enter a <b>Name</b> to identify the data source at runtime.</p> <p>The name is shown next to the timeline and on the tooltip. If you do not provide a name for the data source, the query name appears on the tooltip.</p> <p>3. Use any of these options to get data from a data source:</p> <ul style="list-style-type: none"> <li>◦ Select a query output.</li> <li>◦ Select a global parameter.</li> <li>◦ Enter source data manually.</li> <li>◦ Add a formula.</li> </ul> <p>You must select timestamp as the first value followed by other values. Select the output fields in this order:</p> <ul style="list-style-type: none"> <li>◦ Datetime</li> <li>◦ Value</li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b></p> <ul style="list-style-type: none"> <li>• Currently, we only support the option to use a query output to retrieve data.</li> <li>• If you <a href="#">drag-and-drop (on page 140)</a> multiple tags on the timeline widget, only the last selected tag is bound to the output. Only one data source value can be bound per query.</li> </ul> </div>
Input Datetime Format	Select from local or UTC.
Start Sample	Select the <b>Enable</b> check box to insert an event at the start of the timeline. Then, specify the start timestamp.
Datasource Start Timestamp	<p>Use any of these options to provide start timestamp values from a data source:</p> <ul style="list-style-type: none"> <li>• Select a query output.</li> <li>• Select a global parameter.</li> <li>• Enter source data manually.</li> <li>• Add a formula.</li> </ul>

Field Name	Description
	<div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;">  <b>Note:</b>            When using multiple REST query data sources, ensure that the start time for all the REST query data sources closely match with one another.         </div>
Datasource Start Value	Use any of these options to provide event value at the start (after timestamp) from a data source: <ul style="list-style-type: none"> <li>• Select a query output.</li> <li>• Select a global parameter.</li> <li>• Enter source data manually.</li> <li>• Add a formula.</li> </ul>
End Sample	Select the <b>Enable</b> check box to insert an end time for the last event on the timeline. Then specify the end timestamp.
Datasource End Timestamp	This is the final timestamp for the last event in the query. It is required to specify an end timestamp to get all the values from last queried batch on display. <p>Use any of these options to provide end timestamp values from a data source:</p> <ul style="list-style-type: none"> <li>• Select a query output.</li> <li>• Select a global parameter.</li> <li>• Enter source data manually.</li> <li>• Add a formula.</li> </ul>
Output Targets	You can configure output targets for a selected event. At runtime, these targets trigger only on selecting the respective event. <ul style="list-style-type: none"> <li>• Select <b>+Add Item</b> to configure an output target.</li> <li>• Select an <b>Output Value</b>. The available values are Start Local Time, Start Local Time ISO, Start UTC Time, Start UTC Time ISO, End Local Time, End Local Time ISO, End UTC Time, End UTC Time ISO, Value, and Label.</li> <li>• To specify a target source/tag, use a query or global.</li> </ul> <p>You can add one or more output targets for an event.</p>

Field Name	Description
	<ul style="list-style-type: none"> <li>Use  and  to reorder output targets. The output targets are implemented in the specified order.</li> <li>Select  to delete an output target.</li> </ul>
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

## Timeline at Runtime



## Trend Card

Use the trend card to create and display trend charts in your application.

A trend card widget allows you to plot real time data from OPC UA servers and historical data from Historian servers. You can plot the data using the context of a model or browse for a Historian or OPC UA server. You can then add tags to the chart. The model contains asset types and assets. The assets have properties associated with them, which are, in turn, associated with tags defined in Historian or OPC UA.

1. Drag and drop the trend card plug-in on a page.
2. Configure the trend card properties (see table below) to process the data and generate trend charts for runtime.
3. In the runtime environment, you can customize the trend charts to suit individual preferences or requirements. See [Customize a Trend Chart at Runtime \(on page 623\)](#).
4. To learn how to work with trend charts, refer to [Trend Chart Functions \(on page 634\)](#).

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Trend Card Properties

The following table describes the configurable properties that help to tailor the chart to your specific needs and requirements.

Field Name	Description
Asset Name (Optional Override)	Select an asset name.
Select Favorite	<p>With this property, you can configure the trend chart to load an existing favorite at runtime.</p> <p>To use this property along with the <a href="#">Favorite Organizer (on page 759)</a> widget, configure the Target Output Selection global with an <a href="#">Output Format (on page 760)</a> of <code>Favorite Name</code>, then bind the output of favorite organizer widget to this property in order to drive the trend chart via favorite.</p>
Trend Tags Input	<p>Select your string type global that contains a list of tags separated by commas that you wish to trend with a page load.</p> <p><b>Example:</b></p> <pre>dd-historian://\${Ryder-HIST}/Ryder_Simulation.Simulation00001, His- torian tag: dd-historian://\${Ryder-HIST}/Ryder_Simulation.Simu- lation00002, dd-historian://\${Ryder-HIST}/FIX.COMP_001_AVERAGE_- VIBRATION.F_CV, dd-opcua://\${WEBHMI}/ns%3D3%3bs%3DANIMATIONTAG.Val- ue, dd-opcua://\${Ryder-FIX}/ns%3D2%3bs%3D13%24COMP_001_DISCHARGE_- PRESSURE.CV</pre>
Trend Config Input/Output	The input or output of this property is a string representation of the configuration of the currently trending chart. This contains all of the data that is saved as part of a favorite, such as trend mode (realtime/historical), time settings, selected tags, etc.

Field Name	Description
<ul style="list-style-type: none"> <li>• Trend Type - Input/Output</li> <li>• Realtime Duration - Input/Output</li> <li>• Realtime Duration - Input/Output</li> <li>• Historical End Time - Input/Output</li> <li>• Historical Duration - Input/Output</li> </ul>	<p>For the Input properties, you can enter values manually or use global variables. These values will be used to create a trend chart at runtime.</p> <p>For Output properties, you can select a global variable to store the values generated by the trend chart. These global variables can then be used as inputs for other trends, such as, synchronizing time ranges, trend types, etc., across multiple trend plug-ins).</p> <ul style="list-style-type: none"> <li>• Trend Type Input/Outputs: Valid parameters are 'realtime' or 'historical' for the mode you want to visualize.</li> <li>• Realtime or Historical Duration Input/Outputs are in units of seconds.</li> <li>• Historical End Time Inputs/Outputs are in local time. Example:  <div style="background-color: #f0f0f0; padding: 2px; display: inline-block; margin-top: 5px;">2024-04-01 08:40:23</div> </li> </ul>
Default Sampling Mode	<p>Select a sampling mode. This mode is set as default when displaying historical data on Live and Historical trends at runtime.</p> <p>If you don't select a mode, the default sampling mode is 'Interpolated', which means that if there are missing data points, the trend chart estimates and fills in those gaps based on the already available data points.</p>
Height	Set the height of the trend chart.
Stacked Height	Set the height of an individual trend chart in a stack. This property applies when you opt for a stacked Y-axis mode for the trend chart.
Tabular View Height	Set the height of the table. This property applies when you opt for a tabular view mode for the trend chart.
Chart Title	Provide a title name for the trend chart. The value must be a text string.
X-Axis Label	Provide a label name for the x-axis. The value must be a text string.
Y-Axis Label	<p>Provide a label name for the y-axis. The value must be a text string. Depending on the plotted data, the y-axis label is displayed either on the left or right side of the chart.</p> <p>The label name appears on the y-axis only if you opted for a <a href="#">single y-axis configuration (on page 634)</a>.</p>
Historian Tag Page Size	Paginates large tag lists from Historian.

Field Name	Description
Show Header Controls	Specify a boolean value. <code>True</code> shows chart header controls. <code>False</code> hides chart header controls.
Show Trend Value Axes	Specify minimum and maximum axis values for the trend chart.
Show Trend Legend	Select to show legend on a trend chart.
Show Favorites	Select to show favorites on a trend chart.
Scroll Percentage	Configure the scroll percentage based on the total time range.
Historical Time Selection Mode	<ul style="list-style-type: none"> <li>• <code>Start Time + Duration</code>: With this option, you can select a start time and a duration for which you want to view data. Example: View data for the past 7 days starting from a specific date and time.</li> <li>• <code>Start Time + End Time</code>: With this option, you can select a start time and an end time for which you want to view data. Example: View data for a specific month of the year by selecting the start and end dates of that month.</li> <li>• <code>Duration + End Time</code>: With this option, you can select a duration and an end time for which you want to view data. Example: View data for the last 30 days up until a specific date and time.</li> </ul>
Background Color	Adds a background color to the trend chart.
Tooltip Type	<p>By default, all tooltips are of shared type. You can choose to display any of these tooltip types on your trend card:</p> <ul style="list-style-type: none"> <li>• <code>Shared</code>: Displays a single value for a specific point in time and is shared across all data series.</li> <li>• <code>Single</code>: Displays a single value for a specific point in time and is specific to each data series.</li> <li>• <code>Split</code>: Displays multiple values for a specific point in time and is specific to each data series.</li> </ul>
Tooltip Opacity (0-100%)	Enter the opacity percentage for the tooltip. If 100%, you will not be able to see the data behind the tooltip. By lowering the percentage, you can make the tooltip background transparent.
Legend Position	Determines the placement of the chart's legend:

Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Right:</b> Legend is placed on the right-hand side of the trend chart.</li> <li>• <b>Bottom:</b> Legend is placed at the bottom of the chart.</li> </ul>
Enable Compact View Mode	
Show Border	Select the check box to add a border to the trend chart.
Border Color	If you choose to add a border, then set a color for the border.
Logging Level	Applies to log messages. You can control the level of data logged to the browser console. The default value is <code>info</code> . Other valid values are <code>step</code> , <code>trace</code> , <code>debug</code> , <code>warning</code> , <code>error</code> , and <code>none</code> .
LoggedIn Username	A default user name, which is used to add annotations in the trend chart.
Enable Compact View Mode	Select the check box to allow for a maximized chart area. This is a view-only mode. You cannot pan across the chart in this mode. You can hide the toolbar and legend.

## Customize a Trend Chart at Runtime


This topic describes how to access a trend chart in the runtime environment and customize its settings.

[Create a Data Source \(Classic\) \(on page 421\)](#) for Historian or OPC UA.

For information on building trend charts, refer to these topics:

- [Use the Trend Widget for OPC UA Data Sources \(on page 128\)](#)
- [Use the Trend Widget for Historian Data Source \(on page 103\)](#)

1. Access the trend chart you want to customize.

2. On the chart's toolbar, select  .

The **Trend Configuration** window appears.

### Trend Configuration ✕

**Mode**  Live  Historical

**Duration**  1M  5M  30M  1H  2H  4H  8H  24H  1W  30D

**Custom**

0 : 0 : 5 : 0

**Display**  Tag Name  Tag Description  Tag Name And Description ?

**Notes**

> Specification Limits

> Chart Y Axis Configuration




**Sources**





+ Add Tags for Trend






3. Modify the trend chart settings as specified in the following table.

Field Name	Description
Mode	<p>Select the mode of the trend chart. The following options are available:</p> <ul style="list-style-type: none"> <li>◦ <b>Live:</b> Plots real-time data from a Historian server and/or OPC UA server.</li> <li>◦ <b>Historical:</b> Plots historical data from a Historian server.</li> </ul> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> Changes made to Live affect Historical as well. For example, if you add/delete properties from the chart in the Live mode, these changes reflect when you move to the Historical mode as well.</p> </div>
Duration	<p>Select a duration for which you want to plot the data. The selected duration is subtracted from the <b>End</b> time to deliver past trends. You can go back in time in minutes, hours, days, or provide a customized duration.</p>

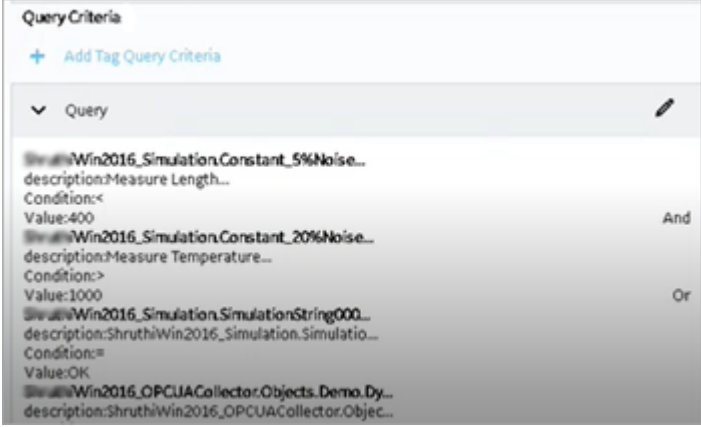



Field Name	Description
	<ul style="list-style-type: none"> <li>◦ 1, 5, or 30 minutes</li> <li>◦ 1, 2, 4, 8, or 24 hours</li> <li>◦ 1 week</li> <li>◦ 30 days</li> <li>◦ Choose <b>Custom</b> and enter a different duration in the time format text box.</li> </ul>
End	<p>Allows to set an end date and time for trending historical data.</p> <p>Select  <b>DatePicker</b> to update a specific date and time.</p> <ul style="list-style-type: none"> <li>◦ If you have set a date and time in the past, select <b>Done</b> to apply.</li> <li>◦ If you want to set the current date and time, select <b>Now</b> to apply. The current time can also be set by enabling the toggle switch.</li> </ul>
Now	<p>Allows to update the <b>End</b> time to your current system time. The toggle is enabled by default when you enter the <b>Historical</b> mode for the first time. Choosing a different date and time automatically disables the toggle.</p> <ul style="list-style-type: none"> <li>◦ Select  to refresh 'Now' configured charts. Use this option to instantly update the end time to current time if the chart is already configured for 'Now'.</li> <li>◦ You can also save a 'Now' configured chart as your favorite. When you reload such charts from favorites, the end time is set to the current system time, and trends are displayed.</li> </ul> <div style="border: 1px solid #00a0c0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> After upgrading to 2.1, values from previously saved favorites are updated to represent the range for end time instead of the start time. The 'Now' toggle remains disabled for old favorites.</p> </div>
Sampling Increment	<p>Select whether you want to increment the sampling data based on time or count, and then specify the time or count, respectively.</p>

Field Name	Description
	<div> <p>Sampling Increment <span>By Time</span> 5 Second </p> <p>Notes <span>By Count</span></p> </div> <div style="border: 1px solid #00a0e3; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b>                      The sampling increment may not always be honored. The maximum number of data points plotted on the trend chart is 3000 when sampling by time, and 8000 when sampling by count. You can zoom in to view more accurate data.</p> </div>
Display	<p>You have the option to set a display style on how tags appear across the trend card. The selected display style applies to <a href="#">configured source tags (on page 629)</a> (except third party OPC UA and asset model tags), chart tooltip/legend, and <a href="#">Historian statistical data (on page 639)</a>. Choose from these options:</p> <ul style="list-style-type: none"> <li>◦ <b>Tag Name:</b> Displays only tag name.</li> <li>◦ <b>Tag Description:</b> Displays only tag description. Lengthy descriptions are truncated with an ellipsis. Move your cursor over ... to reveal the complete description. In the absence of a description, tag name is displayed by default.</li> <li>◦ <b>Tag Name and Description:</b> Displays both tag name and description.</li> </ul>
Notes	<p>You can add notes only to historical trends, and not for OPC UA based trends.</p> <p>Switch the toggle to enable viewing or adding a note on the trend chart.</p> <p>On the trend chart:</p> <ul style="list-style-type: none"> <li>◦ To add a note for the first time for a specific data point, select the data point, and then select .</li> <li>◦ To access a note, select .</li> </ul>


Field Name	Description
	<div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;">  <b>Note:</b>            You cannot modify or delete a note; if you want to augment a note, you can add additional notes.         </div> <ul style="list-style-type: none"> <li>◦ To add an additional note for a data point, select .</li> <li>◦ To navigate through multiple notes, use  and .</li> </ul> <p>When you access an existing note, the timestamp and tag values that appear during the initial loading of the note correspond to the x-axis and y-axis values for the data point, respectively. If you select each individual note, the actual raw and timestamp values to which the comment was added in the Historian archive appear.</p> <p>If you add a note to an interpolated value, it is added to the nearest raw value. Due to this, the value displayed in the note may not always match the value plotted on the chart.</p>
Query Criteria	<p>Applies to Historical mode, and for Historian data sources only. This option allows you to query tag data based on timestamps.</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;">  <b>Note:</b>            Trend via Tag Query can be performed on the tags of the same Historian server only, and not from multiple Historian sources.             If you want to change to a different Historian data source to query tags, do the following:           <ol style="list-style-type: none"> <li>a. Clear the check box for all the tags from the current data source and select <b>Apply</b>.</li> <li>b. Reopen <b>Tag Query Criteria</b>.</li> <li>c. Select the (different) data source tags to add query condition/s.</li> </ol> </div> <p>For example, consider you have two tags in your system - Tag1, Tag2. You can configure a query criteria wherein you request to plot the</p>

Field Name	Description
	<p>Tag1 data for last one hour that matches with the conditions applied to the Tag2 data.</p> <ol style="list-style-type: none"> <li>Select a <a href="#">duration (on page 624)</a> to plot the data. For example, select <b>1H</b>.</li> <li>Select <b>Add Tag Query Criteria</b> to access the <b>Tag Query Criteria</b> screen.                     <div> </div> </li> <li>Select a tag from the Proficy Historian data source. The selected tag appears under <b>ADD CONDITIONS</b>.</li> <li>Expand the tag and set up a condition. You can set up multiple conditions using <b>AND</b>, <b>OR</b> operators.                     <p>For example, you can query Tag1 (multiple tags can be trended) data for the timestamps wherein <code>Tag2 is greater than 100 AND Tag3 is less than 500 OR Tag4 is equal to 300</code> in the specified time range.</p> </li> <li>Select <b>Apply</b>.                     <p>The query fetches only the timestamp values where the condition/s are met. Any data that does not match the query criteria is filtered out from the trend chart display. As a result, you may find interrupted trend lines in the chart.</p> </li> </ol>










Field Name	Description
	<p>To modify or update any added query conditions, select the pencil icon.</p>  <p>The screenshot shows a 'Query Criteria' window with a '+ Add Tag Query Criteria' button. Below it is a 'Query' section with a dropdown arrow and a pencil icon. The query contains three conditions:         <ul style="list-style-type: none"> <li>Condition: &lt; Value: 400</li> <li>Condition: &gt; Value: 1000</li> <li>Condition: = Value: OK</li> </ul>         The conditions are connected by 'And' and 'Or' operators.       </p>
Sources	<p>Data can be plotted to the trend chart using properties from an asset model. In the absence of an asset model, you can also directly browse the data source address space and select tags for the trend chart.</p> <p>Select <b>Add Tags for Trend</b> to <a href="#">select the properties or tags that you want to add to the trend chart (on page 442)</a>.</p>

Field Name	Description
	<div style="border: 1px solid #ccc; padding: 10px;"> <div style="background-color: #2c3e50; color: white; padding: 5px;"><b>Add Sources</b></div> <div style="margin-top: 10px;"> <div style="border: 1px solid #ccc; padding: 2px; display: flex; justify-content: space-between; align-items: center;"> <span>Asset model</span> <span>▼</span> </div> <div style="border: 1px solid #ccc; padding: 2px; display: flex; justify-content: space-between; align-items: center;"> <span>Search</span> <span>🔍</span> </div> <hr/> <div style="display: flex; align-items: center;"> <input checked="" type="checkbox"/> <span>Apply search in context of selected node</span> </div> <hr/> <div style="display: flex; align-items: center;"> <span>▼</span> <span>FinishedWaterPumpStation</span> </div> <div style="background-color: #0072bc; color: white; padding: 2px; display: flex; align-items: center; margin-top: 5px;"> <span>▼</span> <span>DisplacementPump1A</span> </div> <div style="margin-top: 5px;"> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 5px;">R</span> <input type="checkbox"/> <span>Flow_Object1</span> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 5px;">R</span> <input type="checkbox"/> <span>Flow_Object2</span> </div> <div style="display: flex; align-items: center; margin-bottom: 5px; background-color: #f0f0f0; padding: 2px;"> <span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 5px;">R</span> <input type="checkbox"/> <span>Flow_Object3</span> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 5px;">R</span> <input type="checkbox"/> <span>Flow_Object4</span> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 5px;">H</span> <input type="checkbox"/> <span>Flow_Object5</span> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 5px;">H</span> <input checked="" type="checkbox"/> <span>Flow_Object6</span> </div> <div style="display: flex; align-items: center;"> <span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 5px;">H</span> <input type="checkbox"/> <span>Flow_Object7</span> </div> </div> <div style="text-align: right; margin-top: 10px;"> <div style="background-color: #0072bc; color: white; padding: 5px 15px; border-radius: 5px;">CLOSE</div> </div> </div> <p style="margin-top: 10px;">Tags marked as <span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 5px;">H</span> are from the Historian data source. Tags marked as <span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 5px;">R</span> are from the real time data sources such as iFIX, CIMPLICITY, and any other OPC UA server.</p> <div style="border: 1px solid #0072bc; border-radius: 10px; padding: 10px; margin-top: 10px; background-color: #e0f2f1;"> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  </div> <div> <p><b>Note:</b></p> <p>Nodes only work for plotting historical data. They do not work in Live mode.</p> </div> </div> </div> </div>

Field Name	Description
SAMPLING MODE	<p>For each tag <b>SOURCE</b>, you can add multiple sampling modes. This option is available only for the historical mode.</p> <p>Select <b>[Add Sampling Mode]</b> to add additional sampling modes for a tag. For example, you can have 3 different sampling modes for a single tag in the trend chart. Highlight each mode with a different line color, style, and thickness.</p> <div><p><b>Sources</b></p><p><a href="#">+ Add Tags for Trend</a></p><p><b>FinishedWaterPumpStation</b></p><p>↓ CombinedFlow <span style="float:right">TrendToRaw ✕</span></p><p style="text-align:right"><a href="#">[Add Sampling Mode]</a></p><p><b>SOURCE</b></p><p>CombinedFlow</p><hr/><p><b>SAMPLING MODE</b></p><p>Trend To Raw ▾</p><p><b>COLOR</b>      <b>LINE WEIGHT</b>      <b>LINE STYLE</b></p><p><span style="display:inline-block; width:20px; height:10px; background-color:blue; border:1px solid black;"></span>      <span style="display:inline-block; width:20px; border-bottom:2px solid black; border:1px solid black;"></span>      <span style="display:inline-block; width:20px; border-bottom:1px dashed black; border:1px solid black;"></span></p></div> <p>These are the modes available to plot data:</p> <ul style="list-style-type: none"><li>◦ Trend To Raw</li><li>◦ Minimum</li><li>◦ Maximum</li><li>◦ Average</li><li>◦ Total</li><li>◦ Standard Deviation</li><li>◦ Interpolated</li><li>◦ Lab</li><li>◦ Lab To Raw</li><li>◦ Delta</li><li>◦ Delta Positive</li><li>◦ Delta Negative</li></ul>

Field Name	Description
	<p>You can trend each tag-sampling mode combination only once. For example, if <i>Trend To Raw</i> mode is applied to <i>Water Temp</i> tag, this mode becomes inactive for this tag. The other modes are available to use.</p> <p>To delete a plotted sampling mode, select  next to the tag.</p> <p>For more information on the sampling modes, refer to the Historian documentation.</p>
Specification Limits	<p>To monitor a process performance, you can define upper, lower, or targeted limits (from varied data sources) and plot these lines on the trend chart.</p> <p>Provide specification limits for <b>UPPER LIMIT, TARGET, LOWER LIMIT</b> as follows:</p> <ul style="list-style-type: none"> <li>◦ Enter values manually, (OR)</li> <li>◦ Select <b>Browse</b> to browse the data source and select a tag to populate realtime data (current value).</li> </ul> <p>To highlight each plotted line with a unique line color, thickness, and/or style, choose a <b>COLOR, LINE WEIGHT, and LINE STYLE</b>.</p>



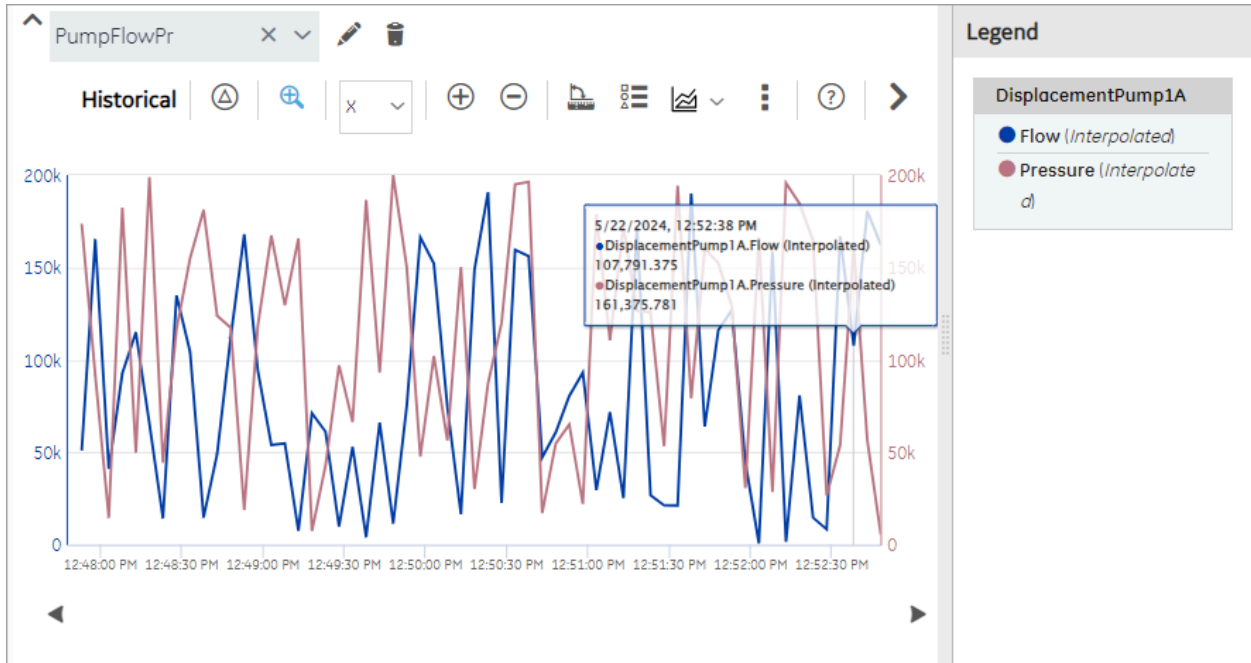
Field Name	Description
	<div> <p>Specification Limits</p> <p>UPPER LIMIT SOURCE PP-HIST2.Simulation00003 <span>Browse</span> <span>X</span></p> <p>UPPER LIMIT 144297.609375</p> <p>COLOR <span></span> LINE WEIGHT <span></span> LINE STYLE <span></span></p> <p>TARGET SOURCE Flow_Object2 <span>Browse</span> <span>X</span></p> <p>TARGET 86.97795071335928</p> <p>COLOR <span></span> LINE WEIGHT <span></span> LINE STYLE <span></span></p> <p>LOWER LIMIT SOURCE Manual <span>Browse</span> <span>X</span></p> <p>LOWER LIMIT 80000</p> <p>COLOR <span></span> LINE WEIGHT <span></span> LINE STYLE <span></span></p> </div> <p>To remove a plotted limit from the chart, select <span>X</span> next to the specification limit. You can set the specification limits for both live and historical mode, and save the chart to favorites.</p>


Field Name	Description
Chart Y Axis Configuration	<p>Allows to compare two or more tags/sources by having a common Y-axis on the trend chart. This option is disabled if you selected the Stacked Y-axis mode.</p> <ul style="list-style-type: none"> <li>◦ <b>Individual Y Axis for each source:</b> Select this option to include an individual Y-axis for each source on a trend chart. For example, if you have multiple tags trending on your chart, each tag has its own Y-axis.</li> <li>◦ <b>Single Y Axis for all sources:</b> Select this option to include a common Y-axis for all the sources on a trend chart. For example, if you have multiple tags trending on your chart, all the tags share only a single Y-axis.</li> </ul>
SHOW Y-AXIS	<p>Select the toggle to switch between showing or hiding the y-axis on a trend chart. This option is available under each tag/source if you selected individual y-axis for each source.</p>
AUTOFETCH LIMITS	<p>By default, the toggle is always turned on, to automatically fetch minimum (Low) and maximum (High) limits. Turn off the toggle if you want to provide manual limits for the chart. Enter values for <b>AXIS LOW</b> and <b>AXIS HIGH</b> to trend the data accordingly. In case you do not enter High and Low limits when the toggle is off, the values are auto scaled.</p> <p>For Individual Y-axis, the option to set limits is available under each tag/source.</p> <p>For Single Y-axis, you can browse and select the tag/source, and set custom limits. Turn on the toggle to be able to browse tag/source.</p>

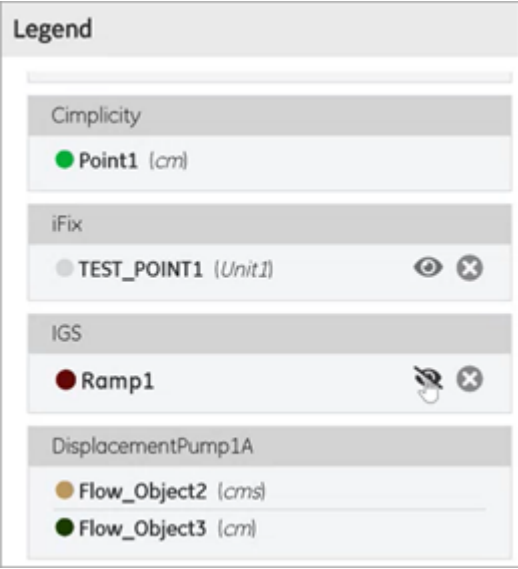






## Trend Chart Functions


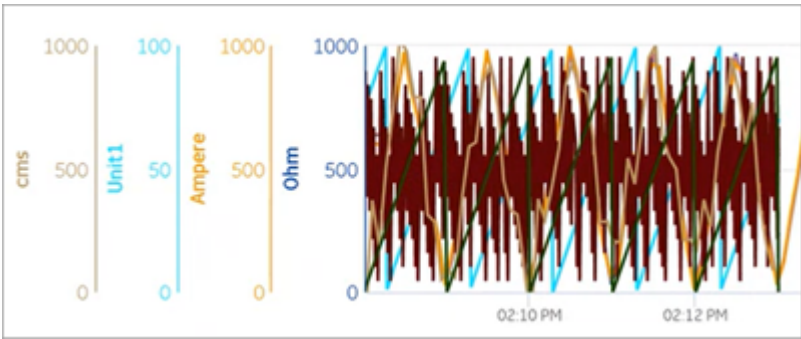




This topic describes the tasks you can perform on a trend chart.





The following image shows an example of a trend chart.


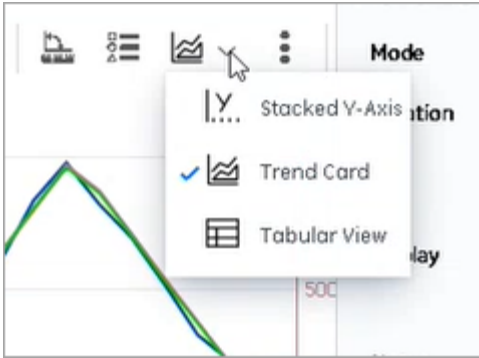





Task	Procedure
View Live mode updates directly in the legend.	<p>When the trend card widget is switched to <b>Live mode</b>, the legend displays the current value and the Engineering Units (EGU).</p> <p>Example: Consider a trend chart monitoring the temperature of a machine:</p> <ul style="list-style-type: none"> <li>• When you activate Live mode, the legend displays the current temperature value (75°C) and its engineering units (°C).</li> <li>• As the machine's temperature changes and new data is received (the temperature rises to 76°C), the legend will automatically update to show 76°C.</li> </ul>
Show/Hide the plotted data.	<p>To display this option, select a property from the trend chart legend. Use  to show or hide the data on the chart.</p>

Task	Procedure
	
<p>Remove a property from the trend chart.</p>	<p>To delete plotted data from the trend chart, select the respective property from the legend, then select .</p>
<p>Increase the area of a trend chart.</p>	<ul style="list-style-type: none"> <li>• Hide the toolbar by selecting .</li> <li>• Hide the <b>Legend</b> section by selecting .</li> </ul>
<p>Pause the data flow of a trend chart.</p>	<p>This option is available only for the live mode.</p> <ul style="list-style-type: none"> <li>• On the toolbar, select  to pause trending.</li> <li>• You can resume the data flow by selecting .</li> </ul>
<p>View the delta value between two data points.</p>	<p>The delta values for the trend is displayed in the <b>Legend</b> section.</p> 







Task	Procedure
	<p>On the toolbar, select , and select the two data points whose delta value you want to view.</p>
View the real-time value and units display in Live Mode	<p>In Live mode, the legend displays the current value and Engineering Units (EGU). As updates are received from the data subscription, these values are dynamically updated in the legend. This allows you to see real-time updates of the current value and its corresponding units as they change over time.</p>
Display units on the Y-axis	<p>If a source tag has engineering units, then the unit information appears on the chart's y-axis, legend, and tooltip.</p>  <p>Units do not appear on a single y-axis. If you opted for a <a href="#">single y-axis configuration (on page 634)</a>, the units appear only on the chart's legend and tooltip.</p>
Drill down a trend chart.	<p>On the toolbar, select  to drill down or zoom into a trend chart for more granular information. To zoom out, select .</p> <p>If you want to zoom in or zoom out a single axis, select the axis in the dropdown list box next to .</p> <p>If you want to enlarge an area on the chart, select , and then select the area on the chart.</p> <p>Data is re-fetched only in historical mode when zoomed in/out (changes chart start time/duration) of a chart. For example, consider trending 500 samples from 1-2pm, then zoom in to 1:00 - 1:10pm to request 500 samples data for that 10 minute span.</p>

Task	Procedure
<p>Pan across a trend chart.</p>	<p>You must zoom in/out of a chart to be able to pan across a trend chart. The pan icon is enabled when you perform the zoom operation.</p> <p>The pan icon is visible only in the <b>Live</b> mode.</p> <ul style="list-style-type: none"> <li>• <a href="#">Zoom in/out of a chart (on page 637)</a>.</li> <li>• On the toolbar, select , and then drag the icon to the area on the chart that you want to view.</li> <li>• Move the icon left/right to pan across the x-axis.</li> <li>• Move the icon up/down to pan across the y-axis.</li> </ul> <p><b>In Historical mode:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Zoom in/out of a chart (on page 637)</a>.</li> <li>• Use the <a href="#">scroll icons (on page 641)</a> for Shift Left/Right to move horizontally on the x-axis.</li> <li>• Use the <a href="#">scroll icons (on page 641)</a> for Shift Up/Down to move vertically on the y-axis.</li> </ul>
<p>Mark a trend chart view as favorite. It is an easy way to view the trend chart for commonly used configuration settings.</p>	<p>On the toolbar, select , enter a name for the view, and then select <b>Add</b>.</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>Enter a name for your new favorite:</p> <input style="width: 100%; border: none; border-bottom: 1px solid #ccc;" type="text" value="sampling"/> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <span style="background-color: #ccc; padding: 5px 15px; border: 1px solid #ccc;">Cancel</span> <span style="background-color: #007bff; color: white; padding: 5px 15px; border: 1px solid #007bff;">Add</span> </div> </div> <div style="border: 1px solid #ffc107; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p> <b>Important:</b> Special characters <code>? / \ # ; %</code> are not supported. Do not include them in your favorite name.</p> </div> <p>To load a favorite view, select the view from the drop-down list box next to .</p>

Task	Procedure
	<p>You can also access the list of saved favorites while <a href="#">creating application pages (on page 450)</a> in Operation Hub. Under Trend Card widget properties, select a favorite chart view from <b>Select Favorite</b> drop-down list. The selected view loads by default when you launch the trend chart at runtime.</p>
View the statistics of tags plotted on a trend chart.	<p>On the toolbar, select  to show/hide the statistical data for Historian tags used in the trend chart. The statistics appear below the chart.</p> <p>In historical mode, tag statistics are re-fetched on zooming in/out (changes chart start time/duration) of a chart.</p>
Trend Card	<p>This is the default chart type. There are three chart types:</p> <ul style="list-style-type: none"> <li>• Stacked Y-axis</li> <li>• Trend Card</li> <li>• Tabular View</li> </ul> <p>You can access other chart types from the trend chart toolbar.</p> 
Stacked Y-axis	<p>On the toolbar, select <b>Stacked Y-Axis</b> to stack multiple charts. For example, if you choose to trend four tags, the chart appears with a common x-axis and a stacked y-axis. With a stacked y-axis, you can:</p> <ul style="list-style-type: none"> <li>• <a href="#">View delta (on page 636)</a> for all the charts in a stack.</li> <li>• Mouse-over each chart in a stack to view tooltips.</li> <li>• Configure a source tag to change the chart type to line, area, or scatter.</li> <li>• Configure a source tag to apply a label name along the y-axis for the chart.</li> </ul>

Task	Procedure
	<div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b></p> <ul style="list-style-type: none"> <li>Zooming into Y-axis and X/Y-axis is disabled.</li> <li>It is recommended to use the scroll bar to scroll through the stacked charts. If using any other means of scrolling (mouse scroll wheel, touch pad/screen) to scroll through the charts, the tooltips appear inconsistently when you hover from one tag to other. To fix this, move your mouse pointer out of the chart area, and then mouse-over the tag to view its tooltip.</li> </ul> </div>
<p>Tabular View</p>	<p>On the toolbar, select <b>Tabular View</b> to display data in a table format.</p> <ul style="list-style-type: none"> <li>Tags appear as column headers. You can choose a <a href="#">display style for tags (on page 626)</a>. If <b>Tag Name and Description</b> is selected as display style, mouse-over the column (tag) name to view its description.</li> <li>You can select the number of rows to display per page, whether 50, 100, 200, or 500.</li> <li>Filter data in each column to search for the exact values.</li> <li>Sort the <b>TIMESTAMP</b> column values in an ascending/descending order.</li> </ul>
<p>Export the trend chart data.</p>	<p>The trend chart data is exported and saved as a CSV file.</p> <p>On the toolbar, select  , then select  to export data.</p>







Task	Procedure
	<div style="border: 1px solid #ccc; padding: 10px;"> <h3 style="background-color: #2c3e50; color: white; padding: 5px;">Export Trend Data</h3> <p>Output file name</p> <input style="width: 100%; border: 1px solid #add8e6;" type="text" value="GE Operations Hub Trend.csv"/> <p>Item delimiter</p> <input style="width: 20px; height: 20px; border: 1px solid #add8e6;" type="text" value=","/> <div style="text-align: right; margin-top: 10px;"> <span style="background-color: #95a5a6; padding: 5px 15px; border: 1px solid #ccc;">CANCEL</span> <span style="background-color: #3498db; color: white; padding: 5px 15px; border: 1px solid #ccc; margin-left: 10px;">EXPORT</span> </div> </div>
<p>Print a trend chart.</p>	<p>On the toolbar, select , then select .</p> <p>You have the option to provide a title that appears above the trend chart.</p> <div style="border: 1px solid #ccc; padding: 10px;"> <h3 style="background-color: #2c3e50; color: white; padding: 5px;">Print Trend</h3> <p>Title</p> <input style="width: 100%; border: 1px solid #add8e6;" type="text"/> <div style="text-align: right; margin-top: 10px;"> <span style="background-color: #95a5a6; padding: 5px 15px; border: 1px solid #ccc;">CANCEL</span> <span style="background-color: #3498db; color: white; padding: 5px 15px; border: 1px solid #ccc; margin-left: 10px;">PRINT</span> </div> </div>
<p>Reset the trend chart options.</p>	<p>On the toolbar, select , then select . Any changes you have made to the duration, start time, axis preferences, and properties are reverted.</p>
<p>Scroll through the historical data.</p>	<p>Select  and  to move back and forth in the chart, and access historical data. Scrolling back and forth changes the start time for the chart.</p> <p>For example, if you are currently viewing trends during 1-2pm, you can scroll back in time to view 12:45-1:45pm, then return to current view.</p>
<p>Use tag groups for flexible trending.</p>	<p>You can dynamically choose which tags to include in the trend chart without having to rely on pre-set favorites.</p> <p>Imagine you have an application with a chart that shows trends over time. The chart can display information about historical data, data from iFIX,</p>

Task	Procedure
	CIMPPLICITY, or a mix of sources. Instead of manually selecting each specific set of data every time, you can use buttons in the app to quickly switch between different sets of data.

## Trend Chart Guidelines

When you create a trend chart, we recommend that you apply the following guidelines:

- When you add a trend chart to a page using the page designer, use separate containers for the breadcrumb and the chart. For the trend chart, set the height to 100%.
- When accessing a trend chart on a mobile device:
  - Use a device with medium to high resolution.
  - Use the device in landscape mode.
  - To print a trend chart using an Android device, use the screen capture feature rather than selecting .
  - Configure the trend chart using a desktop rather than an Android device. This is because when you attempt to search for an asset or a Historian tag on an Android device, the in-built keyboard of the device appears, which may not allow you to enter the search criteria.
  - When you view the delta between two data points, the value may not be clearly readable on a mobile device with low to medium resolution. Therefore, we recommend that you view the delta value on a desktop or a mobile device with high resolution.
  - When you view statistical data, the trend chart area may be limited. To avoid this issue, plot up to two properties on the trend chart.
  - To pan across the trend chart or drill down the trend chart on an iPad, use the Zoom feature of the iPad rather than selecting , , or , respectively.


## Variwide Chart

A variwide chart is a column chart where each column has a separate width to represent the third dimension.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

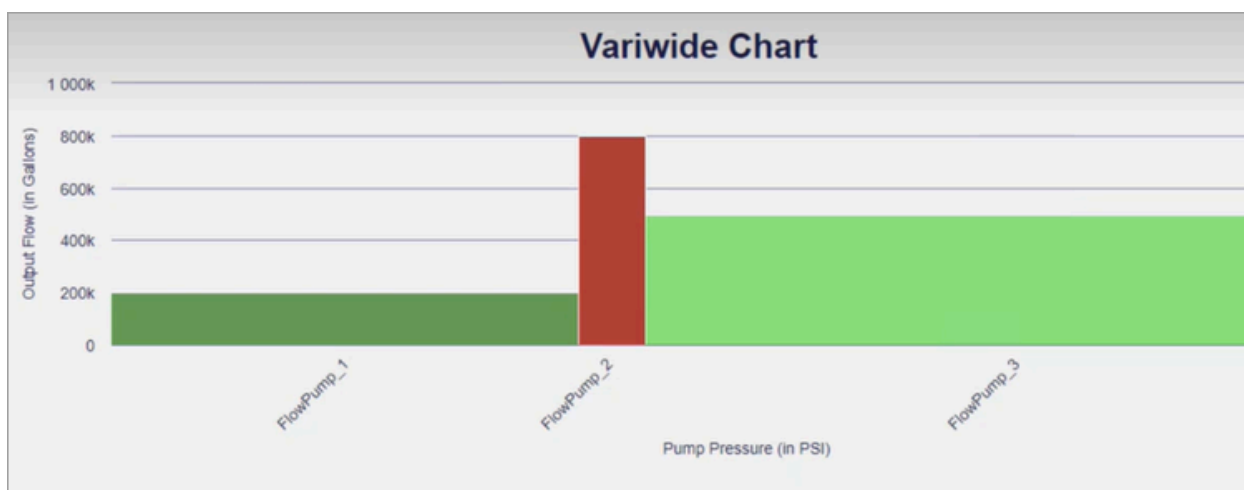
## Variwide Chart Properties

Field Name	Description
Title Configuration	<p>Set a title for your variwide chart.</p> <ul style="list-style-type: none"> <li>• <b>Name:</b> Enter a title name.</li> <li>• <b>Font Size (px):</b> For the title text, enter the font size in pixels.</li> <li>• <b>Font Color:</b> Select a font color for the title.</li> <li>• <b>Width (px) - 0 equals dynamic:</b> Enter a width for the variwide chart. If set to 0, the chart occupies 100% of its container, and fills the area in the application.</li> <li>• <b>Height (px):</b> Enter the height of the chart in pixels.</li> </ul>
Label Configuration	<p>Configure the axes labels in your variwide chart.</p> <ul style="list-style-type: none"> <li>• <b>Y-Axis Label:</b> Enter a label name that appears on the chart's y-axis.</li> <li>• <b>X-Axis Label:</b> Enter a label name that appears on the chart's x-axis.</li> <li>• <b>Font Size (px):</b> For the label text, enter the font size in pixels. This value applies to both the x and y axis labels.</li> </ul>
Series Configuration	<p>Select query output values from a data source to define a data series for your chart.</p> <p>Only three inputs from the query are considered for mapping in the following order:</p> <ul style="list-style-type: none"> <li>• first output field maps to category (x-axis)</li> <li>• second output field maps to value (y-axis)</li> <li>• third output field value represents the width of the column chart (z-axis)</li> </ul>
Series color configuration - manual	<p>Add items to configure colors in your chart. Use this property to override the default chart series color.</p> <ul style="list-style-type: none"> <li>• <b>Label:</b> Enter the label name if you want to apply a specific color for the respective label.</li> <li>• <b>Color:</b> Choose a color to apply to a label (if label name is specified), or a column.</li> </ul>

Field Name	Description
	<p>If you <b>configure both label and color</b>, the column with the label name always appears in the specified color.</p> <p>If you <b>configure only color</b>, the color is applied to a column in a sequential order.</p> <p>Columns with no color configuration adopt the default <a href="#">highcharts</a> configuration.</p>
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a>.</p>

### Variwide Chart at Runtime

In the illustrated example, pump pressure is represented by the width of each column for the respective category.



## HMI

### HMI Overview

The following list of widgets are available under the HMI category:

- [CIMPLICITY HMI WebSpace \(on page 645\)](#)
- [iFIX HMI WebSpace \(on page 673\)](#)

- [Alarm Card \(on page 685\)](#)
- [Alarm Count \(on page 697\)](#)
- [Mimic Card \(on page 697\)](#)

## CIMPLICITY HMI WebSpace

### CIMPLICITY HMI WebSpace

This plug-in offers a web-based interface to remotely access and interact with the CIMPLICITY HMI and SCADA systems without the need for installing the CIMPLICITY software on each device.


Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

Refer to the following topics to get started with the CIMPLICITY HMI WebSpace plug-in.

- [Architecture Overview \(on page 647\)](#)
- [Register CIMPLICITY Plug-in with Configuration Hub \(on page 649\)](#)
- [Configure Windows Credentials \(on page 651\)](#)
- [Configure Relay Server \(on page 653\)](#)
- [Configure Dependent Server \(on page 655\)](#)
- [Configure WebSpace WSM Certificates on Dependent Server \(on page 656\)](#)
- [CIMPLICITY Project Setup \(on page 658\)](#)
- [Operations Hub Server Certificate Setup \(on page 658\)](#)
- [WebSpace Widget Ports \(on page 659\)](#)
- [Publish Mimics to Operations Hub directly from CIMPLICITY \(on page 662\)](#)
- [Publish Model to Operations Hub directly from CIMPLICITY \(on page 670\)](#)

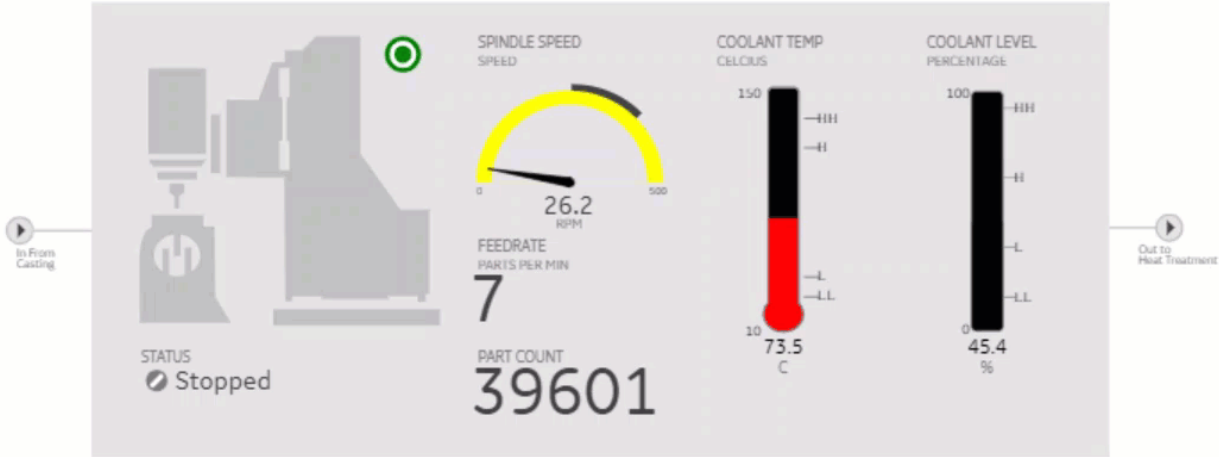
### CIMPLICITY HMI WebSpace Properties

Field Name	Description
Height offset	WebSpace frame will take the proportion specified in Relative height of the browser window minus this offset. It is useful when there are other widgets on the page above or below the WebSpace frame.

Field Name	Description
Relative height (%)	Webpace frame will take this proportion of the height of the browser window minus the Height offset. It is useful when there are multiple Webpace widgets placed vertically on the page.
Screen Variables	A list of name/value pairs that correspond to the variables used on a CIMPLICITY screen. For non-manual configuration this list is expected to be a JSON string: [{"name": "..", "value": ".."}, ...]
Webpace server	Specify the machine that has CIMPLICITY Webpace running on it.  For example, set to <b>Manual</b> and enter the relay server name.
CIMPLICITY screen path	Specify the path to the CimView screen to load. This path is where the file resides on the Webpace system:  For example, set to <b>Manual</b> and enter <code>C:\ProjectsFolder\screens\CimEdit1.cim</code>
Project for unqualified points	CimView will use this project name to provide values for unqualified points.
Zoom to best fit	If the CimView screen sizes are different, zoom to best fit provides automatic consistency in the Webpace frame.
Disable point targets	Prevents point targets, e.g. Point Control Panel and quick trends, from being available.
Disable setpoints	Prevents point values from being set on the CIMPLICITY screen.
Port for the Webpace Session Manager	The port configured on the Webpace system for the Webpace Session Manager service. <code>9443</code> is the default port setting.  <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px;"> <b>Note:</b> Ensure that port number is same as the CIMPLICITY Configuration Microservice (<code>CIMConfigService</code>) port.</div>
Start maximized	Select the check box if you want to open CimView screen in a maximized window filling the whole Webpace frame.
Always maximized	Select the check box if you want the screen will always be maximized in the Webpace frame.

Field Name	Description
Restrict screen opening	Select the check box if you want to open only the CimView screens that are explicitly mentioned in Open Screen and Overlay Screen actions.
Disable window resizing	Select the check box if you do not want to allow resizing the CimView screens within the Webspace frame.
Don't show caption and menu	Select the check box if you want to hide the CimView menu bar and caption in the Webspace frame.
Time without input till quiescent update rate	Webpace will continue to send updates to the client at the normal rate for the number of seconds entered after the user stops using the keyboard and/or mouse.
Time between updates when quiescent	When the number of seconds to wait after the user stops using the keyboard and/or mouse have been reached, Webpace will begin sending the updates at this rate.

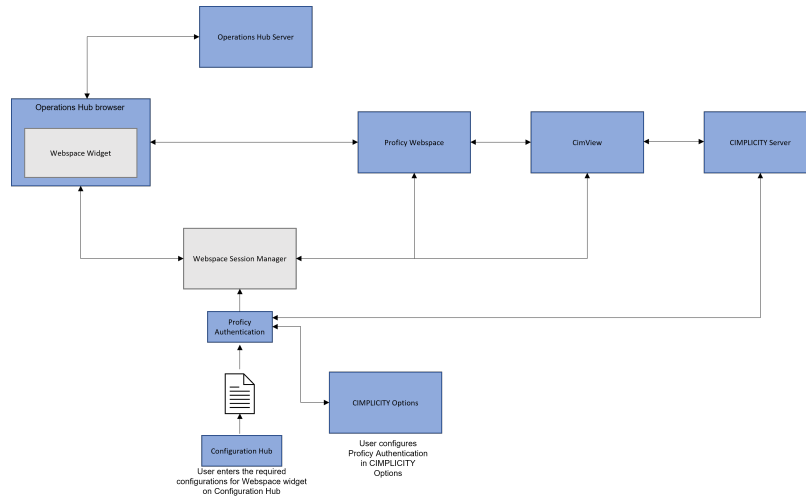
**CIMPLICITY HMI Webspace at Runtime**



**Architecture Overview**

This topic includes an architectural diagram representing the components and their relationship.

The CIMPLICITY HMI Webpace widget is introduced to enable users to access CIMPLICITY CimView screens from Operations Hub. It can be integrated with other Operations Hub widgets for better consolidation and visualization of data. This provides the users an end-to-end solution for better data analysis, visualization and monitoring.



## Components

- **Operations Hub Server** allows you to collect and analyze data from other machines and applications. It provides a user-friendly interface to create components of an application such as queries, database tables (called entities), events, email templates, users, and so on.
- **Operations Hub Browser** is the browser from which you can access the Operations Hub user interface.
- **Webpace widget** is an add-on for Operations Hub user interface. It enables you to access CimView screens from Operations Hub Browser.
- **Webpace Session Manager** interacts with UAA and creates Webpace sessions that allow secure connection between Webpace widget and CimView through Webpace.
- **Proficy Authentication** provides identity-based security for applications. It provides tokens for secure webpace sessions.
- **Configuration Hub** allows you to configure CIMPLICITY Webpace widget on Operations Hub using Proficy Authentication credentials.
- **CIMPLICITY Server** processes the data received from PLCs and displays the processed data through viewers.
- **CimView** displays screens that are created in CimEdit for specific applications.



## Sequence of Communication

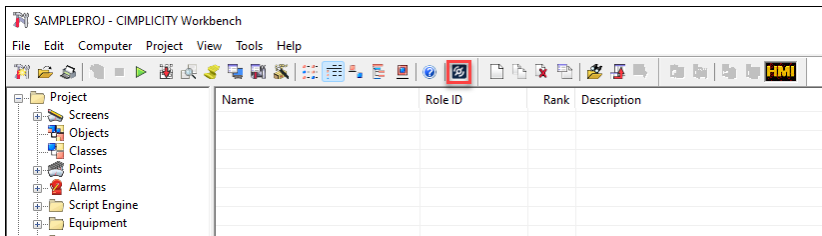
1. When you access a CimView screen from Operations Hub, the CimView parameters entered in the CIMPLICITY HMI WebSpace widget along with a user permissions token is sent to the WebSpace Session Manager through a web service interface.
2. WebSpace Session Manager sends the user information entered to Proficy Authentication.
3. WebSpace sessions are created using windows credentials.
4. WebSpace Widget starts communicating with CimView.
5. You can view CimView pages on Operations Hub Browser.

## Register CIMPLICITY Plug-in with Configuration Hub

To use the CIMPLICITY plug-in, you must configure WebSpace on Configuration Hub.

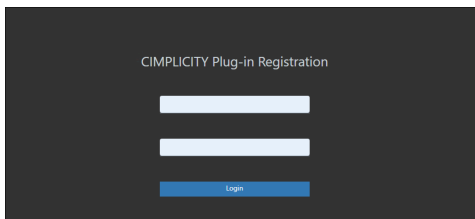
Register the CIMPLICITY plug-in of the standalone server, or relay and dependent servers in the Relay/Dependent server scenario, with Configuration Hub. To register the CIMPLICITY plug-in, perform the following steps:

1. Open the project in **CIMPLICITY Workbench** as needed.



2. From the toolbar, click .


The **CIMPLICITY Plug-in Registration** page opens.



3. In the **CIMPLICITY Plug-in Registration** page, enter the computer level username and password that you generated in CIMPLICITY using the **RegisterComputerUser.exe** tool that is available at **[Install location]\Proficy\Proficy CIMPLICITY\exe**.
4. Click **Login**.

The **Configuration Hub Server Registration** page opens.

5. In **Configuration Hub**, fill the following details:

Options	Description
<b>SERVER NAME</b>	The name of the Configuration Hub server to which you want to register. In the <Fully qualified domain name> format.
<b>SERVER PORT</b>	The port number of the Configuration Hub server to which you want to register.
<b>PLUG-IN ALIAS NAME</b>	The alias name for the CIMPLICITY plug-in that you want to see in the Configuration Hub. <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <b>Note:</b>                          By default, the name populated is the CIMPLICITY node's name. However, you can update it to how you want to see the CIMPLICITY plug-in name in the configuration Hub.                     </div>
<b>CLIENT ID</b>	The client ID of the Configuration Hub server that you provided during the Configuration Hub installation.
<b>CLIENT SECRET</b>	The client secret of the Configuration Hub server that you provided during the Configuration Hub installation.

6. In **Proficy Authentication**, fill the following details:

Options	Description
<b>SERVER NAME</b>	The name of the Proficy Authentication server to which you want to register Configuration Hub. In the <Fully qualified domain name> format.
<b>SERVER PORT</b>	The port number of the Proficy Authentication server to which you want to register Configuration Hub.
<b>Use Configuration Hub Authentication Credentials for Proficy Authentication</b>	Select this check box if you had entered same credentials (Client ID and Client Secret) for both Configuration Hub and Proficy Authentication during installation.
<b>CLIENT ID</b>	The Client ID of the Proficy Authentication server.
<b>CLIENT SECRET</b>	The Client secret of the Proficy Authentication server.

7. If the root certificate of the Proficy Authentication server is trusted, you will see Trusted. If not, you will see Not trusted; then you must manually trust the certificate.
8. To test the connection, click **Test Server Connection**.
9. If the connection to the Configuration Hub or the Proficy Authentication server is successful, you will receive a success dialog. If your connection is unsuccessful, retry to connect to another valid Configuration Hub or Proficy Authentication server.
10. Click **Register**.

The **Configuration Hub Server Registration** dialog box opens, with a success message.

11. Click **OK**.

The **Proficy Authentication Client** dialog box is closed.



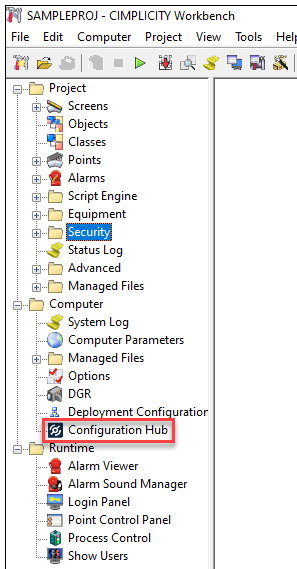
**Note:**


Ensure that the CIMPLICITY plug-in of the standalone server, or relay and all dependent servers in the Relay/Dependent scenario are registered with the same Configuration Hub.

## Configure Windows Credentials

Perform the following steps on Webspaces servers to set up a default Windows login on Webspaces servers and avoid the need to log in every time you open a Webspaces screen from a Webspaces widget.

1. Open a project in **CIMPLICITY Workbench** as needed.
2. In the top-level folders, click and expand **Computer**.

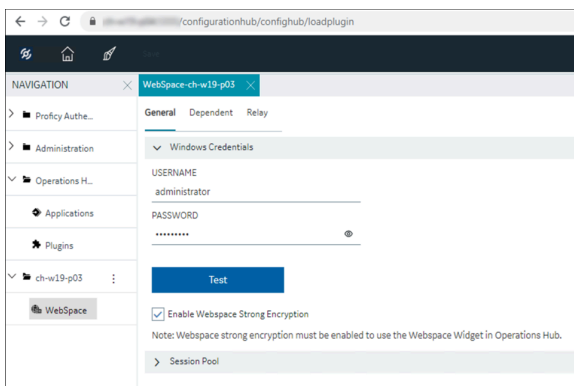


3. Double-click  Configuration Hub.  
The CIMPLICITY Proficy Authentication login page opens.



4. Log in using `ch_admin` as username and your Proficy Authentication secret as password.

Once you log in to Configuration Hub and expand the CIMPLICITY plug-in node. You will see Webspaces plug-in under the CIMPLICITY plug-in node.



5. Click the Webservice plug-in.
6. Click **General**.
7. Enter Windows login user name and password in the **Windows Credentials** section, and then Select **Test**.

For security reason, consider using a windows user that is not an Administrator. Choose a user that has permissions to run CimView.exe and access the screens directories. Refer to the latest CIMPLICITY Secure Deployment Guide for further secure setup suggestions.

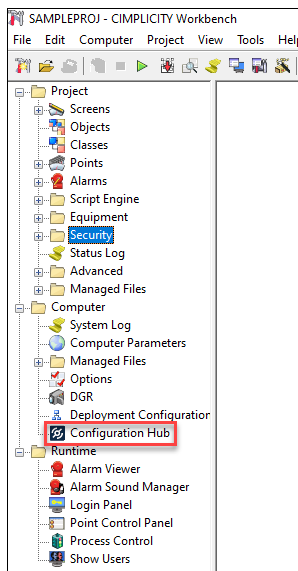
A success message is displayed if the credentials are valid.


8. Select the **Enable Webservice Strong Encryption** check box to use the Webservice widget in Operations Hub.
9. Click **SAVE**.

## Configure Relay Server

To set up a secure connection between CimView and the Webservice Session Manager, you must install CIMPLICITY server on Webservice relay server to enable authentication.

1. Open a project in **CIMPLICITY Workbench** as needed.
2. In the top-level folders, click and expand **Computer**.

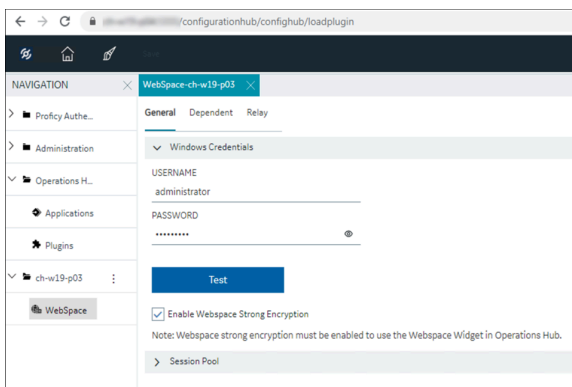


3. Double-click  Configuration Hub.  
The CIMPLICITY Proficy Authentication login page opens.

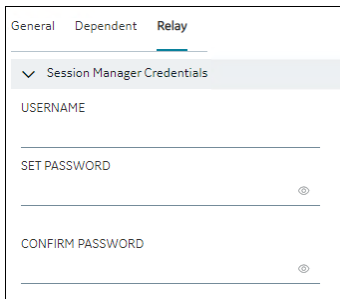


4. Log in using `ch_admin` as username and your Proficy Authentication secret as password.

Once you log in to Configuration Hub and expand the CIMPLICITY plug-in node. You will see Webservice plug-in under the CIMPLICITY plug-in node.



5. Click the Webservice plug-in.
6. Click **Relay**.



7. In the **Session Manager Credentials** section enter the following:



**Note:**

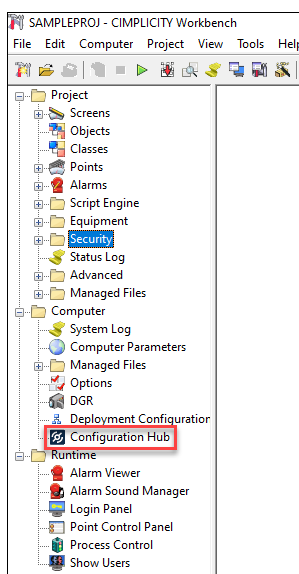
These are not the existing credentials. You must create new credentials.


- a. **USERNAME:** Enter a user name.
  - b. **SET PASSWORD:** Enter a password for the administrator.
  - c. **CONFIRM PASSWORD:** Confirm the password entered above.
8. Click **SAVE**.

## Configure Dependent Server

This is only applicable in the Relay/Dependent scenario. Perform the below steps on all the dependent servers.

1. Open a project in **CIMPLICITY Workbench** as needed.
2. In the top-level folders, click and expand **Computer**.

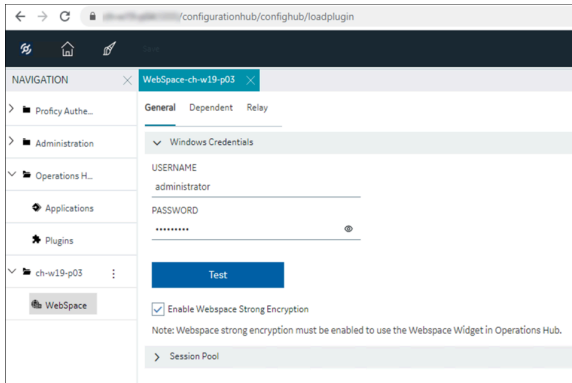


3. Double-click  Configuration Hub.
- The CIMPLICITY Proficy Authentication login page opens.



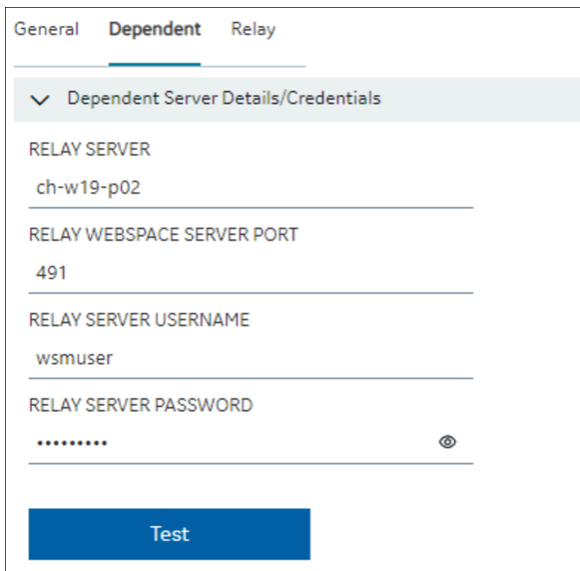
4. Log in using `ch_admin` as username and your Proficy Authentication secret as password.

Once you log in to Configuration Hub and expand the CIMPLICITY plug-in node. You will see Webservice plug-in under the CIMPLICITY plug-in node.



5. Click the Webservice plug-in.

6. Click **Dependent**.



7. In the **Dependent Server Details/Credentials** section enter the following:

- a. **RELAY SERVER:** Enter the relay server user name.
- b. **RELAY WEBSERVICE SERVER PORT:** Default to 491.
- c. **RELAY SERVER USERNAME/PASSWORD:** Enter the user name and password entered during the relay server configuration.

8. Click **TEST**.

9. Click **SAVE**.

## Configure Webservice WSM Certificates on Dependent Server

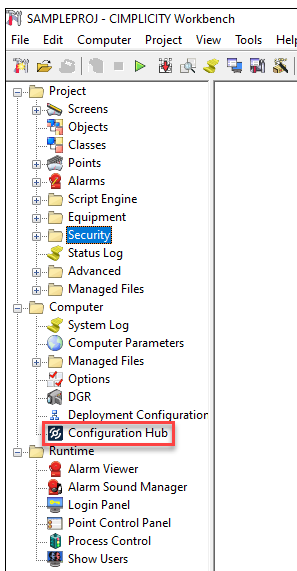
Perform the following steps on all the Dependent Server. This is only applicable in the Relay/Dependent scenario.




1. From the relay server, copy the **Root.crt** certificate available at **C:\Program Files\Proficy\Proficy WebSpace\Programs\PKI**.
2. Paste the copied **Root.crt** certificate at **C:\Program Files\Proficy\Proficy WebSpace\Programs\PKI** and rename it. For example, **RelayRoot.crt**.  
This step must be done on all the dependent servers.
3. Open the **webspace-session-manager.json** file available at **C:\Program Files\Proficy\Proficy WebSpace\Programs\webspace-session-manager**.
4. Below client-configuration, update the root-ca-certificate path to point to the relay server's root certificate that you pasted on the dependent server as follows:

```
"client-configuration" : {
  "register-timeout-seconds" : 5, "relay-server-reverse-proxy-port" : "9443",
  "root-ca-certificate" : "..\PKI\RelayRoot.crt",
  "wsm-admin-password" : "AD2tSYUmQJ3l++ToAVBfF6nrCTRaPmgUhS3odSaoW0=",
  "wsm-admin-user" : "admin",
  "wsm-client-socket-port" : "4958",
  "wsm-hostname" : "localhost"
},
```

5. Open a project in **CIMPLICITY Workbench** as needed.
6. In the top-level folders, click and expand **Computer**.

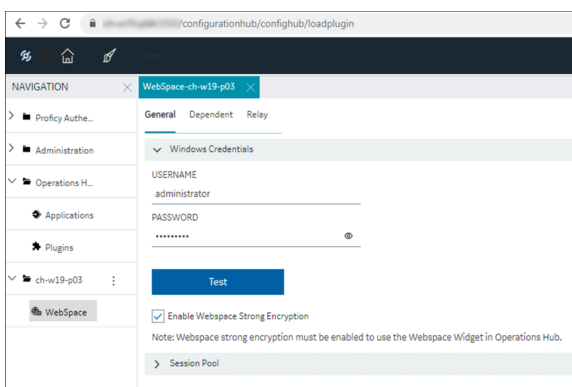


7. Double-click  Configuration Hub.  
The CIMPLICITY Proficy Authentication login page opens.



8. Log in using `ch_admin` as username and your Proficy Authentication secret as password.

Once you log in to Configuration Hub and expand the CIMPLICITY plug-in node. You will see Webservice plug-in under the CIMPLICITY plug-in node.



## CIMPLICITY Project Setup

This topic is meant to ensure that you have enabled Mixed Authentication along with Proficy Authentication for the project with the screens that you want to access on Webservice, and you have created security groups as needed and assigned them to the relevant Proficy Authentication user that will access the screens. If you have not done, please refer to the CIMPLICITY documentation and complete the steps described in the topics: ***Enable and configure Proficy Authentication in Project Properties***, ***Create Security Groups in CIMPLICITY***, and ***Publish Group(s) to Proficy Authentication server***.

## Operations Hub Server Certificate Setup

1. From the standalone server, or relay server in the Relay/Dependent scenario, copy the **CimScadaConfigRootCA.crt** certificate available at **[Install location]\Proficy\Proficy CIMPLICITY \ScadaConfigPKI** and on the Operations Hub server, install the copied certificate under Trusted Root Certification Authorities.


- Once you have installed the certificate, open any browser and try to access the relay server in the following format: **https://<relay-server>:491**.

On successful connection, you will see the Proficy Webspaces page.

## Webspaces Widget Ports

The following table includes services and their respective ports. For CIMPLICITY HMI Webspaces widget to function as expected, the firewall must be opened for some of the ports.

Service	Default Port Number	Fire-wall must be opened?	Configuration Files
HTTPD	9443	Yes	<p>To change the port number, you must look for the port number instances given below and change them in all the relevant files.</p> <ul style="list-style-type: none"> <li><b>httpd.json</b> file, located at <b>[Installation directory]\Proficy\Proficy CIMPLICITY\Web\apache\conf</b>.           <pre>Listen 9443</pre> </li> <li><b>webspaces-session-manager.json</b> file, located at <b>[Installation directory]\Proficy\Proficy Webspaces\Programs\webspaces-session-manager</b>.           <pre>"client-configuration" : { "relay-server-reverse-proxy-port" : "9443",</pre> </li> <li><b>cimplicity_config_service.conf</b> file, located at <b>[Installation directory]\Proficy\Proficy CIMPLICITY\Web\apache\conf\cimplicity_config_service</b> <pre># proxy details for Plugin ProxyPassMatch "/confighub_plugin/(.*)/plugin_bundle.js(.*)" "https://localhost:9443/cimplicity-web-config/main-es2015.js\$2" ProxyPassMatch "/confighub_plugin/(.*)/assets/(.*)" "https://localhost:9443/cimplicity-web-config/assets/\$2"</pre> </li> </ul>
Webspaces Application	491	Yes	Open Webspaces Admin Console, select Tools >Host Options > Security:

Service	Default Port Number	Fire-wall must be opened?	Configuration Files
Publishing Service			
SCADA Web Configuration, REST	4955	No	<p>To change the port number, you must look for the port number instances given below and change them in all the relevant files.</p> <ul style="list-style-type: none"> <li>• <b>cimplicity_config_service.conf</b> file, located at <b>[Installation deirectory]\Proficy\Proficy CIMPLICITY\Web\apache\conf\cimplicity_config_service</b>.</li> </ul> <pre> # reverse proxy for cim_config_service  &lt;Location /cim-config/v1 &gt;      ProxyPass https://localhost:4955/cim-config/v1      ProxyPassReverse https://localhost:4955/cim-config/v1  &lt;/Location&gt;                     </pre> <ul style="list-style-type: none"> <li>• <b>cim_config_service.json</b> file, located at <b>[Installation directory]\Proficy\Proficy CIMPLICITY\data</b>.</li> </ul> <pre> "port" : "4955",                     </pre>
OPC UA browse service, REST	4956	No	<p>To change the port number, you must look for the port number instance given below and change it in the relevant file.</p> <ul style="list-style-type: none"> <li>• <b>cimplicity_config_service.conf</b> file, located at <b>[Installation deirectory]\Proficy\Proficy CIMPLICITY\Web\apache\conf\cimplicity_config_service</b>.</li> </ul> <pre> # reverse proxy for the OPC UA browser  &lt;Location /uabr/v1 &gt;      ProxyPass https://localhost:4956/uabr/v1                     </pre>

Service	Default Port Number	Fire-wall must be opened?	Configuration Files
			<pre>ProxyPassReverse https://localhost:4956/uabr/v1 &lt;/Location&gt;</pre>
Webspace session Manager, REST	4957	No	<p>To change the port number, you must look for the port number instances given below and change them in all the relevant files.</p> <ul style="list-style-type: none"> <li>• <b>cimplicity_config_service.conf</b> file, located at <b>[Installation deirectory]\Proficy\Proficy CIMPLICITY\Web\apache\conf\cimplicity_config_service</b>.</li> </ul> <pre># reverse proxy for webspace-session-manager &lt;Location /wsm/v1 &gt;   Header set Access-Control-Allow-Origin "*"   ProxyPass https://localhost:4957/wsm/v1   ProxyPassReverse https://localhost:4957/wsm/v1 &lt;/Location&gt;</pre> <ul style="list-style-type: none"> <li>• <b>webspace-session-manager.json</b> file, located at <b>[Installation directory]\Proficy\Proficy WebSpace\Programs\webspace-session-manager</b>.</li> </ul> <pre>"port" : "4957",</pre>
Webspace Session Manager, CimView socket	4958	Yes(*)	<p>To change the port number, you must look for the port number instance given below and change it in the relevant file.</p> <ul style="list-style-type: none"> <li>• <b>webspace-session-manager.json</b> file, located at <b>[Installation directory]\Proficy\Proficy WebSpace\Programs\webspace-session-manager</b>.</li> </ul> <pre>"client-configuration" : {   "wsm-client-socket-port" : "4958",</pre>

(\*) The firewall must be opened on the Webservice relay server only if you are using a Webservice dependent server.

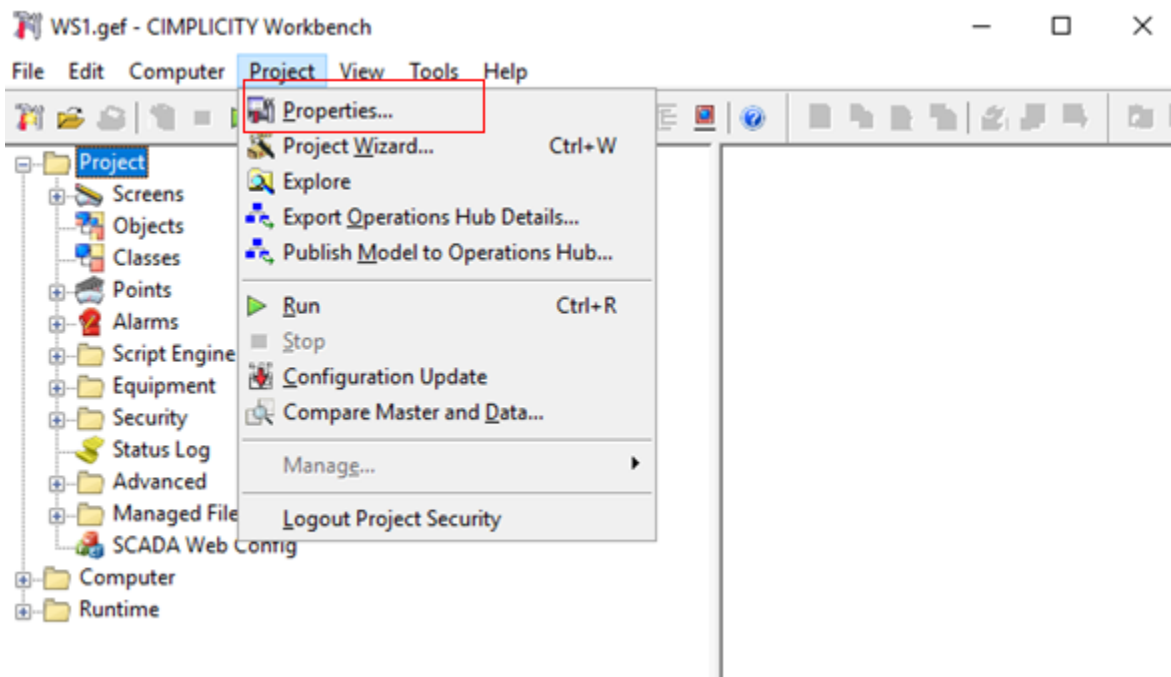
## Publish Models and Mimics to Operations Hub

### Publish Mimics to Operations Hub directly from CIMPLICITY

You can publish a Mimic to Operations Hub directly from CIMPLICITY. This eliminates the two-step process of publishing a Mimic by exporting a screen as a Mimic zip file from the CIMPLICITY server and then importing the Mimic zip file to Operations Hub. Publishing a Mimic to Operations Hub directly from CIMPLICITY is especially useful when you want to publish multiple CimEdit screens simultaneously. You can configure Operations Hub at the project level and globally to avoid configuring it while publishing Mimics. This task describes how to configure Operations Hub at the project level. (Previously, to configure Operations Hub, we selected Operations Hub Configuration in the OPC UA Server tab in the Project Properties window. This has now been updated as mentioned in the procedure below. )

#### To configure Operations Hub at the project level,

1. In the **CIMPLICITY Workbench** window, select **Project**, and then select **Properties**.



2. In the Project Properties window, select the Operations Hub tab and enter the following details:
  - **Server Name:** The machine name on which Operations Hub is running or the URL of the Operations Hub Server
  - **Port:** The port on which Operations Hub is running

- **User Name:** The Operations Hub user name used to publish the Mimic
- **Require Trusted Connection:** Select this check box to use a trusted connection to publish Mimics. You can also select View Certificate to view the certificate used for the connection.

The screenshot shows the 'Project Properties' dialog box with the 'Operations Hub' tab selected. The 'Operations Hub Configuration' section contains the following fields and buttons:

- Server name: SCHQAHV4225 (with a 'Test Connection' button)
- Port: 443
- User name: OpsHubAdmin (with a blue underline)

The 'SSL Security' section contains the following options and buttons:

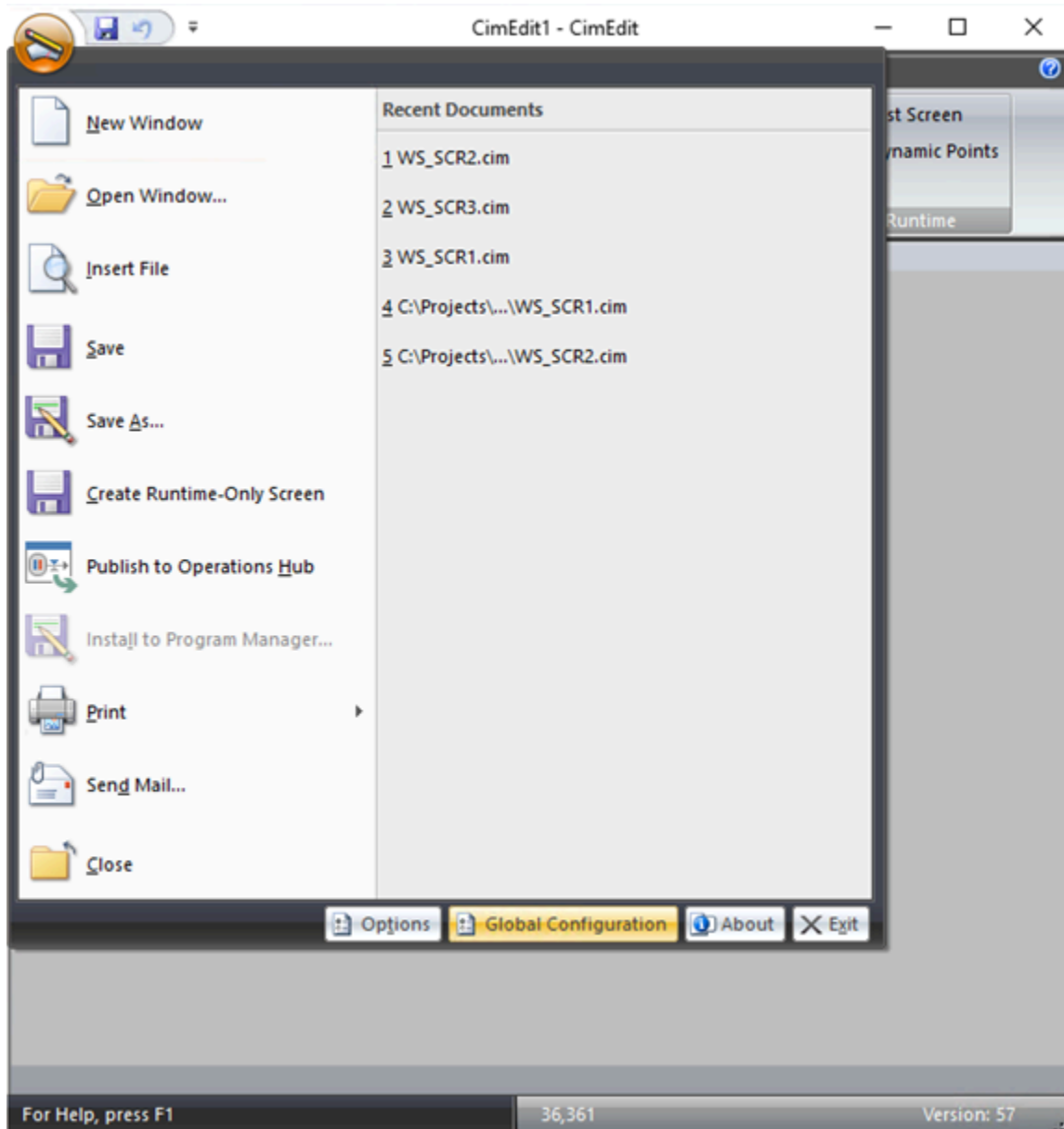
- Require trusted connection (Trusted) (with a 'View Certificate' button)

At the bottom of the dialog are 'OK', 'Cancel', and 'Help' buttons.

3. Select OK.

#### To configure Operations Hub globally,

4. Close the CIMPLICITY Workbench window (if it is open), and launch CimEdit from the Start menu.
5. In the CimEdit window, select , and then select Global Configuration.



6. In the Global Configuration window, select the Operations Hub tab and enter the following details:
  - **Server Name:** The server name on which Operations Hub is running
  - **Port:** The port on which Operations Hub is running
  - **User Name:** The Operations Hub user name used to publish the Mimic



The screenshot shows a 'Global Configuration' dialog box with a sidebar on the left containing the following menu items: General, Scripts, Events, Compatibility, Display Options, and Operations Hub (which is highlighted in orange). The main area is titled 'Operations Hub Configuration' and contains three input fields: 'Server name:' with the value 'W2K12R2X64-WH', 'Port:' with the value '443', and 'User name:' with the value 'admin'. At the bottom of the dialog are four buttons: 'OK', 'Cancel', 'Apply', and 'Help'.

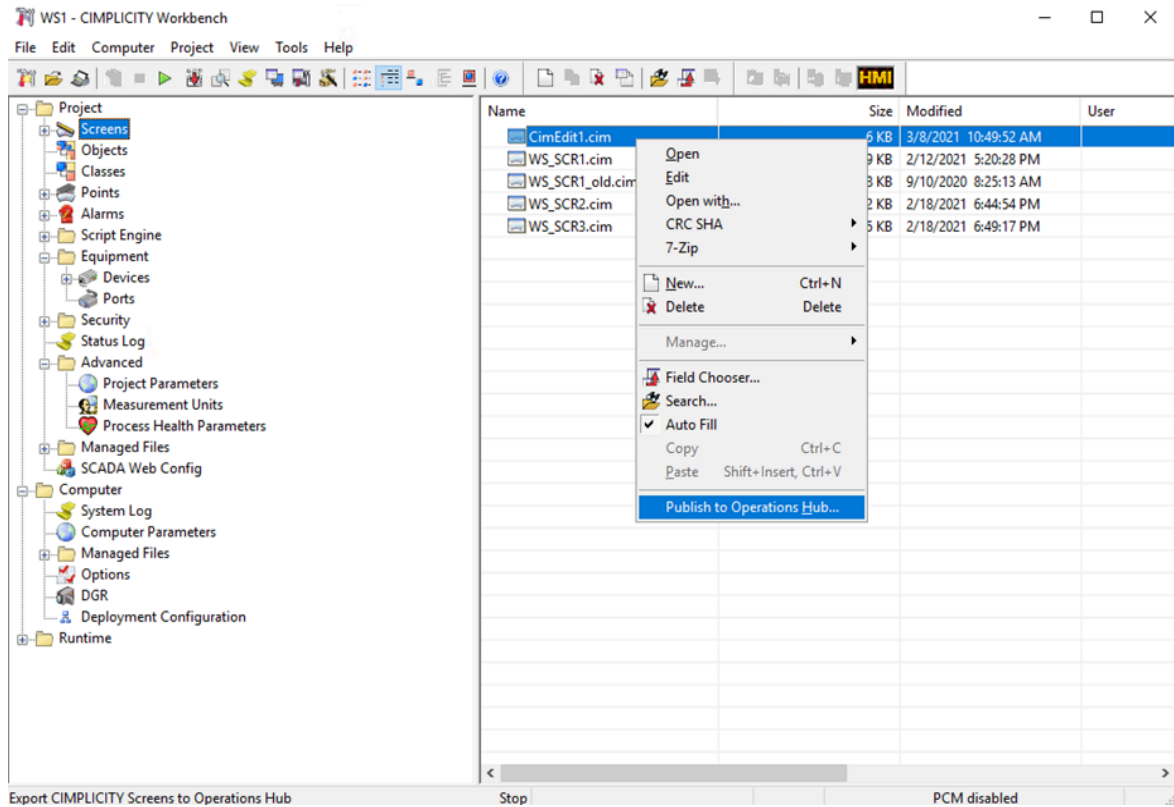
7. Select Apply, and then select OK.

Operations Hub is now configured for Mimics to be published in it. You can publish a Mimic from the following applications: Workbench , CimEdit.

8. To publish Mimics to Operations Hub directly from Workbench, In the **CIMPLICITY Workbench** window, select the Mimics that you want to publish to Operations Hub, right-click the Mimics, and then select **Publish to Operations Hub**.

**Note:**

In the Publish window, the Server Name, Port, and User Name are automatically populated if Operations Hub has already been configured at the project level. If the fields are blank, enter the details before proceeding to the next step.



9. In the Publish window, enter the following details:

- **Save To:** The location where the Mimics will be saved by default. This field is disabled.
- **Publish to Operations Hub:** Select this check box to publish the Mimics to Operations Hub.
- **Overwrite:** Select this check box to overwrite Mimics with the same name.
- **Password:** The password to publish the Mimics.
- **Require Trusted Connection:** Select this check box to publish Mimics only when a trusted connection is used. You can also select View Certificate to view the certificate used for the connection.

Mimic Publish

Save to: C:\Projects\WS1\Screens\WebExport

Publish to Operations Hub  Overwrite

Server name: SCHQAHV4255 Port: 443

User name: OphubAdmin

Password: .....

SSL Security

Require trusted connection (Trusted) View Certificate

Publish Cancel

**Note:**

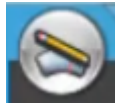
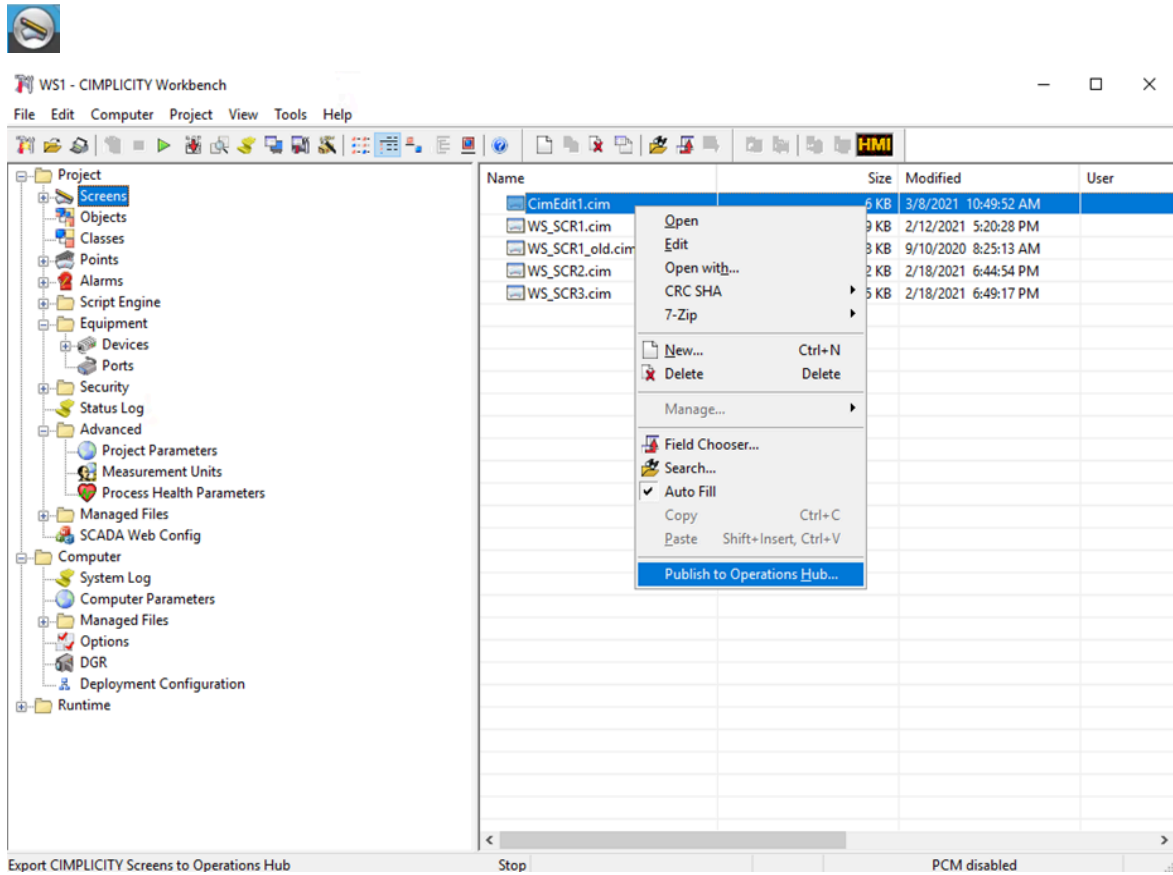
These details are saved after you publish the Mimics. You only need to enter the password if you close and reopen the CIMPLICITY Workbench window.

## 10. Select Publish.

The selected Mimics are published to Operations Hub and appear in the Mimic Management workspace.

11. To publish a Mimic to Operations Hub directly from CimEdit, go to the location where the Mimic file you want to publish is saved, right-click the file, and select **Edit**.**Note:**

You can publish only one Mimic at a time to Operations Hub from CimEdit.

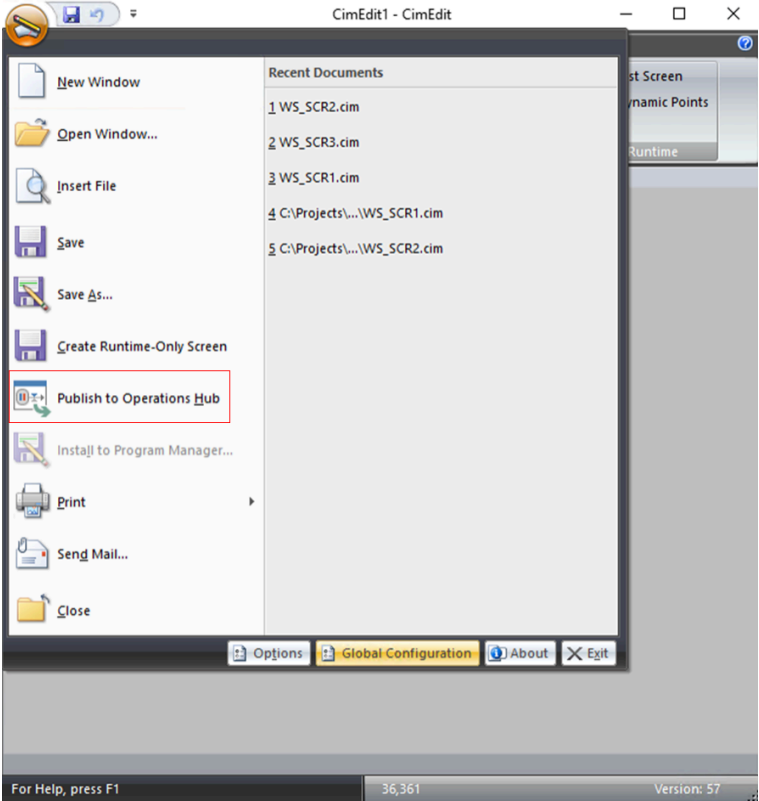


12. In the CimEdit window, select , and then select Publish to Operations Hub.




**Note:**


In the Publish window, the Server Name, Port, and User Name are automatically populated if Operations Hub has already been configured (depending on the project context) at the project level or globally. If the fields are empty, enter the details as described in step 2 of the Configure Operations Hub section before proceeding to the next step.

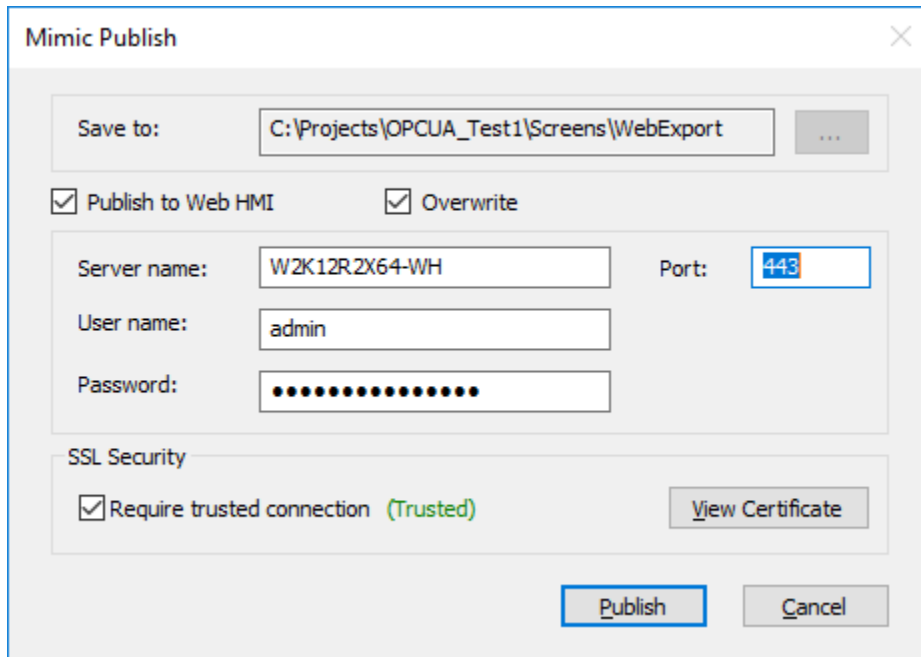


13. In the **Publish** window, enter the following details:

 **Note:**  
If you want to save the Mimic to a shared location on a remote server, the network drive should be mapped to the shared location.

- **Save To:** The location where the Mimic will be saved locally. You can choose this location since you are publishing only one Mimic at a time.
- **Publish to Operations Hub:** Select this check box to publish the Mimic to Operations Hub.
- **Overwrite:** Select this check box to overwrite any Mimic with the same name.
- **Password:** The password to publish the Mimic.
- **Require Trusted Connection:** Select this check box to publish Mimics only when a trusted connection is used. You can also select View Certificate to view the certificate used for the connection.

 **Note:**  
These details are saved after you publish the Mimic. You only need to enter the password if you close and reopen the CimEdit window



The screenshot shows a dialog box titled "Mimic Publish" with a close button (X) in the top right corner. The dialog contains the following fields and options:

- Save to:** A text box containing the path "C:\Projects\OPCUA\_Test1\Screens\WebExport" and a browse button (...).
- Options:** Two checked checkboxes: "Publish to Web HMI" and "Overwrite".
- Server name:** A text box containing "W2K12R2X64-WH".
- Port:** A text box containing "443".
- User name:** A text box containing "admin".
- Password:** A text box filled with 12 black dots.
- SSL Security:** A section with a checked checkbox "Require trusted connection" followed by the text "(Trusted)" and a "View Certificate" button.
- Buttons:** "Publish" and "Cancel" buttons at the bottom.

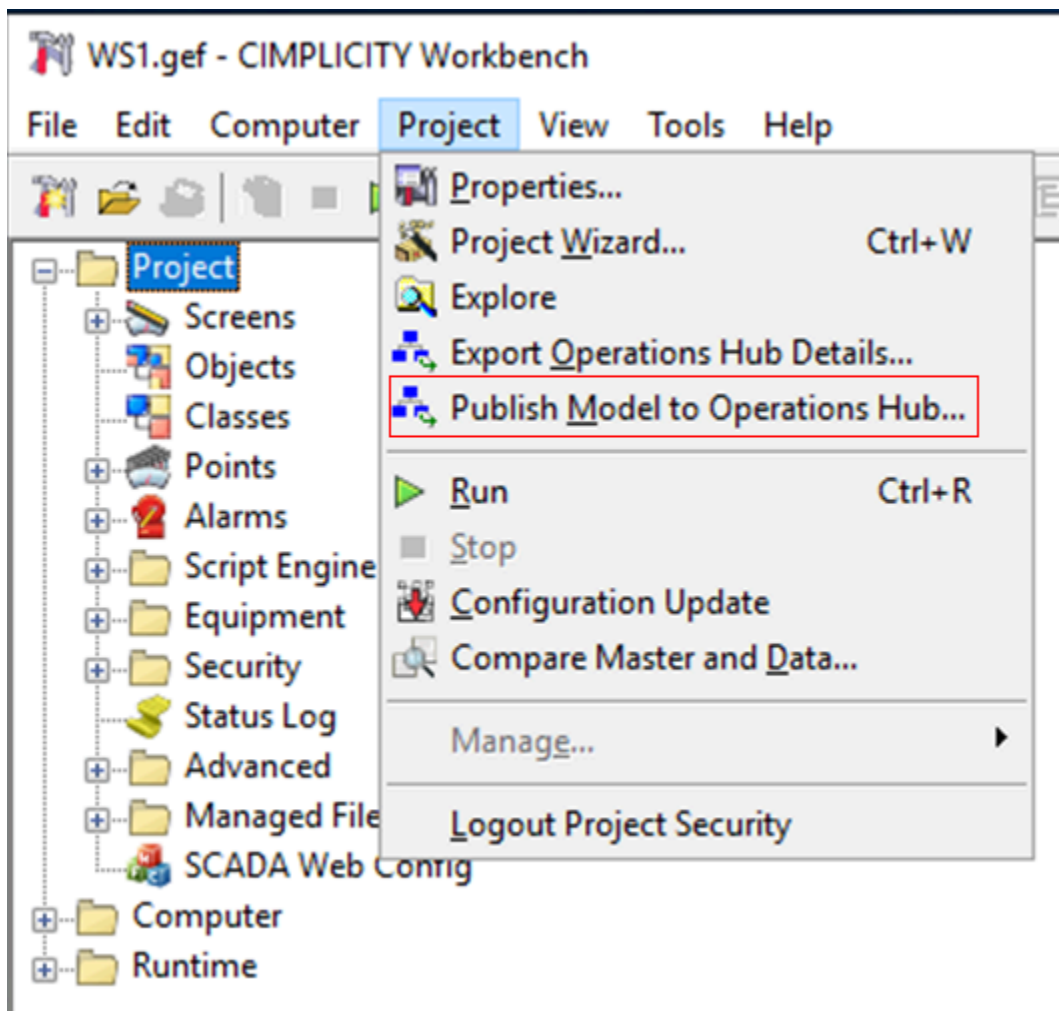
14. Select **Publish**.

The Mimic is published to Operations Hub and appears in the Mimic Management workspace.

## Publish Model to Operations Hub directly from CIMPLICITY

You can publish a Model to Operations Hub directly from CIMPLICITY. This eliminates the two-step process of publishing a Model by first exporting the model data as a .csv file from the CIMPLICITY server and then importing the .csv file to Operations Hub. You can publish a Model to Operations Hub directly from CIMPLICITY only on versions of Operations Hub 2.2 and later. The Workbench application may become unresponsive during the process of publishing a Model to Operations Hub. Model data consists of classes, objects, points, and details of OPC UA and Historian servers. Model data is also project-specific, where the details configured will apply to the last updated project.

1. In the **CIMPLICITY Workbench** window, select **Project**, and then select **Publish Model** to Operations Hub.



2. In the Model Publish window, enter the following details:
  - **Server name:** The machine name on which Operations Hub is running or the URL of the Operations Hub Server.
  - **Port:** The port on which Operations Hub is running.
  - **User name:** The Operations Hub user name used to publish the Model data.
  - **Password:** The password used to publish the Model data.
  - **Branch name:** This is used as a prefix for the name of the branch to which you want to publish a model. This value is added as a prefix to the object names associated with the published model.

For example, you have a project called **Assembly1** and you want to publish a model to a specific branch. If you enter **AssemblyBranch1** as the Branch name, the

published model and its associated objects will have the branch name prefixed as **AssemblyBranch1\_root.Assembly1**.

This enables you to publish different models with the same object names to a branch instead of the root directly.



**Note:**

The branch name that you enter can contain only letters, digits, underscore (\_), and period (.).

- **Include Historian source:** Select this check box to include points configured to the Historian server in the Model data published to Operations Hub.
- **Include non-class/object points:** Select this check box to include points that are not related to classes or objects in the Model data published to Operations Hub.
- **Require trusted connection:** Select this check box to publish Model data only when a trusted connection is used. You can also select View Certificate to view the certificate used for the connection.

Be aware that:

- The Server name, Port, and User name fields are automatically populated if Operations Hub has already been configured at the project level.
- All the details in the Model Publish window are saved for a project after you publish the Model data. You only need to enter the password if you close and reopen the CIMPLICITY Workbench window.
- The connection is not trusted when the server has a blank or invalid name, or has an invalid certificate.



3. Select **Publish**.

The Model data is published to Operations Hub and appears in the Assets workspace with classes mapped to asset types and objects mapped to assets.

## iFIX HMI Webpace

### iFIX HMI Webpace

This plug-in offers a web-based interface to remotely access and interact with the iFIX HMI and SCADA systems without the need for installing the iFIX software on each device.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

Refer to the following topics to get started with the iFIX HMI Webpace plug-in.

- [Overview of Webservice with Configuration Hub \(on page 675\)](#)
- [Sample Webservice Deployment Architecture \(on page 676\)](#)
- [How to Install a Webservice Server \(on page 676\)](#)
- [Export the Root Certificate for Webservice Setup \(on page 677\)](#)
- [Import the Root Certificate for Webservice Setup \(on page 679\)](#)
- [Register iFIX Plug-in with Configuration Hub \(on page 681\)](#)
- [Set Up Webservice in Configuration Hub \(on page 683\)](#)
- [Troubleshooting: Working with Webservice within Configuration Hub \(on page 685\)](#)

## iFIX HMI Webservice Properties

Field Name	Description
ID	The ID name you choose to give your Webservice plug-in instance in your application.
Height offset	<p>Webservice frame will take the proportion specified in <b>Relative height (%)</b> of the browser window minus this offset. It is useful when there are other widgets on the page above or below the Webservice frame.</p> <p>Example: If you set the height offset to 50 pixels, the Webservice frame is displayed 50 pixels below the reference point.</p>
Relative height (%)	Webservice frame will take this proportion of the height of the browser window minus the <b>Height offset</b> . It is useful when there are multiple Webservice widgets placed vertically on the page. This dimension is represented as a percentage value.
Webservice server	Specify the machine that has iFIX Webservice running on it.
iFIX screen path	Specify the path to the screen to load. This path is where the file resides on the Webservice system.
Tag Group File	Specifies the tag of the tag group to open with the picture.
Port for the Webservice Session Manager	The port configured on the Webservice system for the Webservice Session Manager service. 9444 is the default port setting.
Show/Hide	Select the <b>Add Conditions</b> button to add conditions to run when the iFIX Webservice widget runs.
Hidden	Select the check box if you want to hide the iFIX Webservice plug-in on screen.

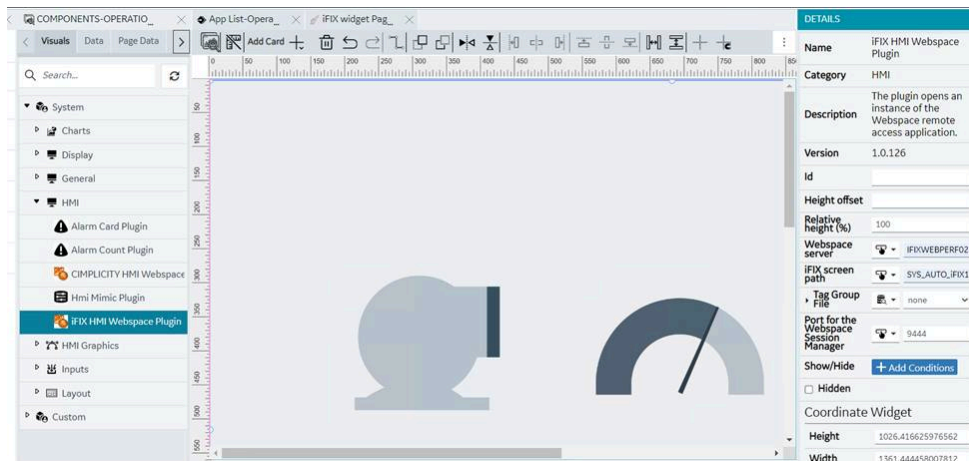
## iFIX HMI Webservice at Runtime



## Overview of Webservice with Configuration Hub

This topic provides an overview of the Webservice within Configuration Hub. For more details on the Webservice Admin app configuration that can be done on the Webservice Server, refer to the [Webservice documentation](#).

Use the Webservice widget along with other Operations Hub widgets for better consolidation and visualization of data.



## Limitations

Be aware of the following limitations when using the iFIX HMI Webspaces Plugin with Operations Hub and Configuration Hub:

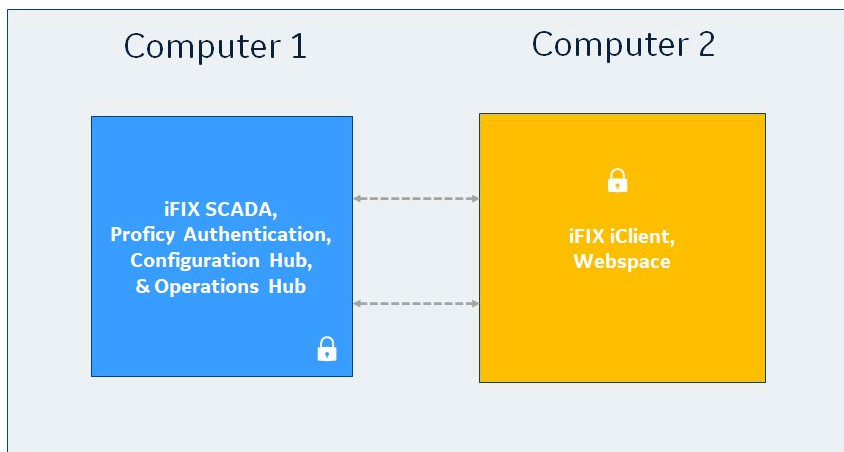
- The Webspaces Server should not be installed on a Failover pair, or on the Operations Hub server or Configuration Hub server.
- Webspaces sessions require credentials for logging into the windows server Webspaces is running on.
- When Webspaces sessions are started, the iFIX Default Project Node Name get updated with the last run iFIX Project Node Name/SCU file. Since you cannot update or start an iFIX with a specific Node Name from Configuration Hub, you should manually start iFIX in this instance. To start iFIX with correct Node Name manually, use the iFIX Startup screen (and not Configuration Hub).

## Sample Webspaces Deployment Architecture

The following figure shows a sample deployment architecture for Configuration Hub with Webspaces. It is recommended that the Webspaces server is not located on the same machine as the Configuration Hub or Operations Hub server.

The following figure shows an example of a simple two node scenario with Webspaces and Configuration Hub.

### Simple Example: Configuration Hub with Webspaces



## How to Install a Webspaces Server

Use the SCADA Client install option on the Integrated Installer to install Webspaces.

The option to install Webspaces can be found on the SCADA Client install option.



1. From the SCADA Client, select **Proficy Webspaces** to install the Webspaces Server.
2. Click **Start**. The License Screen appears.
3. Select **Accept** to continue the install and accept the terms and conditions. Next the Install Location screen appears.
4. Leave the default path and port and click **Next**. The Start Install screen appears.
5. Click **Install**. After the Install completes, a message appears.
6. Click **Close** to exit the installer.

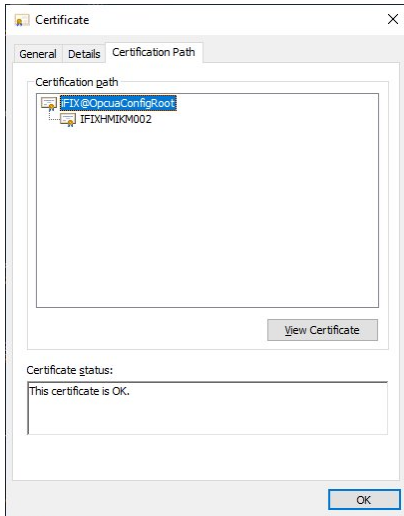
This video provides a overview of the steps above:

[webspaces.mp4](#)

## Export the Root Certificate for Webspaces Setup

Use the following steps to export a root certificate from the Webspaces server, so that you can install it on the Configuration Hub Server machine.

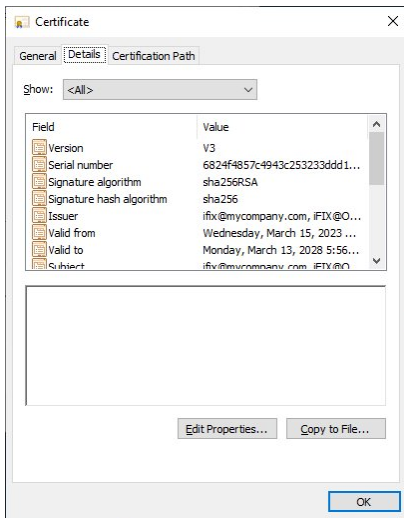
1. On the Webspaces server, navigate to the `C:\Program Files (x86)\Proficy\iFIX\web\conf` folder.
2. Double-click the `iFIX_OpcuaConfigServer.crt` file.  
The Certificate Details dialog box appears.
3. Select the **Certificate Path** tab.



4. In the Certificate Path box, select iFIX@OpcuaConfigRoot (if it is not already selected) and then click the **View Certificate** button.

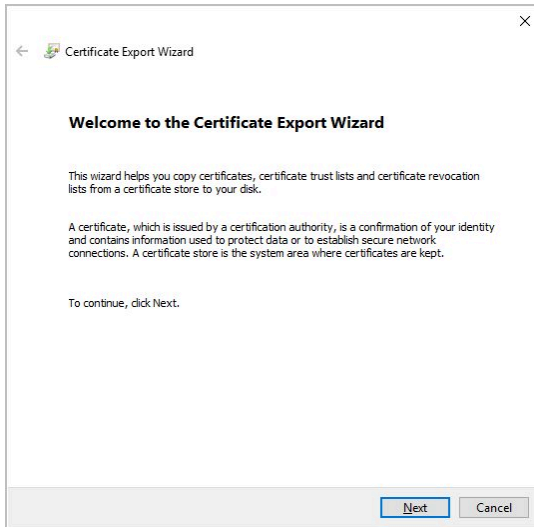
The Certificate Information dialog box appears.

5. Select the **Details** tab, as shown in the following figure.



6. Click **Copy to File**.

The Certificate Export wizard appears, as shown in the following figure.



7. Click **Next**.

The first screen of the wizard appears.

8. Leave the default of **No, do not export the private key**, and then click **Next**.

9. On the Export File format, select **DER encoded binary X.509 (.CER)**, and click **Next**.

10. On the File to Export screen, browse to the location where you want to save the file, and enter a name.

11. Click **Finish**.

The Certificate is generated in the specified folder.

12. Next, copy the root certificate from the output folder to the Configuration Hub machine so that [you can install it](#). *(on page 679)*

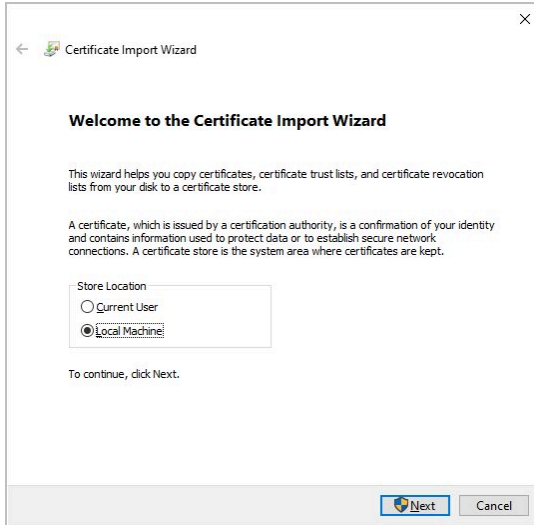
## Import the Root Certificate for Webpace Setup

Use the following steps to install a root certificate from the Webpace server, so that you can install it on the Configuration Hub Server machine.

1. Take the certificate that you exported from the [Webpace server \(on page 677\)](#) and copy it to your [Configuration Hub server machine](#). *(on page 676)*

2. Double-click the certificate file to install it.

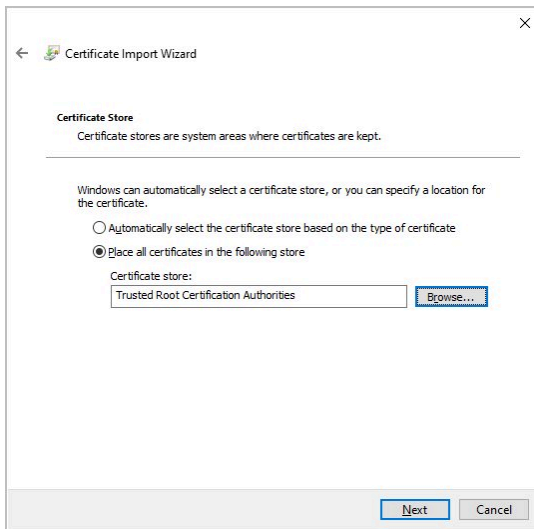
The Certificate Import Wizard appears.



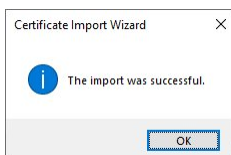
3. Select the **Local Machine** option and click **Next**.

The Import File screen appears in the wizard with your certificate selected.

4. Confirm that the folder and file name are correct, and click **Next**.
5. On the Private Key Protection screen, enter the password and click **Next**.
6. On the Certificate Store screen, select the **Place All Certificates in the following store** option, and click **Browse**.
7. Select the **Trusted Root Certification Authorities** option, and click **OK**.



8. Click **Next**, and then click **Finish** to import the certificates.



A message appears that "The import was successful" when the certificate installs correctly.



## Register iFIX Plug-in with Configuration Hub

Use these steps to register Configuration Hub after Webspaces is installed.

1. On the Configuration Hub machine, launch the registration tool, and trust and register the certificate:
  - a. On the desktop, click the **Register iFIX plugin** icon on the desktop (as shown in the following figure). Or, from the iFIX WorkSpace, on the Applications tab, in the Configuration Hub area, click **Register** to open the login screen.



- b. Enter the iFIX user name and password, and click **Login**. On successful login, the Configuration Hub Server Registration page appears.
    - c. For both Configuration Hub and Proficy Authentication, test the connection by clicking the **Test Server Connection** button. (Enter the server's name and port number if required. If on a domain, use the fully qualified domain name.) Confirm that you can connect to both servers, by clicking the **Test Server Connection** button for both servers.

### Configuration Hub Server Registration

#### Configuration Hub

SERVER NAME  
  **Trusted**

SERVER PORT


[Test Server Connection](#)

#### Create User Friendly Plug-in Name

PLUG-IN ALIAS NAME

#### Configuration Hub Administration Credentials

CLIENT ID

CLIENT SECRET  
 

**NOTE:** Use the credentials created during the configuration hub install process.

#### Proficy Authentication

SERVER NAME  
  **Trusted**


SERVER PORT

[Test Server Connection](#)

#### Proficy Authentication Credentials

Use Configuration Hub Authentication Credentials for Proficy Authentication.

CLIENT ID

CLIENT SECRET  
 

**NOTE:** These credentials are used to register iFIX plug-in with Proficy Authentication.

[Register](#)

If the server certificate shows as **Not Trusted** (in blue next to the server's name), click the **Not Trusted** link next to the server name to establish the trust. Here is an example of what the **Not Trusted** link looks like next to the Proficy Authentication Server Name field:

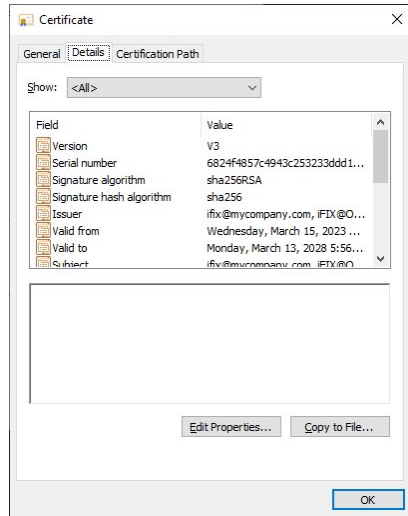
Proficy Authentication

SERVER NAME  
  **Not trusted**

SERVER PORT

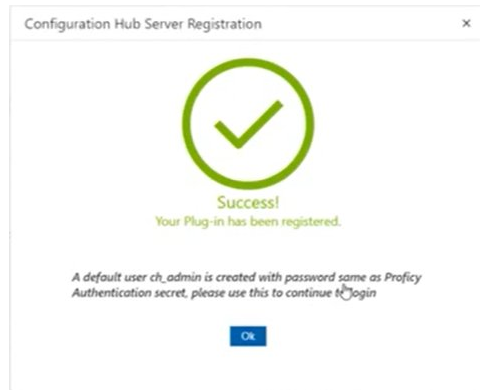
[Test Server Connection](#)

After clicking **Not Trusted**, the Certificate Details window appears. From the Certificate Details window, click **Trust** to trust the certificate.



Both Configuration Hub and Proficy Authentication must have Trusted certificates before proceeding to register.

- d. To complete the registration for Configuration Hub and Proficy Authentication, for both servers, supply the client IDs and client secrets entered during the common component install, and then click **Register**. When registration is complete, the following screen appears.

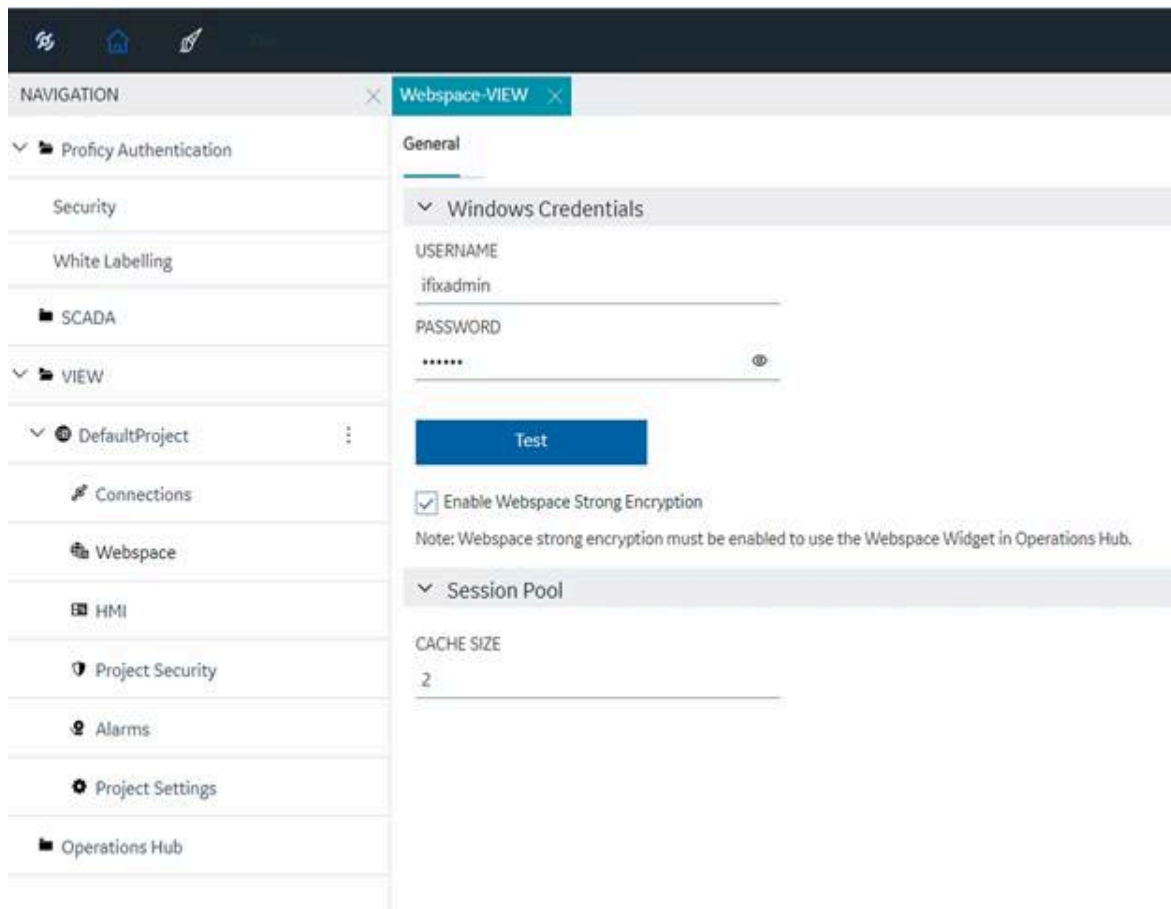


- Next, on the Webspaces server machine, launch the Registration tool and repeat the previous steps. Trust and register the certificate using the Configuration Hub and Proficy Authentication Server names specified in step 1, from the location of when you installed the product.

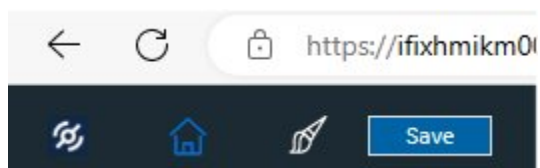
## Set Up Webspaces in Configuration Hub

Use these steps to set up Webspaces in Configuration Hub after you installed the certificate from the Webspaces Server and registered your Configuration Hub and Proficy Authentication Servers.

1. Click the Configuration Hub icon on the desktop to login to Configuration Hub.
2. Enter a valid user name and password (that you entered when you installed Configuration Hub), and click **Sign-in**.
3. Navigate to Weospace panel, as shown in the following figure. In the navigation tree, locate the Weospace Server machine on the View node.



4. Enter the valid Windows credentials for the user name and password.
5. Select the **Enable Weospace Strong Encryption** option.
6. Click **Test** to confirm that you can connect to the Weospace Server.
7. In the Session Pool area, leave the default Cache Size.
8. Click **Save**.



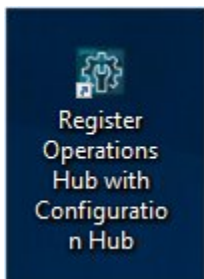
## Troubleshooting: Working with Webservice within Configuration Hub

This topic describes how to troubleshoot connection issues with the iFIX Webservice widget in Configuration Hub, with Operations Hub installed.

### What to do if Operations Hub Does Not Display in Configuration Hub in the Navigation Pane

If you cannot see the Operations Hub widget in the Configuration Hub navigation pane, try re-registering Operations Hub:

1. On the Configuration Hub server, double-click the **Register Operations Hub with Configuration Hub** shortcut on the desktop.



2. In the screen that appears, enter the base URL for Configuration Hub, and the client id and secret.

**Configuration Hub Info**

Configuration Hub Base URL:

Client ID:

Client Secret:

**Operations Hub Plugins**

Designer Plugin:

Result:


3. Click **Register** to re-register Operations Hub with Configuration Hub.


## Alarm Card

Use the alarm card to monitor your industrial assets. Get information from the HMI/SCADA system on alarms generated by their severity levels.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

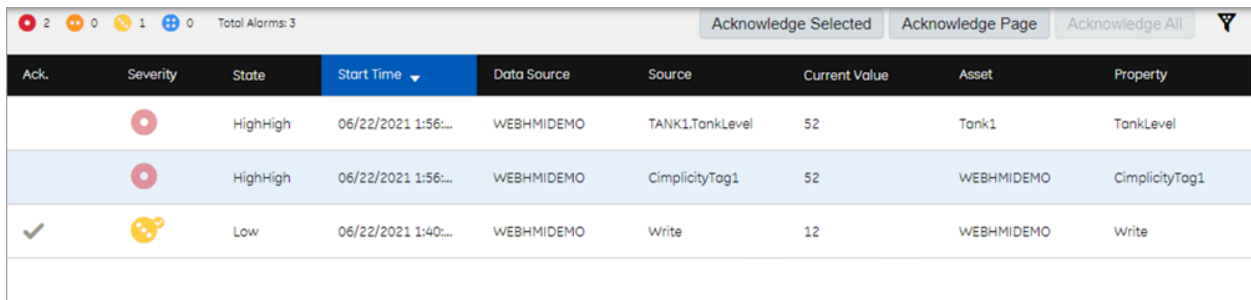
## Alarm Card Properties





Field Name	Description
View All Alarms by default (Disabling this option will display context based alarms)	<p>This is a default setting to show all alarms irrespective of context when the page loads at runtime.</p> <p>If using the bread crumb widget along with the alarm card, then alarms are displayed according to the context.</p> <p>If an alarm contains an OPC UA tag that is not associated with a model property, then the source server of the tag is displayed in the alarm grid.</p>
Asset Name (Optional Override)	Select your own asset to display alarms. The selected asset overrides the default asset name at runtime.
Data Source (default data source used to filter alarms on page load)	Select a data source to set as default for filtering alarms on page load at runtime.
Page Size - Number of alarms to display per page	Enter a number to specify the number of alarms that appear on a page at runtime. The maximum number of alarms you can display per page is 100.
Auto Hide Columns	<p>Select to automatically hide the table columns if screen space is a constraint.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> This option is enabled by default. To hide any of the other columns at runtime, you must clear the check box for this option.</p> </div>
Hide Acknowledge Column	Select to hide the <b>Ack.</b> column at runtime. This column contains the status to indicate whether the alarm is acknowledged in the HMI/SCADA system or not. A check mark in this column indicates that the alarm is acknowledged.

Field Name	Description
Hide Severity Column	Select to hide the <b>Severity</b> column at runtime. This column contains the icon that indicates the alarm severity status.
Hide Start Time Column	Select to hide the <b>Start Time</b> column at runtime. This column contains the start time and date for the alarm.
Hide Source Column	Select to hide the <b>Source</b> column at runtime. This column contains the tag associated to the alarm.
Hide Current Value Column	Select to hide the <b>Current Value</b> column at runtime. This column contains the query value such as whether the alarm is running or stopped.
Hide Asset Column	Select to hide the <b>Asset</b> column at runtime. This column contains the asset name associated to the alarm.
Hide Property Column	Select to hide the <b>Property</b> column at runtime.
Hide Description Column	Select to hide the <b>Description</b> column at runtime.
Hide State Column	Select to hide the <b>State</b> column at runtime. This column contains the alarm's current status.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

### Alarm Card at Runtime

To [acknowledge alarms \(on page 696\)](#), you must have the permission to do so in the supporting HMI/SCADA system.



Ack.	Severity	State	Start Time	Data Source	Source	Current Value	Asset	Property
		HighHigh	06/22/2021 1:56:...	WEBHMIDEMO	TANK1.TankLevel	52	Tank1	TankLevel
		HighHigh	06/22/2021 1:56:...	WEBHMIDEMO	CimplicityTag1	52	WEBHMIDEMO	CimplicityTag1
		Low	06/22/2021 1:40:...	WEBHMIDEMO	Write	12	WEBHMIDEMO	Write

Select  to [filter alarms \(on page 694\)](#) based on specific conditions.

Each icon has a corresponding number to indicate the number of alarms currently active for that severity level. The [alarm count \(on page 697\)](#) in the banner shows the number of alarms per severity level for all assets in the model, whereas the alarm card displays the number of alarms per severity level for the selected context.

The severity of an alarm is based on the priorities set in the HMI/SCADA system (iFIX or CIMPLICITY). Each alarm icon is color-coded and contains a specific number of dots to indicate its severity level, as shown in this table.

**Note:**

The alarm severity ranges are hard-coded in the application. Access the `application.properties` file to modify alarm severity ranges.

You can modify the property `rank.ranks` in `C:\Program Files\GE\Operations Hub\webhmi-tomcat\webapps\alarm-microservice\WEB-INF\classes\application.properties` and restart webHMI tomcat service.

Icon	Description
	Alarm is critical.
	Alarm is high priority.
	Alarm is medium priority.
	Alarm is low priority.

Alarm information is not displayed if data sources are disconnected. Select to get more information.

**Note:**

Currently, if a data source is deleted from Operations Hub, the alarms configured to the deleted data source are still displayed at runtime. To clear such alarms, restart the data distributor service.

## Configure iFIX for Alarms

When using the iFIX HMI/SCADA system as your data source, follow this quick walkthrough to successfully get data and alarms flowing for the first time into Operations Hub.



First install iFIX, and then install Operations Hub on the same server.

1. Start the iFIX application.
2. Log in to iFIX with a default/guest account.
3. Go to **Applications > Security > Security Configuration Utility**.

Security is available in the System & Security group.

4. On the **Security** toolbox, select **User Account**.
5. Select **Add** to create a user account.

The **User Profile** dialog appears.

6. Provide iFIX security for the user account:

Field	Description
Full name	Enter a name for the new user account.
Login name	Enter a login name for the user account.
Password	Enter a password for the user account.
Group Membership	Select <b>Modify</b> to add any/all available groups to the user account, then select <b>OK</b> .
Security Areas	Select <b>Modify</b> to add any/all security areas to the user account, then select <b>OK</b> .
Application Features	Select <b>Modify</b> to add any/all application features to the user account, then select <b>OK</b> .

7. Select **OK** to save the user profile.

The **Password Confirmation** dialog appears.

8. Enter the password again and select **OK**.

The user account is saved with the credentials and added to the **Current Users** list.

9. On the Security toolbox, select Configuration and select **Enabled**.

10. Go to **Applications > OPC UA Configuration**.

The **iFIX OPC UA Server Configuration Tool** screen appears.

11. On the **Server** tab, select the check box for **Server Enabled**.
12. On the **Alarms** tab, select the check box for **Alarms Enabled**.
13. Select **Save and Exit** to save the selections, and close the screen.
14. Go to **Applications > Database Manager**.

The **iFIX Database Manager** spreadsheet appears.

15. Open an existing database, or select **Create New** on the spreadsheet toolbar to save a new database.

16. On the spreadsheet toolbar, select **Add** to add blocks to your database.

The **Select a block type** screen appears.

17. Select any block type, then select **OK**.

The selected block type screen appears.

18. On the **Basic** tab:

- a. Enter **Tag Name**.
- b. Enter **I/O Address**.
- c. Select **Save**.

19. On the **Alarm** tab:

- a. Select the check box for **Enable Alarming**.
- b. In the **Alarm Options** table, enter the alarm values.

For example:

High High	60
High	40
Low	20
Low Low	10

- c. Select **Save**.

20. On the **Advanced** tab:

- a. Select the check box for **Enable Output**.
- b. Select **Save**.

The tag name configured with an alarm is added to the spreadsheet.

21. Repeat steps 8-12 to add more blocks to your database.

- [Create a data source with OPC UA configuration \(on page 429\)](#) in Operations Hub.
- Use the [alarm card \(on page 685\)](#) and [alarm count \(on page 697\)](#) widgets in your application.
- [Acknowledge Alarms \(on page 696\)](#).
- [Apply Filters to View Alarms \(on page 694\)](#).
- [Configure CIMPLICITY for Alarms \(on page 691\)](#).

**Related information**[Configure iFIX for Mimics \(on page 699\)](#)

## Configure CIMPLICITY for Alarms

When using the CIMPLICITY HMI/SCADA system as your data source, follow this quick walkthrough to successfully get data and alarms flowing for the first time into Operations Hub.

- Install the latest versions of CIMPLICITY and Operations Hub on different servers or on the same server.
- Create an administrative user that you can use for both CIMPLICITY and Operations Hub. The user IDs must match in order to connect and manage communications and operations between the two systems, but the passwords must be different.

1. Start the CIMPLICITY Workbench application.
2. From the Workbench toolbar, go to **File > New > Project**.

The **Create User for New Project** dialog appears.

3. Provide these details for the new user account:

Field	Description
Username	Enter the user name for the new account.
Password	Enter a password.
Confirm password	Enter the password again to confirm.

**Note:**

You will use the credentials to establish a secure connection with authentication for the CIMPLICITY data source in Operations Hub.

4. Select **Next**.  
The **Create As** dialog appears.
5. Enter the name and location for the new project.

**Note:**

For write operations to work, the project name and the CIMPLICITY data source name in Operations Hub should be the same.

6. Select product options and protocols that will be included in the project.
7. Select **Create**.
8. After creating the project, go to **Project > Properties**.

The **Project Properties** screen appears.

9. On the **OPC UA Server** tab, perform these steps.
  - a. Select the check box for **Enable Server**.
  - b. Select **Security Configuration**, then select the check box for all the security options you want to enable for the OPC UA server.
10. On the **Operations Hub** tab, perform these steps.
  - a. Provide the following details:

Field	Description
Server name	Enter the name of the Operations Hub server to connect.
Port	Enter the port number for Operations Hub UAA. For example, 443.
User name	Enter the account username that is used to log in to the Operations Hub application.

- b. Select the check box for **Require trusted connection**.
- c. If **(Not Trusted)**, go to the CIMPLICITY project's `\data\WebHMIpki\server_certs` folder and copy the root certificates.
- d. Paste the copied certificates in the CIMPLICITY project's `\data\WebHMIpki\trusted_issuers` folder.
- e. On the **Operations Hub** tab, select **Test Connection**.  
A success message appears updating the connection status as **(Trusted)**.

11. From the CIMPLICITY Workbench project directory, right-click **Points > New**, to create a new device point.
12. Provide the following information for the new point and select **OK**.

Field	Description
Point ID	Provide a unique name that identifies the CIMPLICITY point.

Field	Description
Type	Select <code>Virtual</code> .
Class	Select <code>Analog</code> .

The **Point Properties** screen appears.

13. On the **Virtual** tab, provide these details:

Field	Description
Initialization	Select <code>Initialized</code> .
Initial value	Enter <code>0</code> .
Calculation	Select <code>Equation</code> and build an expression. For more information on calculation types, refer to the <a href="#">Configure Virtual Calculations</a> topic in the CIMPLICITY help guide.

14. On the **Alarm** tab, provide these details:

Field	Description
Alarm message	Select <code>Point ID</code> . For more information on alarm message variables, refer to the <a href="#">Enter an Alarm Definition</a> topic in the CIMPLICITY help guide.
Alarm limits	Enter the alarm limits. For example: <ul style="list-style-type: none"> <li>◦ HiHi: 60</li> <li>◦ Hi: 40</li> <li>◦ Lo: 20</li> <li>◦ LoLo: 10</li> </ul>

15. Select **OK** to save and close the **Point Properties** screen.

16. Repeat steps 6-10 to create more device points.

17. Run the CIMPLICITY project.

- [Create a data source with OPC UA configuration \(on page 429\)](#) in Operations Hub.
- Use the [alarm card \(on page 685\)](#) and [alarm count \(on page 697\)](#) widgets in your application.
- [Acknowledge Alarms \(on page 696\)](#).
- [Apply Filters to View Alarms \(on page 694\)](#).
- [Configure iFIX for Alarms \(on page 688\)](#).

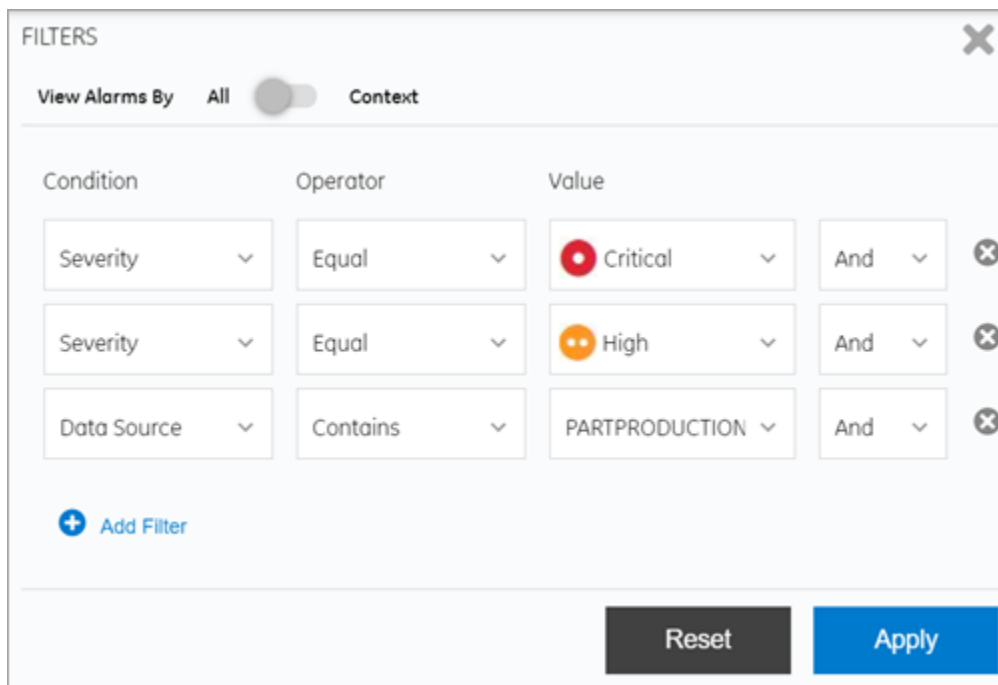
**Related information**

[Configure CIMPLICITY for Mimics \(on page 707\)](#)

## Apply Filters to View Alarms

Apply conditions to filter and display alarms.

You can use filters to narrow down your search for the exact alarm information you want to view.




**Table 5. Filter Criteria for Alarms**

Field	Description
View Alarms By	Use the toggle to switch between these states: <ul style="list-style-type: none"> <li>• Set to <b>All</b> if you do not have an asset model. You can filter alarms from all the available data sources.</li> <li>• Set to <b>Context</b> if you have an asset model. From the breadcrumb, navigate to your asset context to filter respective alarms.</li> </ul>
Condition	Select any of these conditions to filter and display alarms:

**Table 5. Filter Criteria for Alarms (continued)**

Field	Description
	<ul style="list-style-type: none"> <li>• Acknowledged: Displays only the list of acknowledged alarms.</li> <li>• Severity: Displays alarms based on a selected severity value - critical, high, medium, or low.</li> <li>• Start Time: Displays alarms based on a selected date and time.</li> <li>• Source: Displays only alarms from the selected tag/source.</li> <li>• Data Source: Displays only alarms from the selected data source.</li> </ul>
Operator	<p>Select an operator to describe the relationship between the condition and the value. Based on the selected condition, the following operators are available: Equal, NotEqual, GreaterThan, GreaterOrEqual, LessThan, LessOrEqual, Contains, NotContains, etc.</p>
Value	<p>Select the value you want to filter. Values for filtering alarms are populated based on the selected condition and operator.</p> <p>If condition is data source, it takes about 30 seconds to initially populate the list of available OPC UA data sources in your system. In case you deleted a data source from your system, the deleted data source still appears in the <b>Value</b> drop-down list. To clear deleted data sources, restart these services in the following order:</p> <ol style="list-style-type: none"> <li>1. GE Operations Hub WebHMI Tomcat Web Server</li> <li>2. GE OpHub Data Distributor</li> </ol>

**Table 5. Filter Criteria for Alarms (continued)**

Field	Description
+ Add Filter	Select to insert a new filter criteria. Use the <b>And, Or</b> operators to describe the relationship between two or more filter criteria.
Reset	Select to clear all the filters. To clear individual filters, select  next to the filter you want to delete.
Apply	Select to apply the filters and display only alarms that match the filter criteria.

## Acknowledge Alarms

Alarms are acknowledged in the HMI/SCADA system.

Alarms are displayed based on the [applied filter conditions \(on page 694\)](#). You have the option to acknowledge,

- all the alarms at once
- only the specific number of alarms listed per page
- only the selected alarms

Configure [iFIX \(on page 688\)](#) or [CIMPLICITY \(on page 691\)](#) to be able to acknowledge alarms.

1. To acknowledge only selected alarms:
  - a. Select the rows for the alarms in the table.  
To unselect, select the row again.
  - b. Select **Acknowledge Selected**.  
A confirm dialog appears.
  - c. Select **Acknowledge** to confirm.
2. To acknowledge all the alarms listed on a page:
  - a. Select **Acknowledge Page**.  
A confirm dialog appears.



b. Select **Acknowledge** to confirm.

Only alarms on the specific page are acknowledged.



3. To acknowledge all the alarms at once:

a. Select **Acknowledge All**.

A confirm dialog appears.

b. Select **Acknowledge** to confirm.

All the displayed alarms for the applied filter condition are acknowledged.

A check mark  appears for the acknowledged alarm in its **Ack** column. The alarm severity icon also indicates a check mark  if successfully acknowledged in the HMI/SCADA system.

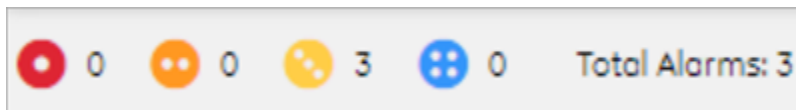
## Alarm Count

This widget provides only the count of alarms per severity level for all the assets in a model.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

You can use the alarm count widget when you want to provide only a summary of alarms in your application.

The alarm count is displayed as a banner at runtime with the number of alarms currently active for the severity level.

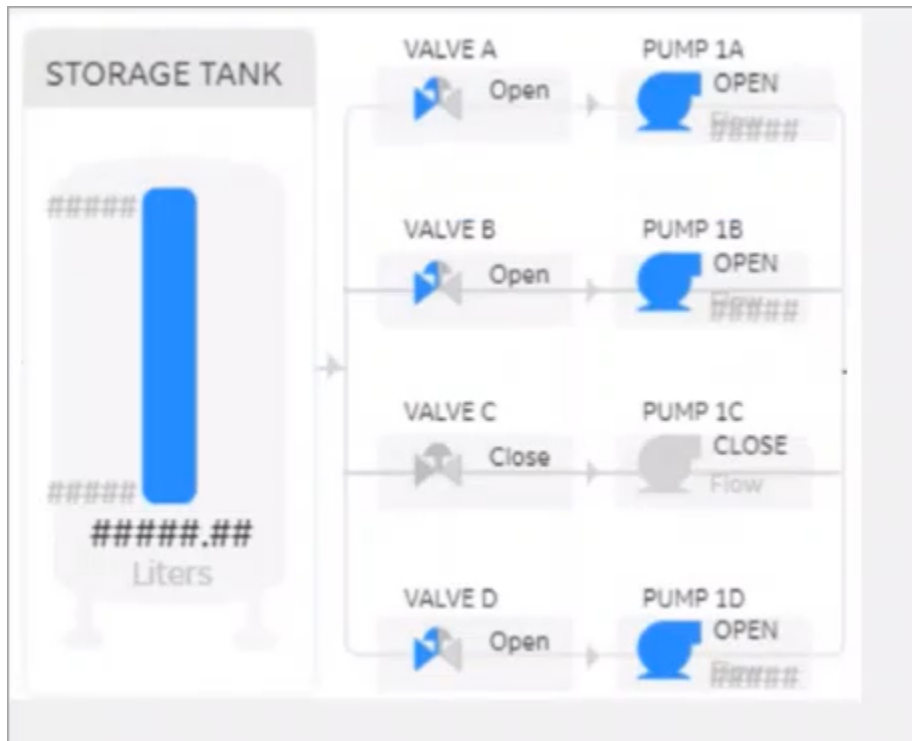


## Mimic Card

A mimic card provides a specific view of a process diagram associated with an asset. This allows you to monitor and control production equipment and processes.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
---------------------------	--

Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic)</a> (on page 494)
-------------------------------	--





The mimic card also allows you to [update values during runtime](#) (on page 713), and get results immediately.

You can use the mimic card with or without a model. When not using a model, create pages and assign direct tags.

### Mimic Card Properties

Field Name	Description
Asset Name (Optional Override)	Provide the asset name for which you want to replace its currently assigned mimic. <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <span style="color: #0070C0; font-size: 1.2em; float: left; margin-right: 5px;">✍</span> <b>Note:</b>                      You can opt to override either an asset name or a mimic name. If you attempt to override both, only the asset name is considered.                 </div>
Mimic Name (Optional Override)	Provide the mimic name to replace the currently assigned mimic. The new mimic must use only direct tags (not model-based) for its data sources. Al-

Field Name	Description
	<p>so, the new mimic cannot use click-target navigation as the mimic has no context for navigation when loaded in this manner.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> If you do not specify an override for both the asset name or mimic name, then the mimic from the selected asset context in a breadcrumb is considered. When not using the breadcrumb in an application, it is mandatory to provide an override either for the asset name or the mimic name.</p> </div>
Height	Allows to set the height of the widget at runtime. You can set the values in percent or pixels. For example, 100%, 50%, 300, etc.
Override Mimic Background Color	Overrides the mimic's background color.
Background Color	Adds a background color.
Show Border	Displays a border.
Border Color	Adds a border color.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

## Configure iFIX for Mimics

When using the iFIX HMI/SCADA system as your data source, follow this quick walkthrough to successfully get mimics into Operations Hub.

Install iFIX and Operations Hub on different servers or on the same server.



### Note:

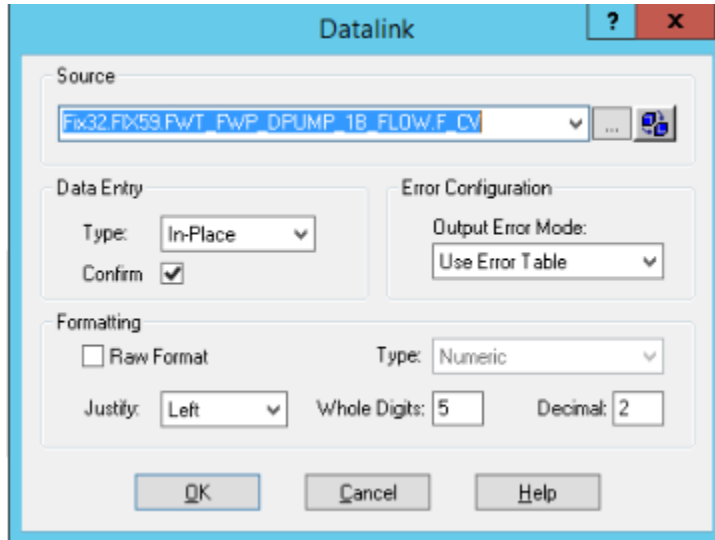
You can display booleans and enumerations as strings in your mimics. When creating the mimic, use the `A_CV` attribute on your data sources. If you use `F_CV`, numeric values are rendered. For inline edits, only booleans currently support selecting a value via a dropdown box.

## 1. Log in to Proficy iFIX and perform these tasks:

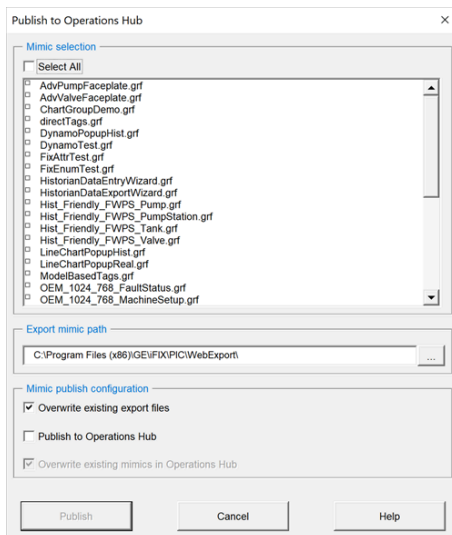
- a. Go to `C:\Program Files (x86)\GE\iFIX` and open the `secmgr.clr.dll.config` file in a notepad.
- b. Save the dll file after verifying and updating these details:  
Ensure that `uaa_oauthHost` points to the UAA server that provides the authentication services. If default UAA server is installed with Operations Hub, this will generally be the hostname (short or FQDN) used during Operations Hub installation.

```
<?xml version="1.0" encoding="utf-8" ?>
<configuration>
  <appSettings>
    <add key="oauthHost" value="127.0.0.1"/>
    <add key="oauthPort" value="8443"/>
    <add key="oauthEndPoint" value="oauth"/>
    <add key="strictCertificatePolicy" value="false"/>
      <add key="ifix_oauthIssuer" value="ifix_auth_service"/>
    <add key="ifix_oauthHost" value="localhost"/>
    <add key="ifix_oauthPort" value="4857"/>
    <add key="ifix_oauthEndPoint" value="ifix-auth-service/v1/oauth"/>
    <add key="ifix_strictCertificatePolicy" value="false"/>
      <add key="confighub_oauthIssuer" value="ConfigHubAuthService"/>
    <add key="confighub_oauthHost" value="localhost"/>
    <add key="confighub_oauthPort" value="5678"/>
    <add key="confighub_oauthEndPoint" value="confighub-auth/v1/oauth"/>
    <add key="confighub_strictCertificatePolicy" value="false"/>
    <add key="uaa_oauthHost" value="localhost"/>
    <add key="uaa_oauthPort" value="443"/>
    <add key="uaa_oauthEndPoint" value="uaa"/>
    <add key="uaa_strictCertificatePolicy" value="false"/>
  </appSettings>
</configuration>
```

- c. Create pictures supporting the Operations Hub objects. To make an object a click target in a Operations Hub mimic, set its `is selectable` property to `true`.
- d. To enable an operator to update an iFIX data source tag on a picture and answer an update confirmation question, access the **Datalink** screen and select the source tag. In the **Data Entry** section, select In-Place in the **Type** field, and then select the **Confirm** check box, as shown below.



- e. In the iFIX Tools Ribbon, select **Publish to Operations Hub** to export selected pictures in GRF format in to a Picture folder as shown below. These GRF files are exported in to JSON ZIP files. These pictures become mimics (process diagrams) that you associate with asset object types in Operations Hub.



- f. Verify the values in the **Advanced** section of the **Configure iFIX OPC AE Server** screen conform to the OPC A&E specification guidelines and use the Operations Hub default dividing point values to separate the alarm severity ranges, as explained in [Alarm Microservice](#).

The following provides a sample **Configure iFIX OPC AE Server** screen.

The screenshot shows the 'Configure iFIX OPC AE Server' dialog box. It features a blue title bar with a question mark and a close button. The main content is organized into several sections:

- OPC Attributes:** A table with two columns: 'iFIX Field Name' and 'Attribute Name'. The table contains the following rows:
 

iFIX Field Name	Attribute Name
<input checked="" type="checkbox"/> SourceTag	SourceTag
<input checked="" type="checkbox"/> Message Type	Message Type
<input type="checkbox"/> Alarm Priority	Alarm Priority
<input type="checkbox"/> Areas	Areas
<input checked="" type="checkbox"/> Node	Node
<input type="checkbox"/> Physical Node Name	Physical Node Name
<input type="checkbox"/> Application	Application
<input type="checkbox"/> ApplicationVersion	ApplicationVersion
<input type="checkbox"/> Message ID	Message ID
<input checked="" type="checkbox"/> Alarm Status	Alarm Status
<input checked="" type="checkbox"/> CV	CV
<input checked="" type="checkbox"/> EngUnitLabel	EngUnitLabel
<input type="checkbox"/> Tag Description	Tag Description
<input type="checkbox"/> User Field1	User Field1
<input type="checkbox"/> User Field2	User Field2

 Below the table are 'Select All' and 'Restore Defaults' buttons.
- User Field Data Source:** Four input fields labeled 'User Field1', 'User Field2', 'User Field3', and 'User Field4', each containing the text 'A\_'.
- Advanced:** A table with two columns: 'Priority Rank' and 'Severity Number'.
 

Priority Rank	Severity Number
INFO	40
LOLO	80
LOW	150
MEDIUM	500
HIGH	850
HIHI	900
CRITICAL	950

 Below this table is a 'Queue Size' input field with the value '1000' and a checkbox labeled 'Only get alarms on node' which is unchecked.
- Alarm Acknowledgement Security:** A section with a checked checkbox labeled 'Require Web HMI Security'.

At the bottom of the dialog are 'Help', 'OK', and 'Cancel' buttons.

2. Log in to Operations Hub.
3. Create a data source with OPC UA configuration (on page 429) in Operations Hub.



**Note:**

The datasource name should match the iFIX node name.

4. Import the mimic (on page 417).
5. Create an application (on page 265).
6. Create application pages (on page 450) for Alarm card (on page 685) and Mimic Card (on page 697).
7. Run the application and check to see if mimics are working.

### Related information

Reference a Model Property in an Animation (on page 703)

Using the Operations Hub Toolbox (on page 703)

[Controlling Data Sources in a Picture by Group Selection \(on page 704\)](#)

[Automatically Binding Child Assets to Click Zones using Group Names \(on page 705\)](#)

## Reference a Model Property in an Animation

You can reference a model property within an animation.

To reference a model property in an animation, you must type @ (at sign) at the beginning and at the end of the property name. This allows the Operations Hub software to differentiate the property name from ordinary text.

### Example:

To enter a reference in an animation to the pump1.speed property in the model:

1. Enter the following in the Fill Expert as the Fill Data Source: @pump1.speed@
2. Export the picture using the Export Web HMI Picture utility. The following line appears in the JSON file: "tag": "@pump1.speed@"

## Using the Operations Hub Toolbox

The Operations Hub Toolbox contains buttons for objects and picture composition tools that allow you to quickly create high performance HMI pictures. You can click and drag the Operations Hub Toolbox to a position anywhere on your picture, or click and drag one of its edges to resize it.

The Operations Hub Toolbox automatically appears by default when high performance HMI graphics are enabled under **User Preferences > General**.

You can disable the Operations Hub Toolbox by toggling the Toolbox button on the Tools tab in the Operations Hub group of the WorkSpace ribbon.

The following table lists the names of the Operations Hub Toolbox buttons. The layout of the cells in this table mimics the layout of the corresponding buttons in the Operations Hub Toolbox. A description of each button can be found in the [Creating Pictures](#) ebook.

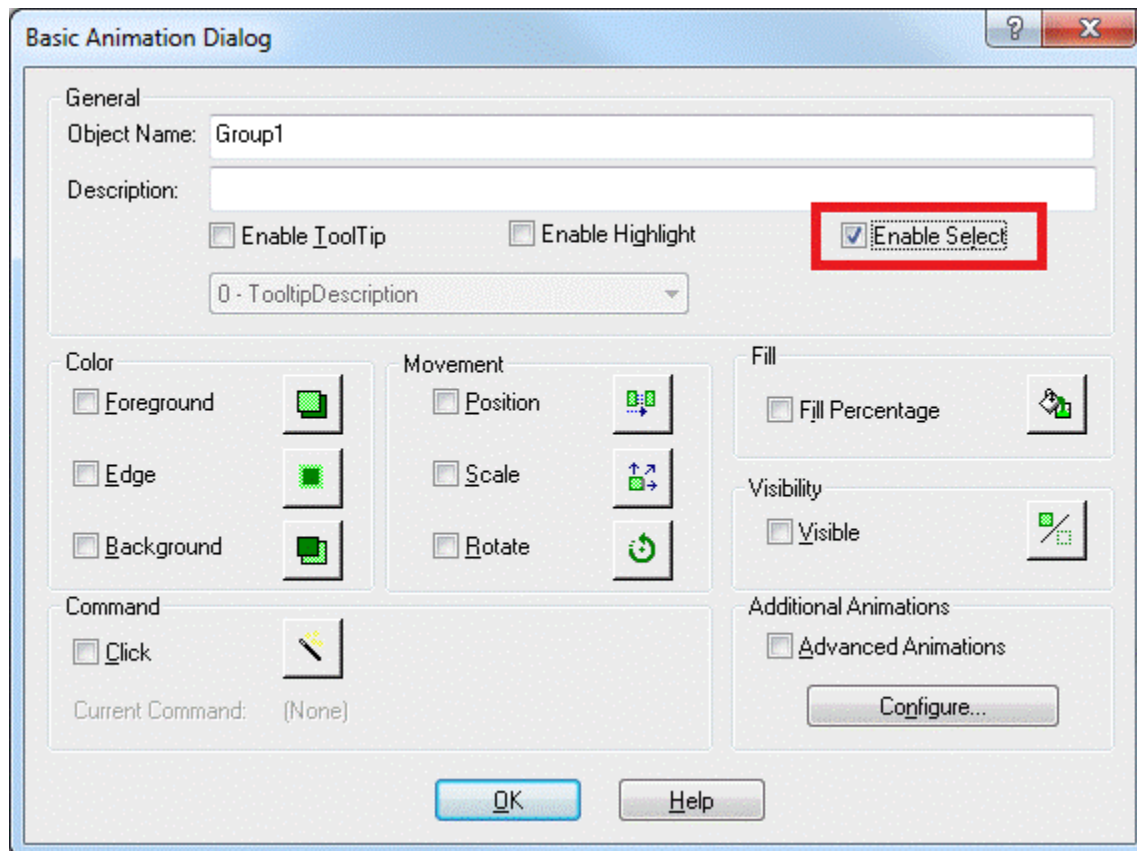
Pointer Selection	Cut	Copy	Paste	Rectangle	Rounded Rectangle	Oval	Chord	Polygon	Pie
-------------------	-----	------	-------	-----------	-------------------	------	-------	---------	-----

Arc	Line	Polyline	Line Connector	Right Line Connector	Text	Datalink Stamper	Bitmap	Set Color	Toggle Grid
Space Evenly Vertical	Space Evenly Horizontal	Align Top	Align Left	Align Bottom	Align Right	Align Horizontal Center	Align Vertical Center	Group	Ungroup
Bring to Front	Send to Back	Set Layer	Display Layer	Fill Expert	Rotate Expert	Foreground Color Expert	Visibility Expert	Undo	--

## Controlling Data Sources in a Picture by Group Selection

Operations Hub allows you to write to tag values associated with an asset's properties in the Asset Model. It is possible to define a group of objects in a picture that can be selected at runtime, resulting in a control card appearing in which the operator can write to controllable properties of a given asset. This is accomplished with the `IsSelectable` property in the exported picture JSON file, which is only exported for iFIX Group objects that have **Enable Select** enabled in iFIX pictures.





With traditional iFIX pictures, selecting the **Enable Select** property allows an object to be selected in the runtime environment.

With iFIX pictures that are intended for export to Operations Hub, selecting the **Enable Select** property of a group designates that group as a "click zone" in that picture. A click zone allows properties of a certain asset to be controlled or modified by writing to the associated iFIX tags. When you click on a selectable group that has an asset associated with it, a control card opens to show the current values for a specified set of properties for that asset. Both controllable and non-controllable properties display, based on the configuration of the properties. (Controllable properties are indicated with a gear icon.) Clicking on the control card changes it to Edit view. Edit view allows you to enter new values for those properties. The new values are written to the iFIX database tags when the Confirm button is selected.

## Automatically Binding Child Assets to Click Zones using Group Names

When creating the iFIX picture for a certain asset type, specifying a selectable group's name in a certain way results in the click zone being automatically associated with a child asset without further configuration once the exported iFIX picture is associated with an asset type.

In order to take advantage of this automatic click zone binding, the group name must be the same as the child asset's property name in the GE Operations Hub Asset Model. Each child asset in the model hierarchy is represented as a property of a parent asset. In order for the automatic binding to associate a click zone with a certain child asset, the group name must exactly match the name of the desired child asset property and the exported iFIX picture must be associated with the parent asset.

**Example:**

For example, say you have an asset type named StorageTank, which has two child asset properties defined in the model, – InletPump and OutflowPump, of asset type Pump. When creating an iFIX picture for the StorageTank asset type to use with GE Operations Hub, you can automatically enable the control card for each of these child assets by:

1. Creating a selectable group of objects within the iFIX picture for each of the child assets.
2. Naming these groups InletPump and OutflowPump. These are the child asset property names as defined in the asset model, (not the child asset instance names for a certain instance of StorageTank).
3. Exporting the iFIX picture from WorkSpace.
4. Importing the exported picture to GE Operations Hub and associating it with the StorageTank asset type (assuming that the asset model has already been created/imported).

After doing this, navigating to any StorageTank in GE Operations Hub at runtime and viewing the HMI display allows an operator to click on either of these groups of objects to display the control card for that child asset – without the need to navigate to that child asset. This allows control of child assets while in the context of a parent asset.

**Rules for Automatic Binding of Group Names**

- You must name the group the same as the child asset property of an asset type.
- Only child or other descendant assets of a given asset type can be bound to a click zone in a picture associated with that asset type.
- You can access the control card for grandchild assets and below by using double underscores (\_\_) in the group name to separate each asset level. For example, if the above Pump asset type had a child asset property named RestrictionValve, a click zone could be auto-bound to this grandchild asset from the StorageTank picture by defining a selectable group with the name InletPump\_\_RestrictionValve or OutflowPump\_\_RestrictionValve. This shows the control card for one of these RestrictionValves, depending upon which name you used.

- You can display the control card for the asset type that is associated with the IFIX picture, rather than one of its descendants, by naming the selectable group the same as the asset type. In the previous example, naming a selectable group StorageTank would result in the click zone displaying the control card for the StorageTank itself when that group is selected at runtime.

**Note:**

It is not necessary to name the selectable groups in a certain way for them to be able to show the control card for an asset. It is only necessary in order to take advantage of the automatic binding feature. If you do not name them in this way, the click zones will still be selectable at runtime in GE Web HMI, but will require further configuration in GE Operations Hub Administration in order to associate them with the desired assets for control at runtime.

## Configure CIMPLICITY for Mimics

When using the CIMPLICITY HMI/SCADA system as your data source, follow this quick walkthrough to successfully get mimics into Operations Hub.

- Install the latest versions of CIMPLICITY and Operations Hub on different servers or on the same server.
- Create an administrative user that you can use for both CIMPLICITY and Operations Hub. The user IDs must match in order to connect and manage communications and operations between the two systems, but the passwords must be different.

By integrating Operations Hub and CIMPLICITY, you can view CIMPLICITY data in Operations Hub using screens called mimics that were created in CimEdit.

**Note:**

You can display booleans and enumerations as strings in your mimics. When creating the mimic, use the `.value` attribute on your data sources. If you use `.$RAW_VALUE`, numeric values are rendered. For inline edits, both booleans and enumerations display a dropdown box with the possible values.

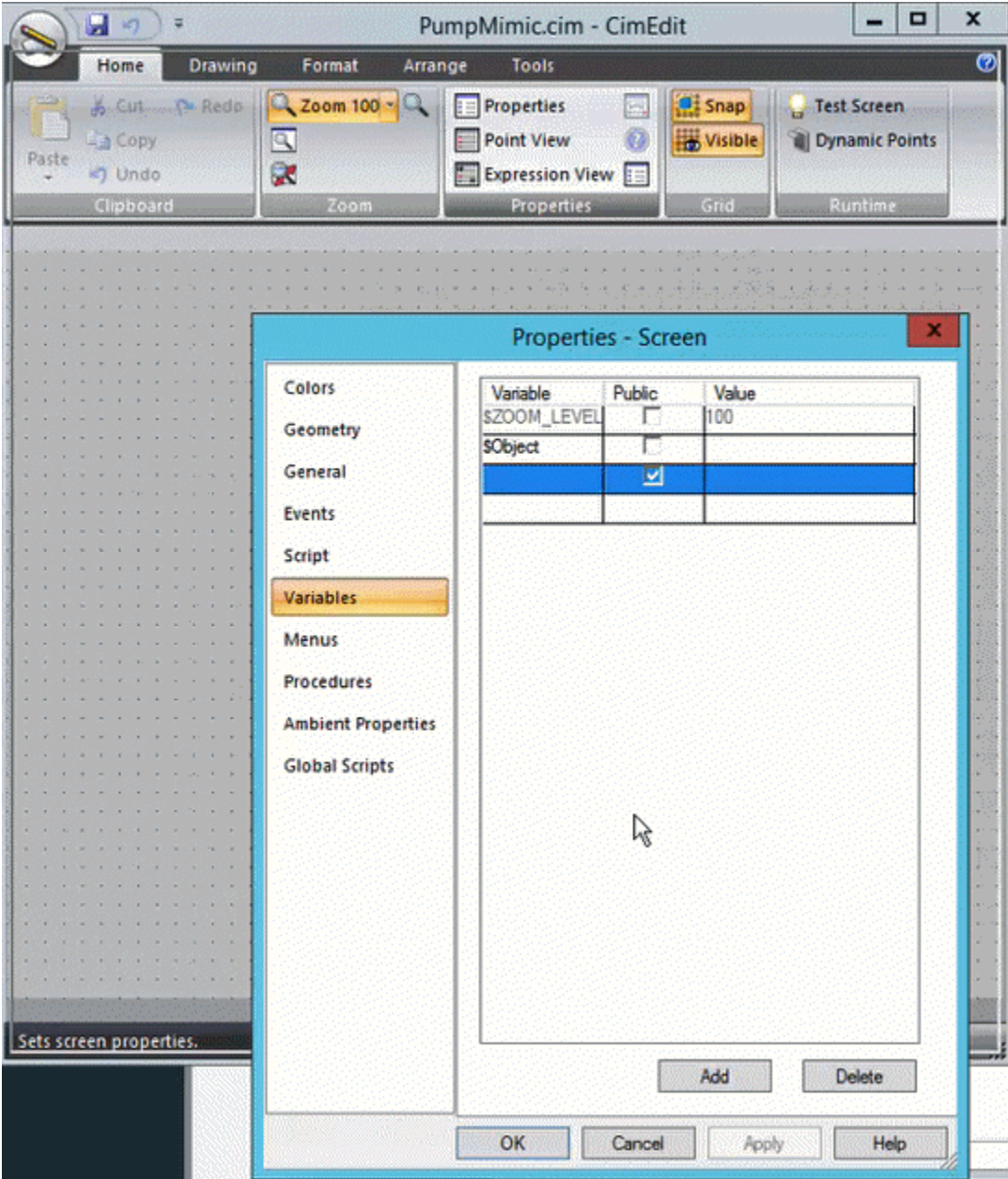
1. Start the CIMPLICITY Workbench application.
2. From the Workbench toolbar, go to **File > New > Project** and [create a new project](#).
3. After creating the project, go to **Project > Properties**.  
The **Project Properties** screen appears.
4. On the **OPC UA Server** tab, perform these steps.

- a. Select the check box for **Enable Server**.
  - b. Select **Security Configuration**, then select the check box for all the security options you want to enable for the OPC UA server.
5. On the **Operations Hub** tab, perform these steps.

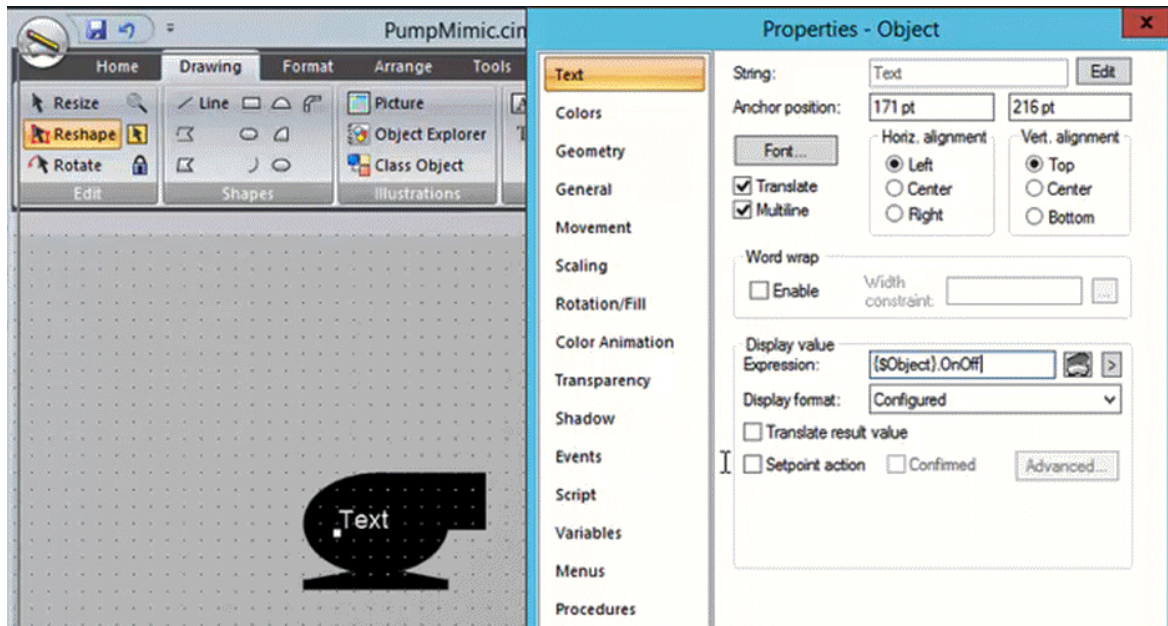
- a. Provide the following details:

Field	Description
Server name	Enter the name of the Operations Hub server to connect.
Port	Enter the port number for Operations Hub UAA. For example, 443.
User name	Enter the account username that has permission to access the Operations Hub application.

- b. Select the check box for **Require trusted connection**.
  - c. Select **View Certificate** and if `Untrusted`, select **Trust**.  
The certificate gets added to the CIMPLICITY project's `\data\WebHMIpki\server_certs` folder. The certificate status now appears as `Trusted`.
  - d. Copy the certificate files from the CIMPLICITY project's `\data\WebHMIpki\server_certs` folder, and paste them to the project's `\data\WebHMIpki\trusted_issuers` folder.
6. In the CIMPLICITY project, create a `TPump` class with an alarm enabled.
7. Create a `Pump01` object that corresponds to the class.
8. Create a visual representation (PumpMimic) of the `TPump` on the CimEdit screen.
9. On **Properties**, enter `$Object` in the **Variable** column. CIMPLICITY uses this value to reference the context in the Operations Hub model, which is the `TPump` in this example.



10. On **Text**, type `($Object).OnOff` in the **Display value Expression** field. This value represents the `OnOff` value on the `TPump` object type in the Operations Hub model.



11. To export or publish the mimic, right-click on the CIMPLICITY screen and select **Publish to Operations Hub**.
12. In Operations Hub, do the following:
  - a. [Create a data source with OPC UA configuration \(on page 429\)](#) in Operations Hub.
  - b. [Import the mimic \(on page 417\)](#).
  - c. [Associate the mimic to the `TPump` object type \(on page 417\)](#).
  - d. [Create an application \(on page 265\)](#).
  - e. [Create application pages \(on page 450\)](#) for [Alarm card \(on page 685\)](#) and [Mimic Card \(on page 697\)](#).
  - f. Run the application and check to see if mimics are working.

### Related reference

[Referencing Data in CimEdit Screen Animations \(on page 710\)](#)

## Referencing Data in CimEdit Screen Animations

You can use the following two methods to reference data in CimEdit screens that will work in Operations Hub mimics.



### Important:

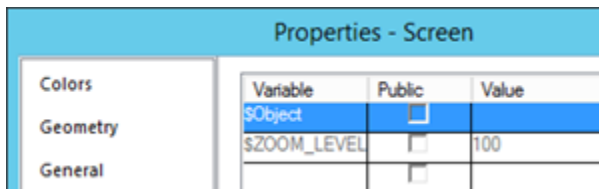
The CIMPLICITY OPC UA Server does not support enterprise points; therefore, they are not supported in exports for Operations Hub. If you use enterprise points in your CIMPLICITY screens, they will not be available in the imported Operations Hub mimic.

Method	Description
Method 1	Continue to directly reference your CIMPLICITY point database in your animations – This method retrieves data directly from CIMPLICITY and shows the values of the points in the database. This is often useful when referencing data that is global to or outside of the model context you build in Operations Hub. For example, OverallPartCount.
Method 2	Reference model context-based data that resolves in accordance with the model context you are in when you display the mimic in Operations Hub. This is the most powerful way to use Operations Hub mimics because it allows you to create screens as templates using CIMPLICITY's existing local variable mechanisms that resolve at Operations Hub runtime. For example, if you have created a Operations Hub object type to represent a pump and created 2 pumps objects from that type, you can build one screen in Operations Hub to represent the pump object type, and then have the data resolve and appear in that screen/mimic based on the Pump instance that is selected.

You can reference both direct CIMPLICITY database points and context references in the same screen.

Use the \$OBJECT local variable to reference context-based data. You must define this variable at the screen level and leave the value blank when you export the screen as a mimic for Operations Hub.

You can use this local variable to represent the model context with which this screen is displayed. For example, a pump screen is shown when in the Pump01 or Pump02 context.



**Note:**

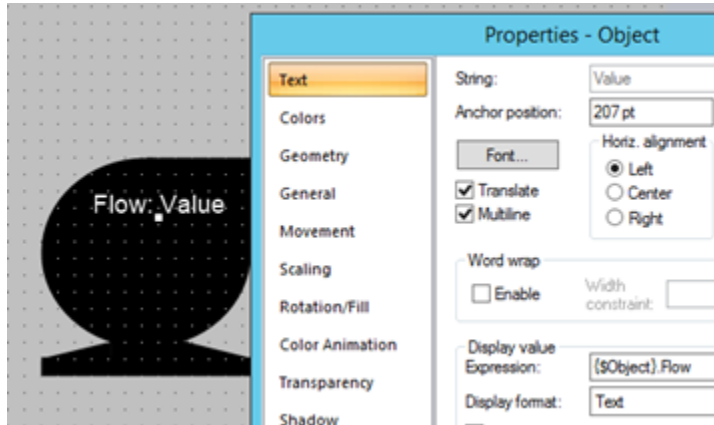
You should build the model in Operations Hub before you build Operations Hub mimics in CimEdit. If you reference model object variables using the same names, Operations Hub can automatically map your model context references in your animations to the model when you import the mimic into Operations Hub.



### Example 1: Referencing Contained/Child Model Object Variables

When in the Inlet pump context, the animation shown below displays the value of Inlet Pump's flow. If on the Outflow Pump context, this same screen will show Outflow Pump's flow.

`$(Object).Flow`



### Example 2: Referencing Contained/Child Model Object Variables

You can also reference contained object properties in your Operations Hub mimics that will be exported from CimEdit. For example, if I want to build an overview screen to show two pumps in my pump station, then I can build a CimEdit screen where the `$(Object)` represents PumpStation01 and I reference my animations to show the individual pump values as follows:

`$(Object).InletPump.Flow`

`$(Object).OutflowPump.Flow`

### Example 3: Referencing CIMPLICITY Point Attributes in Operations Hub Example

You can continue to reference CIMPLICITY attributes like engineering units, description, alarm limits, and so forth, in Operations Hub screens on direct point references and model context references as follows:

`$(Object).Flow.Description` or

`$(Object).InletPump.Flow.EU_LABEL`

### Using Linked Objects to Generate Operations Hub Screens

In order to build Operations Hub screens using linked objects, any Linked Object local variables that are used to reference Operations Hub Object variables must eventually resolve back to the screen `$(Object)` variable in which they are placed. When you create the source of a linked object, you create a



public “\$Object” local variable in your source group object. Use this \$Object local variable to reference Operations Hub model variables.

For example:

{Object}.Flow

When you create a linked object from this source group object, you set the value of the inherited \$Object local variable to point to the screen \$Object defined in the screen in which you created the linked object using local variable syntax like {..\\$Object} or {..\\$Object}.InletTank”

Variable	Public	Inherited	Value
\$Object	<input type="checkbox"/>	Yes	{..\\$Object}
	<input checked="" type="checkbox"/>	No	

## Update Values on Mimic Cards

When configured, you can modify values in the HMI/SCADA data source directly on mimic cards.

You must have permissions in the HMI/SCADA data source to perform this task.

1. Hover over the value you want to update on the mimic card.  
If the background of the value changes to blue, you can update the value.
2. Enter the new value in its entirety and press **Enter** or select the value from a drop-down list.  
If you specify an invalid value in any entry box on the mimic card, the box becomes outlined in red.
3. **Optional:** For mobile devices:

- a. Select the entry field whose value you want to update. If its background changes to blue, you can edit this value, as shown below:



- b. Select the entry field again and specify the new value or select it from a drop-down list.
  - c. **Optional:** Click outside the field if you do not want to update the current value.
  - d. If an update confirmation window appears, answer accordingly.
4. If an update confirmation window appears, answer accordingly.
 

An error can occur when you are not connected to the data source, you do not have permissions to write to your data source, or you entered a numeric value not within the acceptable minimum and maximum range for that value.

## Display

### Display Overview

The following list of widgets are available under the display category:

- [DataGrid \(on page 715\)](#)
- [Gauge Bar \(on page 723\)](#)
- [Gauge Circular \(on page 725\)](#)

- [Gauge Linear \(on page 727\)](#)
- [Pivot Grid \(on page 729\)](#)
- [Solid Gauge \(on page 734\)](#)
- [Value Display \(on page 738\)](#)
- [Image \(on page 743\)](#)
- [Simple Indicator \(on page 745\)](#)
- [Indicator \(on page 746\)](#)
- [List \(on page 750\)](#)
- [Text Display \(on page 751\)](#)


## DataGrid

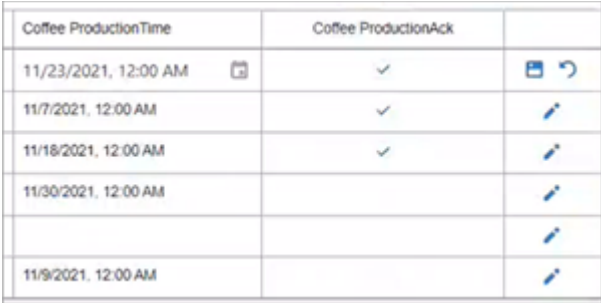
Use this widget to access advanced features of a table.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>





## Datagrid Properties

Field Name	Description
BEHAVIOR > Selected Items Changed BEHAVIOR > Edited Rows Updated	Use this property to define the action to be taken when a value is modified in the datagrid. For this behavior to work, you must also configure the <b>Add Table Column</b> for the modified value.
Source - Input	Use any of these options to provide values from a data source. <ul style="list-style-type: none"> <li>• Select the <b>Query</b> tab. Choose a query and select output fields to view data on the grid. The data grid table displays the output field names as column headers. If <b>Alias</b> is provided for any output field, then the alias name overrides the column header name.</li> <li>• Select the <b>Global</b> tab. Choose an output field value that is available as a global parameter.</li> <li>• Select the <b>Formula</b> tab. Add a formula that returns columns as output.</li> </ul>

Field Name	Description
	 <b>Note:</b> Currently we do not support manually passing values to the widget.
Use Raw Format	Select the check box to display numbers in raw format.  For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.
Number of decimals	This option appears if you do not want to display numbers in raw format.  In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.  The decimals will apply to all the datagrid columns that contain numeric values.
Height (px) - 0 equals dynamic	Set the height in pixels. If set to 0, the datagrid table occupies 100% of its container.
Border, Row and Column Lines Width (px)	Set the line width for the datagrid table border, rows, and columns.
Border Color	Select a color for the datagrid table border.
Show Borders	Select the check box to apply a border to the datagrid table. To remove the border, clear the check box.
Show Column Lines	Select the check box to display column gridlines. To remove gridlines, clear the check box.
Show Row Lines	Select the check box to display row gridlines. To remove gridlines, clear the check box.
Enable Search	Select the check box to add a search field above the datagrid widget to search the entire table.
Allow Grouping	Select the check box to allow grouping of columns at runtime.

Field Name	Description
	<ul style="list-style-type: none"> <li>• The message <code>Drag a column header here to group by that column</code> is displayed at the top of the table.</li> <li>• Select the column you want to group by, drag and drop on the message.</li> <li>• You can also group data by multiple columns. Drag and drop columns on the message one after the other to group data accordingly.</li> </ul> <p>To undo grouping, drag the columns back to their previous position.</p>
Allow Filtering	<p>Select the check box to allow filtering of data in every column.</p> <p>At runtime, to filter values:</p> <ol style="list-style-type: none"> <li>1. Select the filter icon from the respective column header.</li> <li>2. Select the check box for the data you want to filter out.</li> <li>3. Select <b>OK</b>.</li> </ol>
Allow Edit	<p>Select the check box if you want to modify grid data. An edit option appears at runtime next to each row.</p>  <p>The modified data value must be sent to a target data source. To use the edit option successfully, configure the <b>Add Table Column</b> and <b>Output Target</b> properties.</p> <p>Changes are written to the target, and not to the input data source. Hence, you may lose edits on refreshing the page.</p>
Allow Export	Select the check box to allow exporting data at runtime.
Allow Show/Hide Columns	If you select this check box, a column chooser icon appears on top of the datagrid at runtime.


Field Name	Description
	A column chooser dialog appears, wherein you can drag-and-drop the data-grid columns you want to remove from the table. Similarly, you can also add the removed columns back to the table.
Allow Column Filtering	<p>If you select this check box, a filter icon appears in every column to filter out datagrid rows.</p> <p>At runtime, to filter values:</p> <ol style="list-style-type: none"> <li>1. Select the filter icon from the respective column header.</li> <li>2. Select the check box for the data you want to filter out.</li> <li>3. Select <b>OK</b>.</li> </ol>
Pages or scroll	<p>If the number of rows exceed page size, then specify whether you want to browse through pages, or scroll through data.</p> <ul style="list-style-type: none"> <li>• Select <b>Pages</b> to divide and display grid data in separate pages. Enter the number of rows to display per page in <b>Page Size</b>.</li> <li>• Select <b>Scroll</b> to add a scroll bar to the datagrid.</li> </ul>
Rows	<p>Use these properties to configure datagrid table rows:</p> <ul style="list-style-type: none"> <li>• <b>Header Alignment:</b> Align the data in the header either left, right, or center. Default alignment is based on the data type, whether numeric or string.</li> <li>• <b>Header Font Family:</b> Select a font family for the header text.</li> <li>• <b>Header Font Size:</b> Set a font size in pixels for the header text.</li> <li>• <b>Header Font Weight:</b> Choose whether the header text should appear as Normal, <b>Bold</b>, or <i>Italic</i>.</li> <li>• <b>Header Font Color:</b> Select a font color for the header text.</li> <li>• <b>Header Background Color:</b> Select a background color for the table headers.</li> <li>• <b>Body Font Family:</b> Select a font family for the body text.</li> <li>• <b>Body Font Size:</b> Set a font size in pixels for the body text.</li> <li>• <b>Body Font Weight:</b> Choose whether the body text should appear as Normal, <b>Bold</b>, or <i>Italic</i>.</li> <li>• <b>Body Font Color:</b> Select a font color for the body text.</li> <li>• <b>Body Background Color:</b> Select a background color for the table cell body.</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Icon or Image size (px):</b> Set the icon/image size in pixels. The default value is 40px.</li> <li>• <b>Selection Mode:</b> <code>Single</code> allows to select a single row in the grid. <code>Multiple</code> allows to select multiple rows using a check box. <code>None</code> disables row selection.</li> </ul>
Add Animation	<p>Use this property to highlight a row when a condition is met. Boolean values are represented with <code>1</code> or <code>0</code>.</p> <p>This property is similar to <a href="#">Add Cell Animation (on page 721)</a>.</p>
Add Table Column	<p>Use this property to customize the <a href="#">datagrid columns (on page 715)</a>. Select <b>+Add Column</b> to show configuring options.</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b> Add only the columns you want to customize. It is not required to add all the columns.</p> </div> <ul style="list-style-type: none"> <li>• <a href="#">Configure column (on page 719)</a></li> <li>• <a href="#">Configure output target (on page 720)</a></li> <li>• <a href="#">Add image/icon (on page 721)</a></li> <li>• <a href="#">Add cell animation (on page 721)</a></li> </ul> <p>To organize table columns:</p> <ul style="list-style-type: none"> <li>• Use  and  to rearrange order of columns in the datagrid.</li> <li>• To delete a column, select  next to it.</li> </ul>
Column	<p>Use these properties to configure a column:</p> <ul style="list-style-type: none"> <li>• <b>Data Field:</b> Provide the column header name. This value must match the output field name (returned by query).</li> </ul> <p>If an <b>Alias</b> is configured for the output field for the specific column, then the value must match the alias name.</p>

Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Data Type:</b> Specify the type of data in the column. For example, select <code>Picture</code> if the column contains image URLs and images will be retrieved from the data source.</li> <li>• <b>Min Width (px):</b> Set a default minimum width for each column. The column will not decrease beyond this minimum width if the volume of data is less.</li> <li>• <b>Alignment:</b> Align the data in the column either left, right, or center. Default alignment is based on the data type, whether numeric or string.</li> <li>• <b>Visible:</b> Select/Clear the check box if you want to show/hide the column in the datagrid.</li> <li>• <b>Hide Row if Empty:</b> Select the check box to hide any row in the datagrid that contains only empty or null values in its cells. This helps to create more compact and visually appealing data display, particularly when you want to focus on rows with useful information.</li> <li>• <b>Show Header Name:</b> Select/Clear the check box to show/hide the header text in the datagrid column header.</li> <li>• <b>Allow Filtering:</b> Select/Clear the check box to enable/disable filtering on column.</li> <li>• <b>Allow Sorting:</b> Select/Clear the check box to enable/disable sorting by this column.</li> <li>• <b>Allow Edit:</b> Select/Clear the check box to enable/disable editing the column data.</li> <li>• <b>Enable Summary:</b> Select/Clear the check box to enable/disable showing the summary totals for the column.</li> <li>• <b>Summary Type:</b> If you enabled summary, you must select a summary type. The summary type depends on the type of data in the column. <ul style="list-style-type: none"> <li>◦ <code>sum</code>: Calculates a total for all values in the column.</li> <li>◦ <code>Minimum</code>: The smallest value in the column.</li> <li>◦ <code>Maximum</code>: The largest value in the column.</li> <li>◦ <code>Average</code>: Calculates an average of all values in the column.</li> <li>◦ <code>count</code>: Counts the total number of values present in the column.</li> </ul> </li> </ul>
Output Target	Select <b>+ Add Output Target</b> to specify the target data source for column data. At runtime, when column data is selected/modified, the target specified in this property is triggered.



Field Name	Description
	<ul style="list-style-type: none"> <li>• Choose a query input value as target. (OR) Add or choose a global value as target.</li> <li>• Select <code>Unix timestamp</code> format to represent all time zones at once.</li> </ul>
Add Image	<p>Use this property to deliver an image when a condition is met. Boolean values are represented with <code>1</code> or <code>0</code>.</p> <p>Select <b>+Add Image</b> to add a condition. You can add as many conditions as required.</p> <ul style="list-style-type: none"> <li>• <b>Condition:</b> Create a condition for the column data. For example, if column value is <code>&gt;</code> than <code>150</code>, then update an image.</li> <li>• <b>Image or Font Awesome Icon:</b> Select whether you want to load an image, or icons from the Font Awesome Free library.</li> <li>• <b>URL or Icon name:</b> For image, enter its URL address. Also ensure that the <a href="#">column (on page 719) Data Type</a> is <code>Picture</code>. For font awesome icon, enter the icon name.</li> <li>• <b>Icon Color:</b> Select a color for the icon.</li> </ul>
Add Cell Animation	<p>Use this property to highlight a cell when a condition is met. Select <b>+Add Cell Animation</b> to add as many conditions as required. Boolean values are represented with <code>1</code> or <code>0</code>.</p> <ul style="list-style-type: none"> <li>• <b>Column:</b> Select a column and create a condition for it. For example, if the value in <code>Column 1</code> is <code>=</code> to <code>Alarm 1</code>, then trigger these changes.</li> <li>• <b>Font Color:</b> Change cell text color to the selected font color.</li> <li>• <b>Background Color:</b> Change cell color to the selected background color.</li> </ul>
Group By	<p>Set the default grouping of data by column.</p> <ul style="list-style-type: none"> <li>• <b>Columns:</b> Select a column for default grouping.</li> <li>• <b>Expanded:</b> Select/Clear the check box to expand/collapse data by default.</li> </ul>
Sort By	<p>Set the default sorting for data grid columns. For example, you can add multiple items to configure default sorting first by column X, then by column Y, etc in an ascending/descending order. The sequence of sorting order appears at runtime indicated by a number.</p>


Field Name	Description														
	<table border="1"> <thead> <tr> <th>Coffee ProductionYear ↓ 1</th> <th>Coffee ProductionLbsOutput ↑ 2</th> </tr> </thead> <tbody> <tr> <td>2022</td> <td>10</td> </tr> <tr> <td>2021</td> <td>40</td> </tr> <tr> <td>2020</td> <td>30</td> </tr> <tr> <td>2019</td> <td>10</td> </tr> <tr> <td>2019</td> <td>11</td> </tr> <tr> <td>2019</td> <td>25</td> </tr> </tbody> </table> <p>At runtime:</p> <ul style="list-style-type: none"> <li>• Hold the <b>Shift</b> key and select column headers to sort in a sequential order.</li> <li>• Hold the <b>Ctrl</b> key and select column headers to clear any column in a sequence.</li> </ul>	Coffee ProductionYear ↓ 1	Coffee ProductionLbsOutput ↑ 2	2022	10	2021	40	2020	30	2019	10	2019	11	2019	25
Coffee ProductionYear ↓ 1	Coffee ProductionLbsOutput ↑ 2														
2022	10														
2021	40														
2020	30														
2019	10														
2019	11														
2019	25														
Selected Rows Output	<p>Specify the target data source for a selected row data. A separated string or array can be written to a global variable.</p> <ol style="list-style-type: none"> <li>1. Choose a query input value as target. (OR) Add or choose a global value as target.</li> <li>2. Select the column to which you want to write data, and in which format.</li> <li>3. Specify an output separator if format is separated string.</li> </ol>														
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a>.</p>														

## DataGrid at Runtime

Drag a column header here to group by that column

timestamp	name	value	quality
2021-09-26T08:40:14.08	PP-HIST2.Simulation00002	32727.3125	0
2021-09-26T08:40:14.08	PP-HIST2.Simulation00001	-390461.8125	0
2021-09-26T10:26:47.7	PP-HIST2.Simulation00002	23890.5	0
2021-09-26T10:26:47.7	PP-HIST2.Simulation00001	62774.28125	0
2021-09-26T10:26:47.7	WebHMTaco.Simulation00001	62	0
2021-09-26T12:13:21.32	PP-HIST2.Simulation00002	157022.625	0
2021-09-26T12:13:21.32	PP-HIST2.Simulation00001	-261736	0
2021-09-26T12:13:21.32	WebHMTaco.Simulation00001	146	0
2021-09-26T13:59:54.94	PP-HIST2.Simulation00002	195446.875	0
2021-09-26T13:59:54.94	PP-HIST2.Simulation00001	-247517.375	0


1 2 3 4 5 ... 50


You have the option to export and download the datagrid table data. Select  icon that appears at runtime at the top of the table to export the data to an Excel file.

## Gauge Bar

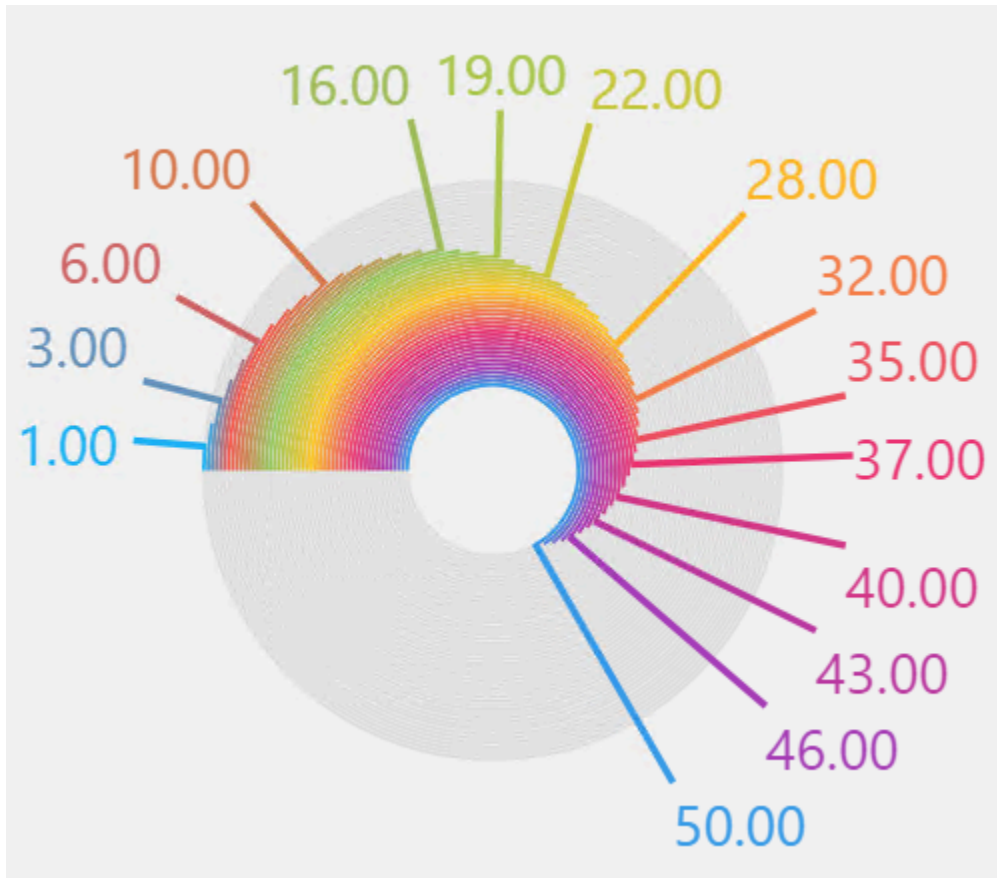
Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Gauge Bar Properties

Field Name	Description
Source > Input Value	<p>To get values for gauge bar from a data source, use any of these options:</p> <ul style="list-style-type: none"> <li>• Select a query output.</li> <li>• Select a global parameter.</li> <li>• Enter source data manually.</li> <li>• Add a formula.</li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> If configuring data source manually, ensure that the first output field is always a 'value' and the second is a 'string'.</p> </div>

Field Name	Description
Source > Minimum Value	Sets the minimum scale value.
Source > Maximum Value	Sets the maximum scale value.
Use Raw Format	<p>Select the check box to display numbers in raw format.</p> <p>For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.</p>
Number of decimals	<p>This option appears if you do not want to display numbers in raw format.</p> <p>In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.</p>
Advanced Settings	<ul style="list-style-type: none"> <li>• Select the <b>Show Label</b> check box to display a label name, if provided.</li> <li>• Select the <b>Show Animation</b> check box to display animation.</li> <li>• Select the <b>Show Legend</b> check box to display a legend.</li> </ul>
Angles	<ul style="list-style-type: none"> <li>• <b>Start Angle:</b> Defines the point on the circumference of the gauge at which the bar will begin to appear in displaying the input value.</li> <li>• <b>End Angle:</b> Defines the point on the circumference of the gauge at which the bar will complete its appearance in displaying the input value.</li> </ul>
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a>.</p>

### Bar Gauge at Runtime



**Note:**


If you choose to show legend on a graph with large amounts of data values, the graph may become unreadable.

### Gauge Circular

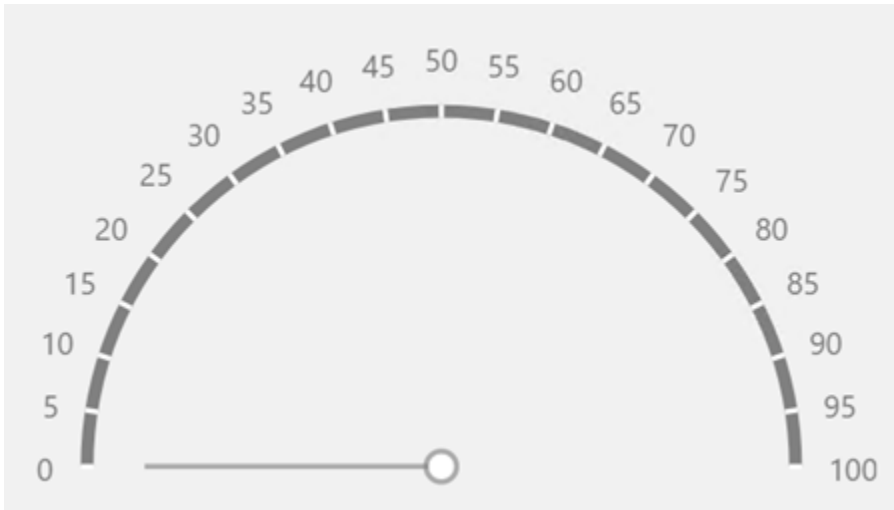
Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Gauge Circular Properties

Field Name	Description
Source > Input Value	<p>To get values for gauge circular from a data source, use any of these options:</p> <ul style="list-style-type: none"> <li>• Select a query output.</li> <li>• Select a global parameter.</li> <li>• Enter source data manually.</li> <li>• Add a formula.</li> </ul>
Source > Minimum Value	Sets the minimum scale value.
Source > Maximum Value	Sets the maximum scale value.
Use Raw Format	<p>Select the check box to display numbers in raw format.</p> <p>For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.</p>
Number of decimals	<p>This option appears if you do not want to display numbers in raw format.</p> <p>In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.</p>
Advanced Settings	<ul style="list-style-type: none"> <li>• Select the <b>Show Label</b> check box to display a label name, if provided.</li> <li>• Select the <b>Show Animation</b> check box to display animation.</li> <li>• Select a <b>Needle Color</b>.</li> <li>• Choose a <b>Needle Style</b> from available options - rectangle needle, triangle needle, range bar, marker, text.</li> </ul>
Range(s)	<p>You can specify one or more ranges to display in different colors.</p> <ol style="list-style-type: none"> <li>1. Select <b>+Add Item</b>.</li> <li>2. <b>Start of Range</b></li> <li>3. <b>End of Range</b></li> <li>4. <b>Select a color (on page 831) Color in Range.</b></li> </ol>
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b></p>

Field Name	Description
	column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

### Circular Gauge at Runtime




### Gauge Linear

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

### Gauge Linear Properties

Field Name	Description
Source > Input Value	To get values for gauge linear from a data source, use any of these options: <ul style="list-style-type: none"> <li>• Select a query output.</li> <li>• Select a global parameter.</li> <li>• Enter source data manually.</li> <li>• Add a formula.</li> </ul>
Source > Minimum Value	Sets the minimum scale value.

Field Name	Description
Source > Maximum Value	Sets the maximum scale value.
Use Raw Format	Select the check box to display numbers in raw format.  For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.
Number of decimals	This option appears if you do not want to display numbers in raw format.  In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.
Advanced Settings	<ul style="list-style-type: none"> <li>• Choose an orientation for the linear gauge: <ul style="list-style-type: none"> <li>◦ <b>Horizontal</b>: Data values appear on a horizontal scale.</li> <li>◦ <b>Vertical</b>: Data values appear on a vertical scale.</li> </ul> </li> <li>• Select the <b>Show Range Bar</b> check box to dynamically show the highest and lowest value on the linear gauge scale.</li> <li>• Select a default color for the range bar.</li> </ul>
Range(s)	You can specify one or more ranges to to display in a different color. <ol style="list-style-type: none"> <li>1. Select <b>+Add Item</b>.</li> <li>2. Specify a value range by entering values for <b>Start of Range</b> and <b>End of Range</b>.</li> <li>3. <a href="#">Select a unique color (on page 831)</a> for the specific range.</li> </ol>
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

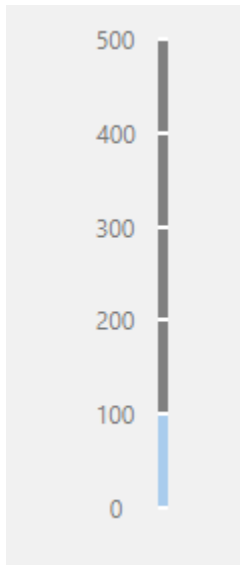
## Linear Gauge at Runtime

Example of a horizontal orientation:





Example of a vertical orientation:



## Pivot Grid

Pivot grid allows to visualize data in a multi-dimensional format.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

Use the pivot grid to arrange your data in a two-dimensional table, and compare tag names and their columns against timestamps. With the pivot grid, you can:

- Rename rows/columns to replace lengthy tag names
- Apply conditional formatting to rows/columns based on values
- Calculate values quickly using totals
- Sort, filter, and summarize data
- Export pivot data to Excel

### Pivot Grid Properties


Field Name	Description
Source - Input	To enable the pivot grid, provide values from a data source.

Field Name	Description
	<ol style="list-style-type: none"> <li>1. Select a query.</li> <li>2. Select the query output fields you want to use to get data for the pivot grid.</li> </ol>
Use Raw Format	<p>Select the check box to display numbers in raw format.</p> <p>For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.</p>
Number of decimals	<p>This option allows you to format numeric values in the Pivot Grid. If you do not want to display numbers in raw format, you can specify the number of decimal places (0-7) to consider after the decimal point. The value will be rounded off to the nearest whole number based on the specified decimals.</p> <p>This format will apply to all Pivot Grid columns that contain numeric values, including those with a 'String' data type.</p>
Height (px) - 0 equals dynamic	Set a height for the pivot grid in pixels. If set to 0, the widget occupies 100% of its container.
Row Header Width (px) - 0 equals dynamic	Set a width for the header row in pixels.
Show Borders	Select the check box to apply a border to the pivot grid table. To remove the border, clear the check box.
Allow Sorting	Select the check box to sort the rows and columns alphabetically by default.
Allow Sorting by Summary	<p>Select the check box to provide an option to sort the rows by column.</p> <p>At runtime, right-click the column you want to sort by and select the sorting option.</p>
Allow Filtering Row/Column Values	Select the check box to provide an option to filter data at runtime.
Allow Expand/Collapse All	<p>Select the check box to enable expand/collapse data levels at runtime.</p> <p>Your pivot grid should have multiple data levels to use this property. For value-based table cell data, you can expand and collapse data details to aggregate values.</p>

Field Name	Description
Allow Export	Select the check box to allow exporting data at runtime.
Show Row Totals	Select the check box to show totals for each row.
Show Row Grand Totals	Select the check box to show the grand totals for each row.
Show Column Totals	Select the check box to show totals for each column.
Show Column Grand Totals	Select the check box to show the grand totals for each column.
Field Configuration	<p>Configure pivot grid rows, columns, and data. Map all the three areas (rows, columns, data).</p> <ol style="list-style-type: none"> <li>1. Enter the tag names under <b>Data Field</b>.</li> <li>2. Select the <b>Data Type</b> for the entered tag names. For example, <code>string</code>.</li> <li>3. Enter a <b>Caption</b>.</li> </ol> <p>Use this option to add user-friendly captions to your row/column/data fields. Avoid lengthy captions with special characters.</p> <ol style="list-style-type: none"> <li>4. Select the <b>Area</b> for the tags to appear. For example, if you select column, then the respective tags appear in the column at runtime.</li> <li>5. When area is data, define additional properties for data values.</li> </ol>


**Formatting:** [Set default colors \(on page 831\)](#) for the pivot grid.

Field Name	Description
Cell Color	Select a color for the pivot grid table cells.
Cell Font Color	Select a font color for the pivot grid table cell text.
Column Header Font Color	Select a font color for the pivot grid table column header text. This helps to differentiate the header text from the cell text.
Totals Background Color	Select a unique cell color for the row/column totals.
Totals Font Color	Select a font color for the row/column totals text.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b>


Field Name	Description
	column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .



**Item Configuration:** Allows to customize the pivot grid table to override the default settings. Select **+Add Item** for configuring options.

Field Name	Description
Item Display	<ul style="list-style-type: none"> <li>• <b>Row/Column Value:</b> Enter the value that is displayed in a row or column.  For example, if you're viewing OPCUA tags and their values, you can enter a tag name such as <code>FIX.FWT_FWP_DPUMP_1A_FLOW.F_CV</code>.</li> <li>• <b>Display Value (optional):</b> Use this option to display more user-friendly values instead of tag names. This display value overrides the <b>Row/Column Value</b>.  For example, enter <code>Pump1A Flow</code> to replace the OPC UA tag name <code>FIX.FWT_FWP_DPUMP_1A_FLOW.F_CV</code> entered under <b>Row/Column Value</b>. At runtime, the column displays values for <code>Pump1A Flow</code> in the pivot chart.</li> </ul>
Conditional Formatting	<p>Apply conditions to format cells based on values. You can create more than one condition for a <b>Row/Column Value</b>. The conditions are applied according to their order of display. If more than one rule matches a particular cell, the first condition in the list to match takes effect and rule processing for that cell will stop.</p> <p>Select <b>+Add Item</b> for options to create conditions. For example, format a cell if its value is less than 9000:</p> <ul style="list-style-type: none"> <li>• <b>Comparison:</b> Select <code>&lt;</code> from the list of comparison operators.</li> <li>• <b>Value:</b> Enter <code>9000</code>.</li> <li>• <b>Cell Color:</b> Select a color for the cells with values less than 9000.</li> <li>• <b>Cell Font Color:</b> Select a color for the cell text with values less than 9000.</li> </ul>

Field Name	Description
	<p> <b>Tip:</b> If you want to format a row/column with a color that does not change based on value, apply the <code>Always</code> comparison operator.</p>

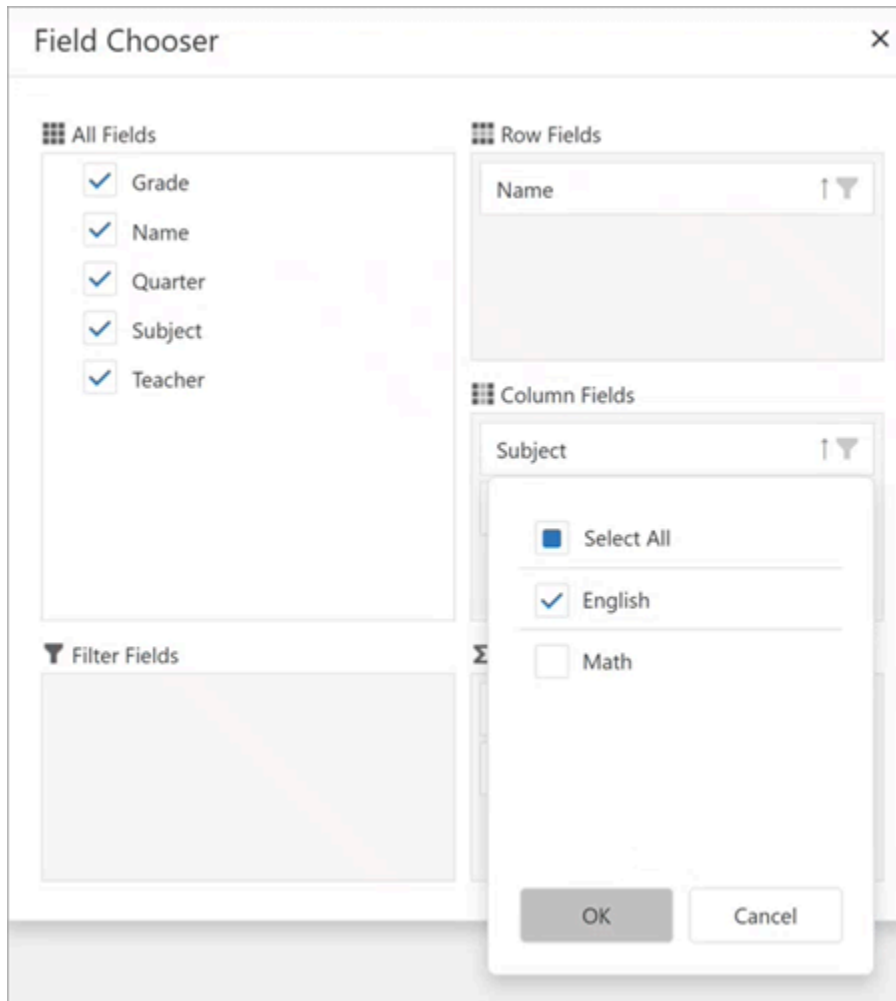
### Pivot Grid at Runtime

Select  to export the data to an Excel file.

 	FIX.FWT_FWP_DPUMP_1A_FLOW.F_CV	FIX.FWT_FWP_DPUMP_1A_PRESSURE.F_CV	FIX.FWT_FWP_DPUMP_1B_FLOW.F_CV	FIX.FWT_FWP_STO
2021-09-24T06:11:30.398	34	68.79197692871094	23	
2021-09-24T08:58:32.794	34	68.8282470703125	23	
2021-09-24T10:22:03.992	34	68.84638214111328	23	
2021-09-24T11:45:35.19	34	68.86450958251953	23	
2021-09-24T13:09:06.388	34	68.88264465332031	23	
2021-09-24T14:32:37.586	34	68.9007797241211	23	
2021-09-24T15:56:08.784	34	68.91891479492188	23	
2021-09-24T17:19:39.982	34	68.93704986572266	23	
2021-09-24T18:43:11.18	34	68.9551773071289	23	
2021-09-24T20:06:42.378	34	68.97331237792969	23	
2021-09-24T21:30:13.576	34	68.99144744873047	23	

Select  to show the **Field Chooser** option.

- You can switch the position of row and column fields. To switch a field position, drag and drop the field in the desired row/column.
- You can apply multiple filters to the data to get focused results.
- You can sort fields by ascending/descending order.

**Note:**

In **Field Chooser**, row/column/data fields may get misplaced if you remove and add fields to the pivot chart. This is a DevExtreme control behavior. For example (refer screenshot):

1. Under **All Fields**, clear the check box for `Name`. The field is removed from **Row Fields**.
2. Under **All Fields**, select the check box again for `Name`.

The `Name` field may not show up under **Row Fields**. It may show up under column or data fields. In such cases, drag and drop the field to the appropriate location.

## Solid Gauge

Use the widget to insert circular charts and monitor the status of industrial systems.




Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

You can use both thin and thick gauges of these types:




- Half
- Three-fourths
- Full


### Solid Gauge Properties

Field Name	Description
Title	Enter a title to help identify the solid gauge at runtime.
Value	To get values for the widget from a data source, use any of these options: <ul style="list-style-type: none"> <li>• Select a query output.</li> <li>• Select a global parameter.</li> <li>• Enter source data manually.</li> <li>• Add a formula.</li> </ul>
Min	Enter the minimum value for the solid gauge scale.
Max	Enter the maximum value for the solid gauge scale.
Use Raw Format	Select the check box to display numbers in raw format.  For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.
Number of decimals	This option appears if you do not want to display numbers in raw format.  In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.  The decimals will apply to <b>Value</b> , <b>Min</b> , and <b>Max</b> properties.
Engineering Unit	Enter the unit of measurement for the values on the gauge.

Field Name	Description
Width (px) (0 equals Dynamic)	Enter a width for the solid gauge. If set to 0, the widget occupies 100% of its container, and fills the area in the application.
Background Color	<a href="#">Select a background color (on page 831)</a> to fill the widget.
Font Color	<a href="#">Select a font color (on page 831)</a> for the widget text.
Font Size (px) (0 equals Dynamic)	Specify a font size in pixels for the solid gauge display text. If set to 0, the font resizes to match with the width of the widget.
Sparkline	<p>The sparkline data is created based on the query applied to the widget. We can see a sparkline only if the query returns multiple records from the data source. The sparkline is not displayed for a single record even if it is enabled.</p> <p>Select the check box to enable the sparkline for the selected <b>Gauge Variant</b> at runtime.</p>
Gauge Variant	List of different types of gauges you can use in your application.
Text position	<p>Select a position to display text for the solid gauge at runtime.</p> <ul style="list-style-type: none"> <li>• <b>Top Left</b> is the default position.</li> <li>• You can choose to position the text at the <b>Center</b> of the gauge.</li> </ul>
Range(s)	<p>You can specify one or more ranges to display in different colors.</p> <ol style="list-style-type: none"> <li>1. Select <b>+Add Item</b>.</li> <li>2. Enter a value for <b>limit</b>. At runtime, the gauge is displayed in the selected color on reaching this value.</li> <li>3. <a href="#">Select a color (on page 831)</a> for the range limit.</li> <li>4. Use  and  to reorder ranges. The ranges are implemented in the specified order.</li> <li>5. Select  to delete a range.</li> </ol>
Alert Limit(s)	<p>You can add one or more alerts on a gauge, each with unique values.</p> <ol style="list-style-type: none"> <li>1. Select <b>+Add Item</b>.</li> <li>2. Enter a value for <b>limit</b>. At runtime, a line alert is displayed on the gauge on reaching this value.</li> <li>3. <a href="#">Select a color (on page 831)</a> to identify the line alert.</li> </ol>

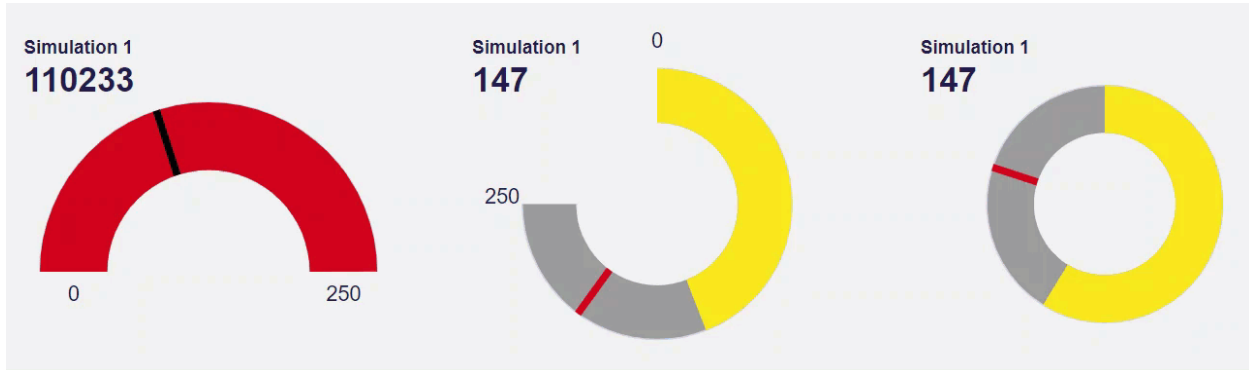


Field Name	Description
	<p>4. Use  and  to reorder alerts. The alerts are implemented in the specified order.</p> <p>5. Select  to delete an alert.</p>
Result Set Index	<p>This property is applicable for REST queries only. It allows to define which index of the result set the widget should use as input data. Default is 0.</p> <p>For example, consider a Historian REST query that returns data for three tags.</p> <ul style="list-style-type: none"> <li>• If you want the widget to use the first tag data from the query result set, then set the index value as <b>0</b>.</li> <li>• To direct the widget to use the second tag data, enter the index value as <b>1</b>.</li> <li>• Similarly, you can set index values as 2, 3, 4, etc. based on the data to provide as input to the widget.</li> </ul>
Reverse Order	<p>This property helps to reverse the query result set.</p> <p>Select the check box to provide the bottom record value as input to the widget.</p> <p>Clear the check box to provide the top record value as input to the widget.</p> <p>When you apply this property to REST queries that return more than one record for each input tag, the records of the selected tag (use <b>Result Set Index</b> to select the tag) are reversed.</p> <p>For example, consider a Historian REST query with two input tags (tag1 and tag2); each with 100 records as result. Set the <b>Result Set Index</b> as <b>0</b> and verify the following:</p> <ul style="list-style-type: none"> <li>• If you selected the <b>Reverse Order</b> check box, then the 100th record (last) value of tag1 is displayed on the gauge.</li> <li>• If you cleared the <b>Reverse Order</b> check box, then the first record value of tag1 is displayed on the gauge.</li> </ul>
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b></p>

Field Name	Description
	column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

### Solid Gauge at Runtime

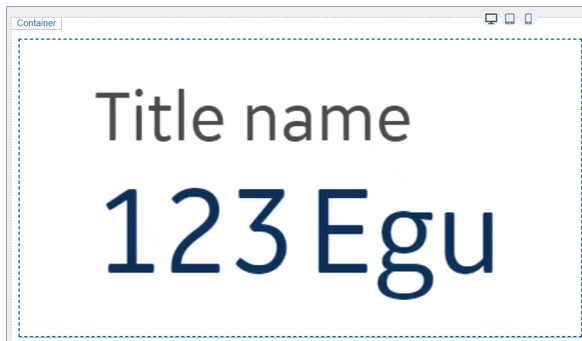
The change in values are indicated with changing colors.



### Value Display

Use this widget to display any type of data value.




Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>




## Value Display Properties

Field Name	Description
Title	Enter a title for the widget, which is displayed at runtime.
Engineering Unit	Enter the engineering unit of measurement for the values, which is displayed at runtime.
Height	Set a height for the value display widget in pixels.
Width	Set a width for the value display widget in pixels.
Padding	Enter a value that defines the space between the content and the widget's borders.
Background Configuration	<ol style="list-style-type: none"> <li><b>Options:</b> <ul style="list-style-type: none"> <li>Select <code>Transparent</code> to apply a transparent background for the widget.</li> <li>Select <code>Color</code> to apply a colored background for the widget.</li> </ul> </li> <li><b>Color:</b> If you opted for a colored background, specify a color for the background.</li> </ol>
Border Configuration	<ul style="list-style-type: none"> <li><b>Width:</b> <code>0</code> implies that the widget has no border. <code>1</code> implies that the widget has a border. With every increasing value, the thickness of the widget's border is determined.</li> <li><b>Radius:</b> <code>0</code> implies that the widget has no round corners. <code>1</code> implies that the widget has a round corner. With every increasing value, the curve at the corners are determined.</li> <li><b>Color:</b> Applies a color to the widget's border.</li> </ul>
Font Size	Enter a font size for the widget's <b>Title</b> and <b>Current value and EGU</b> .
Font Color	Select a font color for the widget's <b>Title</b> and <b>Current value and EGU</b> .
Font Style	Select a font style for <b>Title</b> and <b>Current value and EGU</b> , whether normal, bold, or italic.
Rotate	Allows to rotate the widget based on the selected degree of rotation.
Align	<ul style="list-style-type: none"> <li><b>Text:</b> Allows to align the text left, right, or center within the widget.</li> <li><b>Horizontal:</b> Allows to align the widget left, right, or center within its container.</li> <li><b>Vertical:</b> Allows to align the text either at the top, middle, or bottom of the widget.</li> </ul>

Field Name	Description
State Configuration	<p>You can configure how the widget should appear whenever there is a change in its status. Use any of these options:</p> <ul style="list-style-type: none"> <li>• Select the <b>Query</b> tab to specify a query, which returns output values that indicate the status change. The query should include these output fields - <code>value</code>, <code>operator</code>, <code>textColor</code>, <code>borderColor</code>, <code>background</code>, <code>backgroundColor</code>, and <code>blinking</code>.</li> <li>• Select the <b>Global</b> tab to choose from values that are available as global parameters.</li> <li>• Select the <b>Manual</b> tab, and enter the values for all fields in the text field. However, if you are manually entering values, then it is recommended to use the <b>Manual State</b> property.</li> <li>• Select the <b>Formula</b> tab to add a formula that returns output values to indicate the status change. <ul style="list-style-type: none"> <li>◦ Select <b>Add Formula &gt; Add text</b>.</li> <li>◦ Enter the values for all fields in the text field.</li> <li>◦ Select <b>Done</b> to save and add the formula to the value display widget.</li> </ul> </li> </ul> <p>Example: For <b>Global</b>, <b>Manual</b>, and <b>Formula</b>, you can paste the following sample code in the text field:</p> <pre>[   {     "value": "130000",     "operator": "&gt;=",     "textColor": "red",     "borderColor": "green",     "background": "color",     "backgroundColor": "blue",     "blinking": true   } ]</pre>
Manual State	<p>You can manually configure each field (instead of applying a query) how the widget should appear on reaching a specified value. Select <b>+Add Item</b> and provide these field values that help to indicate the change:</p>

Field Name	Description
	<ul style="list-style-type: none"> <li>• Enter a threshold <b>Value</b>, and select an <b>Operator</b> for comparison. For example, consider the value is 100 and operator is =. It means that when the widget value is equal to 100, the following changes apply to the widget.</li> <li>• Selected <b>Text Color</b> and <b>Border Color</b> are applied.</li> <li>• <b>Background</b>, if not transparent applies the selected <b>Background Color</b>.</li> <li>• If selected, applies <b>Blinking</b> animation on the widget when the value is equal to 100.</li> </ul> <p>You can configure several manual states using <b>+Add Item</b>.</p> <ul style="list-style-type: none"> <li>• Use  and  to reorder manual states.</li> <li>• Select  to delete a configured manual state.</li> </ul>
Value Configuration	<p>You can configure the values on how they should appear at runtime.</p> <p>Select a <b>Format</b> for the value, whether the value should be a number or string.</p> <ul style="list-style-type: none"> <li>•</li> <li>• If value is a number, specify the <b>Number of decimals</b> for the value. If value is a string, decimals do not apply.</li> </ul>
Number Format	<ul style="list-style-type: none"> <li>• <b>Use Raw Format:</b> Select the check box to display numbers in raw format. For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.</li> <li>• <b>Number of decimals:</b> This option appears if you do not want to display numbers in raw format.</li> </ul> <p>In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.</p>
Value	Use any of these options to provide data source values for the widget.

Field Name	Description
	<ul style="list-style-type: none"> <li>• Select the <b>Query</b> tab to choose from queries that return data source values as output.</li> <li>• Select the <b>Global</b> tab to choose values that are available as global parameters.</li> <li>• Select the <b>Manual</b> tab, and enter the value in the text field.</li> <li>• Select the <b>Formula</b> tab to add a formula that returns data source values as output.</li> </ul>
Historian REST Options > Result Set Index	<p>This property is applicable for Historian REST queries only. It allows to define which index of the result set the widget should use as input data. Default is 0.</p> <p>For example, consider a Historian REST query that returns data for three tags.</p> <ul style="list-style-type: none"> <li>• If you want the widget to use the first tag data from the query result set, then set the index value as <b>0</b>.</li> <li>• To direct the widget to use the second tag data, enter the index value as <b>1</b>.</li> <li>• Similarly, you can set index values as 2, 3, 4, etc. based on the data to provide as input to the widget.</li> </ul>
Historian REST Options > Reverse Sorting Order	<p>This property is applicable for Historian REST queries only. It helps to reverse the query result set.</p> <p>Select the check box to provide the bottom record value as input to the widget.</p> <p>Clear the check box to provide the top record value as input to the widget.</p> <p>When you apply this property to REST queries that return more than one record for each input tag, the records of the selected tag (use <b>Result Set Index</b> to select the tag) are reversed.</p> <p>For example, consider a Historian REST query with two input tags (tag1 and tag2); each with 100 records as result. Set the <b>Result Set Index</b> as <b>0</b> and verify the following:</p>

Field Name	Description
	<ul style="list-style-type: none"> <li>If you selected the <b>Reverse Order</b> check box, then the 100th record (last) value of tag1 is displayed on the value display.</li> <li>If you cleared the <b>Reverse Order</b> check box, then the first record value of tag1 is displayed on the value display.</li> </ul>
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .




## Image

Allows to insert images in your application.



Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Image Properties

Field Name	Description
BEHAVIOR > Click Event	<p>You can choose from these available actions:</p> <ul style="list-style-type: none"> <li><b>Submit</b>: This action submits the data to the selected entity.</li> <li><b>Go to page</b>: This action leads to the specified page within the application.</li> <li><b>Go to previous page</b>: Use this action to navigate between historical entries created for the current application session. If there is no previous history, then the plugin remains idle.</li> <li><b>Go to next page</b>: Use this action to navigate between historical entries created for the current application session. In the absence of next session entries, the plugin remains idle.</li> <li><b>URL</b>: This action leads to the specified (external) URL.</li> <li><b>Set global value</b>: This action enables the data to be available globally.</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Show Component</b>: This action displays a hidden component in the end app.</li> <li>• <b>Hide Component</b>: This action hides a component.</li> <li>• <b>Toggle Show/Hide</b>: This action allows to switch between hidden and shown views of a component.</li> </ul>
Source > Input Value	<p>Provide the input data source to receive values for the image.</p> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b> This property applies only when you select <b>Data</b> as the image source.</p> </div>
Image Source	<p>Use these options to set a background image for the widget.</p> <p><b>Type:</b> Select from these image types:</p> <ul style="list-style-type: none"> <li>• <b>Data</b>: When you select this option, specify the input data source.</li> </ul> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b> If you want to use a global variable as the data source, make sure the variable value points to an image URL. For example, <code>https://&lt;machine-name&gt;/custom/images/myimage.png</code></p> </div> <ul style="list-style-type: none"> <li>• <b>File</b>: Browse and select the file you want to use.</li> <li>• <b>URL</b>: Allows to retrieve an image from a URL. Provide the source image URL. For example, you can also upload your image to any third party (such as imgur), and get its URL.</li> </ul> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Note:</b> Applies to importing applications from an older version of Operations Hub Classic to Operations Hub 2023.</p> <p>When you import an App to v2023, the Image plug-in's <b>Image Source &gt; Type</b> is altered in the new system.</p> </div>




Field Name	Description
	<div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin-bottom: 10px;">  To rectify in the imported App, go to the Designer and select the Image plug-in to access its properties. Change the <b>Type</b> back to the originally set type. The original source information (if exists) is retrieved. </div> <p><b>Image Fit:</b> Determines how the image fits into its container, whether to align horizontal (or) vertical.</p>
Image Height	Enter the height in pixels.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

## Simple Indicator

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Simple Indicator Properties

Field Name	Description
Source > Input Value	Provide the input data source to receive values for the simple indicator.
Source > Label (False)	The label that appears when the indicator is in false state. For example, <code>Off</code> .
Source > Label (True)	The label that appears when the indicator is in true state. For example, <code>On</code> .
Legacy Support (act like original widget)	
Icon Size (px)	Enter the icon size in pixels.
Label Styling	Formats the label: <b>Font Family</b> and <b>Font Size</b> formats the label text.

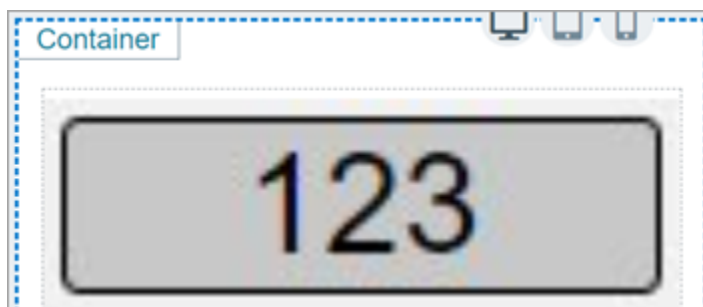
Field Name	Description
State Colors	Select colors that appear in the background for true/false status. <ul style="list-style-type: none"> <li>• <b>False Background Color:</b> This color appears when the simple indicator is in false state.</li> <li>• <b>True Background Color:</b> This color appears when the simple indicator is in true state.</li> </ul>
State Icons	Choose from font awesome icons to represent true and false states.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

## Indicator

Use the indicator widget to monitor and interpret the status of your industrial systems.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

You can apply different colors and introduce gif animations to communicate a value or state effectively. The indicator widget helps to draw attention towards the changing status of a system and the indication to take corrective actions, if necessary. For a simpler version, use [Simple Indicator \(on page 745\)](#).



Bind the widget to a query and set the properties to appear at runtime. You can define unique properties for values within specific ranges, and also for values that are outside of any range.


**Important:**


This rule applies if you have upgraded to a SIM version. Make sure to [upgrade your applications \(on page 290\)](#) before attempting to modify them in Operations Hub.

**Indicator Properties**

Field Name	Description
Multistate Indicator Value	The value is populated when you bind the indicator widget to a query.
Indicator Mode	<p>Select to display output in any of these modes:</p> <ul style="list-style-type: none"> <li>• <b>Analog:</b> In this mode, the widget provides analog values as output. You can choose to add a background image, and use several other options to indicate the current status.           <div> </div> </li> <li>• <b>Status:</b> In this mode, the widget functions as a simple indicator status. It provides a push button to indicate the change in current status. You can also choose to show the analog values.           <div> </div> </li> <li>• <b>Image:</b> In this mode, you can provide a background image to indicate the change in current status. You can also choose to show the analog values along with the image.           <div> </div> </li> </ul>
Display Value?	Select the check box to display the analog value.
Repeat Background Image	<b>Analog</b> indicator mode:




Field Name	Description
	Select the check box to apply the background image repeatedly to provide a continuous background across the widget.
Width	<p><b>Analog</b> indicator mode:</p> <p>By default, the indicator widget occupies the width of its container. Reset the width in percentage or pixels.</p>
Height	<p><b>Analog</b> indicator mode:</p> <p>By default, the indicator widget occupies the height of its container. Reset the height in percentage or pixels.</p>
Size	<p><b>Image</b> and <b>Status</b> indicator modes:</p> <p>For the image mode, enter the image size in pixels.</p> <p>For the status mode, enter the size to set the diameter of the indicator button.</p>
Use Raw Format	<p>Select the check box to display numbers in raw format.</p> <p>For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.</p>
Number of decimals	<p>This option appears if you do not want to display numbers in raw format.</p> <p>In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.</p>
Insert Commas	<p>Select the check box to use comma as a thousands separator. A comma is inserted for every three digits.</p>
Prefix Units	<p>Enter the unit of measurement to appear as a prefix for the value.</p>
Suffix Units	<p>Enter the unit of measurement to appear as a suffix for the value.</p>
Label Above	<p>Enter the text to appear above the value.</p>
Label Below	<p>Enter the text to appear below the value.</p>
Font Size	<p>Enter the size of the font for the label text.</p>
Font Family	<p>Select a font family for the label text.</p>

Field Name	Description
Font Color	Select a font color <i>(on page 831)</i> for the label text.
Background Color	Select a color <i>(on page 831)</i> to fill in the background for labels and values.
Background Image Mode	<p>Use these options to set a background image for the widget.</p> <p><b>Type:</b> If you choose to set a background image, then select from these two types:</p> <ul style="list-style-type: none"> <li>• <b>File:</b> Browse and select the file you want to use.</li> <li>• <b>URL:</b> Enter the complete URL address for the image from a server.</li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p> <b>Note:</b> Applies to importing applications from an older version of Operations Hub Classic to Operations Hub 2023.</p> <p>When you import an App to v2023, the Indicator plug-in's <b>Background Image Mode &gt; Type</b> is altered in the new system.</p> <p>To rectify in the imported App, go to the Designer and select the Indicator plug-in to access its properties. Change the <b>Type</b> back to the originally set type. The original source information (if exists) is retrieved.</p> </div> <p><b>Background Image Fit:</b> Determines how the image fits into its container, whether to align horizontal (or) vertical. <b>Background Image Position:</b> Determines the position of the image, whether the image should be placed behind value only, (or) behind value and labels.</p> <p><b>Border Type:</b> Select from different types of border styles to apply to the background image.</p> <p><b>Border Width (Pixels):</b> Enter the width size if the widget has a border.</p> <p><b>Border Radius (Pixels):</b> Enter the radius size to style the corners of a border.</p>

Field Name	Description
	<b>Border Color:</b> <a href="#">Select a color (on page 831)</a> for the border.
+Add Item	Select to customize settings for values within a specific range. Create an input range and highlight with unique colors and style.
Input Range Low (Greater than or Equal)	Enter the lowest value to create an input range.
Input Range High (Less than)	Enter the highest value to create an input range.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

### About Custom Range Settings


You can add several custom ranges to the widget; each with a different input range. The custom ranges are implemented in the specified order, from first to last. If the input ranges overlap with each other, the custom range setting at the top of the order is applicable. Arrange the custom ranges in the order you want them to be implemented.

- Select  for the custom range to move upwards in a list.
- Select  for the custom range to move downwards in a list.
- Select  for the custom range to remove from the list. These inputs are deleted.

### List

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## List Properties

Field Name	Description
Source > Input Value	Provide the input data source to receive values for the list.
Target > Selected Item	Provide the target data source to send information.
Prefix Icon (Font Awesome)	Adds a prefix icon. Choose icons from Font Awesome icon library.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .


## Text Display

Use this plug-in to add display-only text in your application.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## Text Properties

Field Name	Description
Source > Label	Provide the input data source to receive label names for the text plugin.
Source > Input Value	Provide the input data source to receive values for the text plugin.
Use Raw Format	Select the check box to display numbers in raw format.  For example, a numeric value with 5 or more decimal places is shown as it is, and not rounded off.
Number of decimals	This option appears if you do not want to display numbers in raw format.  In that case, enter the decimal places (0-7) to consider after the decimal point to format large numbers. Based on the decimals, the value is rounded off to the nearest whole number.

Field Name	Description
	The decimals will apply to <b>Input Value</b> , <b>Minimum Value</b> , and <b>Maximum Value</b> properties.
Label Styling	Formats the label: <b>Font Family</b> , <b>Font Size</b> , and <b>Font Color</b> formats the text.
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .

## Maps

### Maps Overview

Plug-in/s available under the maps category:

- [Google Map \(on page 752\)](#)

### Google Map

This topic describes Google Map plug-in properties.

Use the plug-in to enhance your location-based decision-making and streamlining operational processes. The Google Map plug-in provides access to detailed geographical data and also allows to customize map markers for various types of data.

Refer to [Visuals Tab \(on page 220\)](#) for more information on the layout of widgets in Configuration Hub.



### Google Map Properties


Field Name	Description
Google API Key	To access Google Maps services, enter the Google API key.  You can get the Google API Key from here: <a href="https://cloud.google.com/maps-platform/">https://cloud.google.com/maps-platform/</a> . Follow the on-screen instructions to generate the API key.
View Mode	Select from these available view modes to configure how your map appears to users: <ul style="list-style-type: none"> <li>• <b>Roadmap</b>: Displays standard road map.</li> <li>• <b>Satellite</b>: Displays satellite imagery.</li> </ul>



Field Name	Description
	<ul style="list-style-type: none"> <li>• <b>Terrain:</b> Displays physical terrain features.</li> <li>• <b>Hybrid:</b> Combines satellite imagery with road and feature labels.</li> </ul>
Location	<p>Choose from Data, Manual, or User Location to provide location details.</p> <ul style="list-style-type: none"> <li>• Select <b>Data</b> to dynamically specify the location on the map. Use any of these options to retrieve latitude and longitude values from a data source.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Select a query that can fetch the values.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Select a global variable that contains the values.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Manually type in the latitude and longitude values separated by a comma. For example <code>40.7128, -74.0060</code> represents the coordinates of New York City.</p> </div> <ul style="list-style-type: none"> <li>• Select <b>Manual</b> to manually enter the location coordinates. The following text fields appear to type in the values: <ul style="list-style-type: none"> <li>◦ <b>Latitude</b></li> <li>◦ <b>Longitude</b></li> </ul> </li> <li>• Select <b>User Location</b> to automatically pull the coordinates based on your current location.</li> </ul>
Zoom Level	<p>The zoom level determines how much of the map is visible and how close the view is to the specified latitude and longitude.</p> <p>Set an integer value. A higher value gets you a closer and more detailed view of the specified location. A lower value provides you with a wider, more zoomed-out view.</p>
Markers	<p>You can add multiple markers on the map. Markers represent data points. You can use markers to locate areas on the map easily. At runtime, selecting a marker can provide additional information on the location, such as its name, address, phone number, or website. You can modify the marker's icon, color, and shape to convey specific locations.</p> <ol style="list-style-type: none"> <li>1. Select <b>Add</b> to add a marker.</li> <li>2. <b>Shape:</b> Choose from the list of available markers.</li> <li>3. <b>Type:</b></li> </ol>

Field Name	Description
	<div style="border: 1px solid black; padding: 5px;"> <p>Select <b>Data</b> to dynamically set the marker on the map. Specify a query that can fetch the marker related values from a data source.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Select <b>Manual</b> to type in the marker's location.</p> </div>
Action	<p>Markers represent data points. You can use markers to locate areas on the map easily. At runtime, selecting a marker can provide additional information on the location, such as its name, address, phone number, or website.</p> <p>You can add multiple actions to a single marker.</p> <ol style="list-style-type: none"> <li>1. Select <b>Add Action</b>.</li> <li>2. <b>Action:</b> Select an action you want to perform when the marker is clicked on the map.</li> <li>3. <b>Query:</b> Select a query to be executed when the marker is clicked on the map. This displays the data associated with the marker.</li> </ol>
Add Conditions	<p>This property allows you to add conditions to marker actions. You can specify that an action should only be triggered if certain conditions are met.</p>
GeoJSON URL	<p>Enter a GeoJSON URL.</p> <p>GeoJSON (Geographic JavaScript Object Notation) data is retrieved from the URL and displayed on the map. You can use such data to visualize custom geographical information on a web map.</p>
KML URL	<p>Enter a KML URL.</p> <p>The API retrieves the KML (Keyhole Markup Language) data from the URL and displays it on the map. With such information, you can create custom map layers.</p>
Heatmap	<p>Use this property to generate a heatmap layer based on your data points and display it on the map. With a heatmap, you can visualize large datasets and identify patterns or trends in the distribution of data points.</p> <p>For adding values, refer to <a href="#">Bind Your Data to Plug-ins (on page 237)</a>.</p>
Traffic Layer	<p>Select the check box if you want to display traffic congestion, road conditions, etc. on the map. This property is useful for applications relying on navigation information.</p>

Field Name	Description
Bicycle Layer	Select the check box if you want to show bike lanes, cycling routes, etc. on the map. This property is useful for applications that cater to cyclists to provide bike-friendly navigation information.
Transit Layer	Select the check box if you want to show bus stops, train stations, transit routes, etc. on the map. This property is useful when applications want to include information on public transportation.
Show Businesses	Select the check box if you want to show business areas of interest on the map. For example, restaurants, hotels, and shops.
Show Map Type	Select the check box if you want to provide an option on the map to switch between different map types, such as roadmap, satellite view, terrain view, and hybrid view.
Show Zoom Buttons	Select the check box if you want to provide zoom buttons on the map. The button controls help to zoom in and out of the map.
Disable Mouse Controls	Select the check box if you want to disable the use of mouse on the map. Which means you cannot perform actions like pan or zoom the map using a mouse.
Show Full Screen	Select the check box if you want to provide an option to view the map in full-screen mode.
Show Street View	Select the check box if you want to enable the "Street View" feature for the map. This feature allows to virtually explore the streets and neighborhoods on the map.
Show/Hide	<div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;">  <b>Note:</b>            This property is used to control the visibility and behavior of a plug-in/widget on the application interface.         </div> <p>You can add conditional statements to show or hide the plug-in.</p>
Hidden	<div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;">  <b>Note:</b>            This property is used to control the visibility and behavior of a plug-in/widget on the application interface.         </div>

Field Name	Description
	<div style="border: 1px solid #0070c0; border-radius: 10px; padding: 5px;">  As a best practice, either apply 'conditions' or mark as 'hidden', but not both simultaneously. </div> <p>Select this check box if you want to hide a plug-in using the <b>Hidden</b> property. Remember, the plug-in remains hidden until a specific action is taken, such as clicking a button designed to reveal it.</p> <p>In order to support the visibility behavior, associate a <a href="#">button</a> to allow for a show/hide action.</p>
Scoped CSS	Select the check box to enable CSS scoping for the plug-in. This property allows you to isolate the CSS styles specific to the plug-in. As a result, any modification to the plug-in's CSS stylesheet will not affect the global CSS defined for the application.

## General

### General Overview

The following list of widgets are available under the general category:

- [Breadcrumb \(on page 756\)](#)
- [Favorite Organizer \(on page 759\)](#)
- [HTML Editor \(on page 763\)](#)
- [iFrame \(on page 765\)](#)
- [Task Client \(on page 767\)](#)


### Breadcrumb

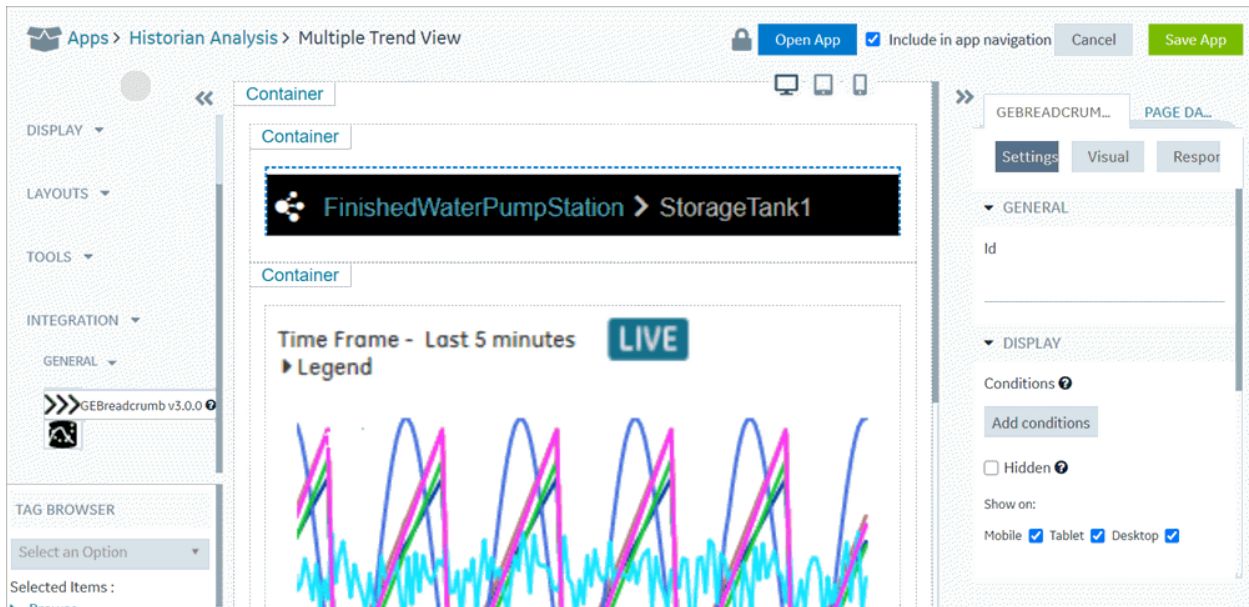
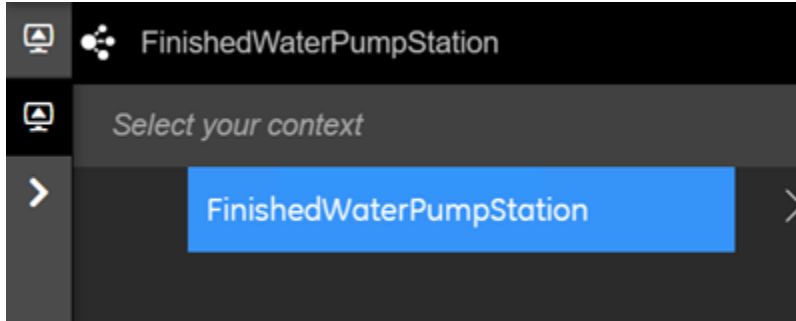
With the Breadcrumb plug-in, you can navigate through the asset model.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

The purpose of a breadcrumb is to allow you to access an asset's information located anywhere in the asset model hierarchy. A breadcrumb navigation also defines the relationship between different assets in a model.

The breadcrumb navigation is available for all the widgets in Operations Hub. You can navigate in the trend card using breadcrumb.

In the end application UI, to access the breadcrumb, select  and browse your model.



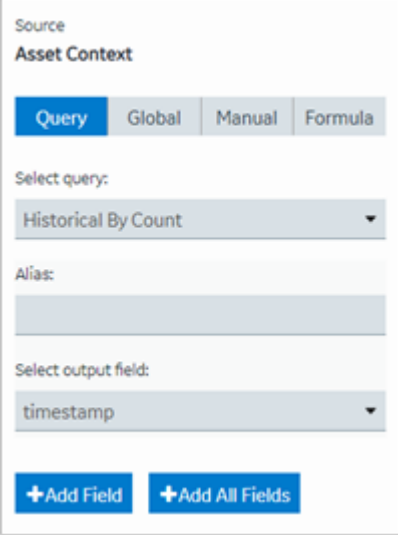
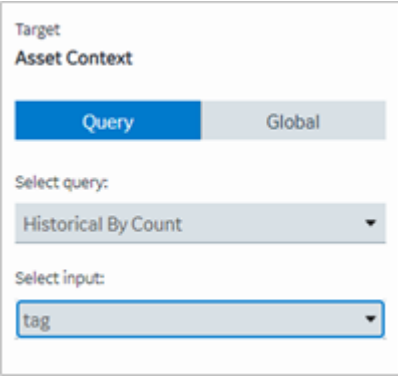
You must specify these breadcrumb properties:

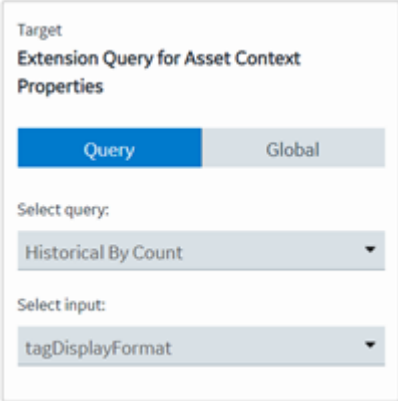


**Note:**

When configuring input targets for plug-ins, ensure that no other binding exists for the target query input. To remove a binding from the query input, select the unlink icon next to the binding.

## Breadcrumb Properties

Field Name	Description
Source Asset Context	<p>Select the source (asset name) for an asset context. The selected context appears as a default breadcrumb view in the end application. This asset name must exist in your <a href="#">asset model (on page 407)</a>.</p> 
Target Asset Context	<p>Select the target for an asset context. This target defines where that output goes on selecting an asset in a breadcrumb, so that it can be fed either to a query or a global.</p> 
Target Extension Query for Asset Context Properties	<p>Select the target for an extension query. This is a formatted string with a list of properties that defines the hierarchy of the breadcrumb in the end application. For example, consider these crumbs in a hierarchy - first is 'pump', second is 'pump pressure', 'pump frequency', 'pump vibration', or 'pump flow'.</p>

Field Name	Description
	

## Favorite Organizer

Use the widget to create folders and organize your favorite trend charts.

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

This widget allows you to group all your favorites under a meaningful folder structure, and get to them quickly. The favorite organizer can be used along with the trend card on the same page to display favorites effortlessly.

When you import/export apps in Operations Hub, only favorites are imported/exported as unparented items. The folder structure is not imported/exported.

### Favorite Organizer Properties

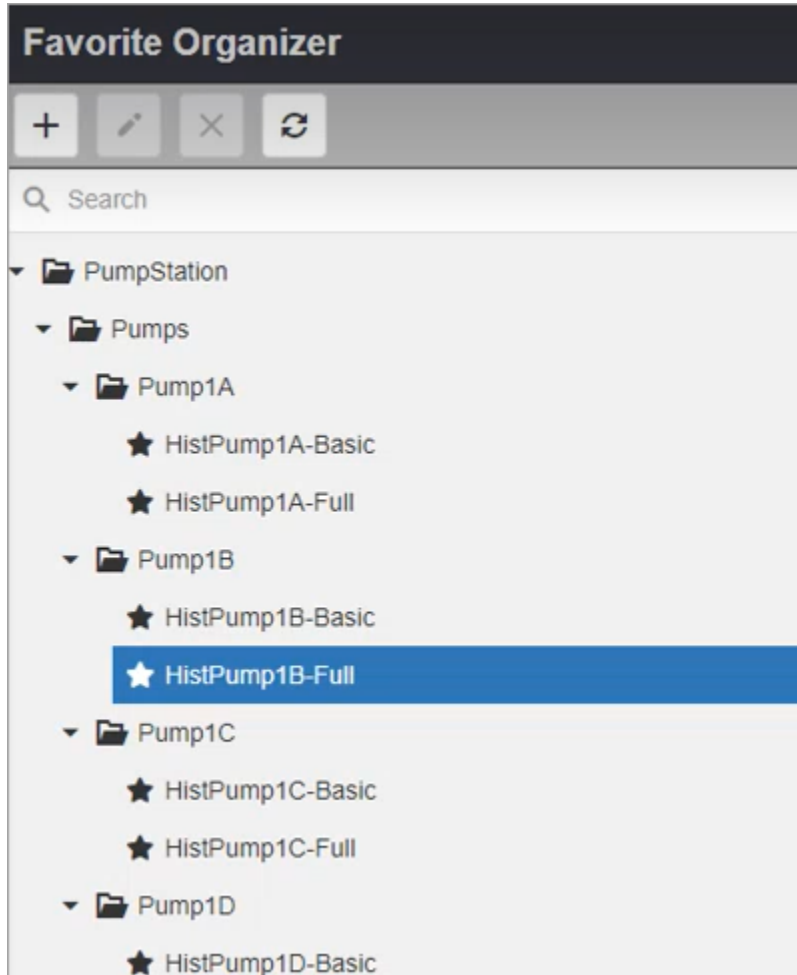
Field Name	Description
Title	Provide a title name for the favorite organizer.
Unparented items folder	<p>By default, the folder that contains the unparented items is called <code>Unorganized</code>. You can modify the default name.</p> <p>Unparented items are orphaned favorites, which are not yet organized in a tree folder structure.</p>

Field Name	Description
Permissions Visible	<p>Select/Clear the check box to show/hide the option to set folder/favorite permissions.</p> <p>If selected, permissions appear in the Favorite Organizer next to each folder/favorite at runtime. See <a href="#">Manage Permissions (on page 762)</a>.</p>
Height	Set the height for the favorite organizer widget.
Header Background Color	Set a background color for the favorite organizer header.
Header Color	Set a color for the favorite organizer header text (if a title name is set).
Toolbar Background Color	Set a background color for the favorite organizer toolbar (contains menu options to create, rename, refresh, and delete folders).
Icons	<p>You can customise the icons that represent folders and favorite items. You can also assign unique icons to distinguish between the folders/favorites that are shared with you, and those created by you. Choose icons from Font Awesome or DevExtreme icon libraries.</p> <p>To use a Font Awesome icon, you need to specify that it is from the font awesome library, such as <code>fa fa-star</code>. <a href="https://fontawesome.com/icons">https://fontawesome.com/icons</a></p> <p>To use a DevExtreme icon, use the icon name (such as <code>folder</code>). <a href="https://js.devexpress.com/Documentation/Guide/Themes_and_Styles/Icons/">https://js.devexpress.com/Documentation/Guide/Themes_and_Styles/Icons/</a></p>
Source > Input Selection	Select a global parameter to control the selected favorite within this widget. This global drives the selection of the favorite in the tree.
Target > Output Selection	<p>Select a global parameter for capturing output selection. When you select a favorite item in the favorite organizer at runtime, your selection is published to this global.</p> <p>Select <b>Output Format</b> from these options:</p> <ul style="list-style-type: none"> <li>• <code>Favorite Name</code>: When you select a favorite in the favorite organizer, the name of that favorite is published to this global.</li> <li>• <code>Favorite JSON</code>: When you select a favorite in the favorite organizer, a string containing a JSON representation of the data stored in that favorite (depending on the format selected), is published to this global.</li> </ul>



## Favorite Organizer at Runtime

Use the toolbar menu to [create \(on page 761\)](#), [rename \(on page 761\)](#), [delete \(on page 762\)](#), and refresh folders.



### Create a Folder

1. Select **+** to access the **Add Folder** screen.
2. Enter a name for the new folder.
3. Select **Add**. The new folder is created under its parent folder.
4. Drag and drop the favorites into the newly created folder.


### Rename a Folder

1. Select the folder to rename.
2. Select **✎** to access the **Rename Folder** screen.

3. Enter the new name for the folder.
4. Select **Rename**.

## Delete a Folder

Deleting a folder does not delete favorites in the folder.

1. Select the folder to delete.
2. Select . The **Remove Folder** confirmation dialog appears.
3. Select **Delete**. Any favorites in the deleted folder are moved to `Unorganized` folder.

## Manage Permissions

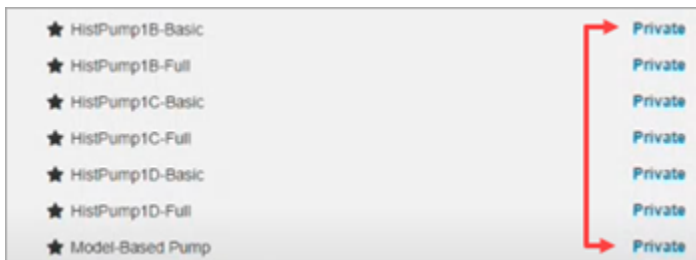
Share your favorites and favorite folders with other users. By default, favorites/folders are set to private when you create them, and are not visible to other users. You can change the default permission, and share with all or select users belonging to groups.



### Note:

If upgrading from an older version (2022.4.1 or before), then existing favorites are visible to all groups.


1. Select the permission next to the favorite/folder you want to share.



When you set folder-level permission, the favorites in that folder are not automatically shared. You need to share favorites by setting individual permissions.

2. In the **Manage Permissions** screen, you can choose to share or keep your favorite/folder private.

Field	Description
Name	Name of the favorite/folder.
Owner	Owner of the favorite/folder.

Field	Description
All Groups	Select this option if you want to share your favorite/folder with all groups.
Selected Groups	Select this option if you want to share your favorite/folder with only selected groups. A field appears to browse through a list of groups for selection. <b>Child Groups</b> appear based on the selected groups for further selection.  To filter the list and show only GE groups, select <b>Only GE Groups</b> .
Private	Select this option if you want to keep your favorite/folder private.  <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;">  <b>Note:</b> An administrator can access and modify all favorites/folders, including private. </div>

3. Select **Save Permissions** to save and close the screen.

You do not have permission to modify or delete the favorites/folders shared with you. You can only load the shared favorites.

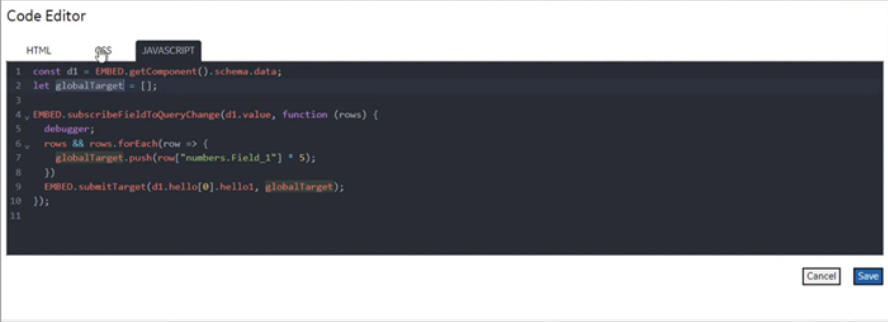
## Organizing Favorites/Folders


To organize favorites/folders, drag and drop favorite and folder items into other folders. To do this, you must be the owner of both the items - dragged item and target folder. Administrators are not bound by this restriction because they have read/write permissions to all favorites/folders.

## HTML Editor

Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## HTML Editor Properties

Field Name	Description
Code Editor	<p>You can write and edit HTML, CSS, and JavaScript code to display the result in the end application.</p> <ul style="list-style-type: none"> <li>To write new code, select <b>Code Editor</b>.</li> <li>To edit existing code, select <b>Edit Code</b>.</li> </ul> <p>With the code editor, you can write a JavaScript code to:</p> <ul style="list-style-type: none"> <li>Embed external resources such as documents, or any other media.</li> <li>Use global (variable as data source) option to set as many output data targets as necessary. The Html Editor plug-in can render multiple target globals to use with other plug-ins in Operations Hub.</li> </ul> 
Source Value	<p>Define the data source to get values for the Html Editor plug-in. Use the available data binding options. See <a href="#">Bind Your Data to Plug-ins (on page 237)</a>.</p>
Target Value	<p>Choose any of these options to send values from the Html Editor plug-in to your data source (target data).</p> <ul style="list-style-type: none"> <li><b>Query:</b> Select a query from your list of available queries followed by the output field/s you want to add to the plug-in.</li> <li><b>Global:</b> Select a global from your list of available global parameters.</li> </ul>
Scoped css?	<p>Indicates whether the CSS code should be applied only to the plug-in or globally.</p>


Field Name	Description
	<ul style="list-style-type: none"> <li>If you want the CSS code to be applied only to the elements in the html editor, select this check box.</li> <li>If you want the CSS code to be applied globally, clear this check box.</li> </ul>
Hidden	Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a> .


## iFrame

Use the iFrame widget to load content from another website within Operations Hub.

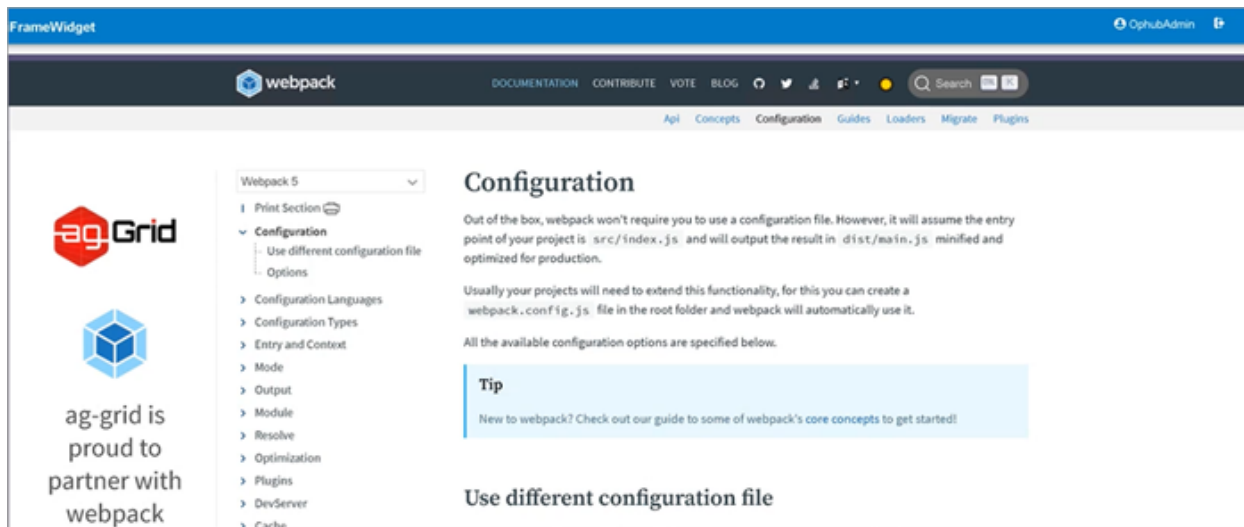
Operations Hub New Layout	Refer to <a href="#">Visuals Tab (on page 220)</a> for more information on the layout of widgets in Configuration Hub.
Operations Hub Classic Layout	Refer to <a href="#">About Widgets (Classic) (on page 494)</a>

## iFrame Properties

Field Name	Description
Source - URL	<p>Use any of these options to provide the URL address of the website you want to load in the iFrame widget.</p> <ul style="list-style-type: none"> <li>Select the <b>Query</b> tab to choose from queries that return an URL as output.</li> </ul> <div style="border: 1px solid #0070c0; border-radius: 10px; padding: 10px; margin: 10px 0;"> <p> <b>Note:</b> If the query output returns an array with multiple URLs, then the first URL value is taken into consideration.</p> </div> <ul style="list-style-type: none"> <li>Select the <b>Global</b> tab to choose from URL outputs available as global parameters.</li> <li>Select the <b>Manual</b> tab, and enter the URL address in the text field.</li> <li>Select the <b>Formula</b> tab to add a formula that returns an URL as output.</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>◦ Select <b>Add Formula &gt; Add text</b>.</li> <li>◦ Enter the URL address in the text field.</li> <li>◦ Select <b>Done</b> to save and add the formula to the iFrame widget.</li> </ul>
Hide Scrollbars	If selected, hides the scroll bar. The horizontal and vertical scroll bars appear only when the content in the iFrame widget extends beyond the widget's width and height.
Enable Full Width	If selected, the iFrame widget occupies 100% of the width of the container. Enabling this property overrides the <b>Width (px)</b> set for the widget.
Width (px)	If you do not select <b>Enable Full Width</b> , then set a width for the iFrame widget in pixels.
Height (px)	Set a height for the iFrame widget in pixels.
Border Style	<p>To apply a border to the iFrame widget, select from any of the available styles, or select <b>None</b> for no border.</p> <ul style="list-style-type: none"> <li>• Solid: Applies a solid border</li> <li>• Inset: Applies a 3D inset border</li> <li>• Outset: Applies a 3D outset border</li> </ul>
Border Width (px)	Enter a value that defines the thickness of the iFrame border.
Border Color	Select a color to apply to the four borders of the iFrame widget.
Hidden	<p>Select this check box if you want to hide the plug-in. To show the hidden plug-in in Operations Hub new layout, go to <b>Page Visuals</b> and under <b>Action</b> column, select  for the hidden plug-in. See <a href="#">Page Visuals Tab (on page 229)</a>.</p>

## iFrame at Runtime



### Note:

- When you print preview a webpage, it may not look like the actual web page. The print stylesheet formats the web page to print in a user-friendly format.
- Some website URLs may not load within an iFrame due to their security policies.
- To load YouTube videos within an iFrame, use the video's embed URL.

## Task Client

### Configure the Task Client

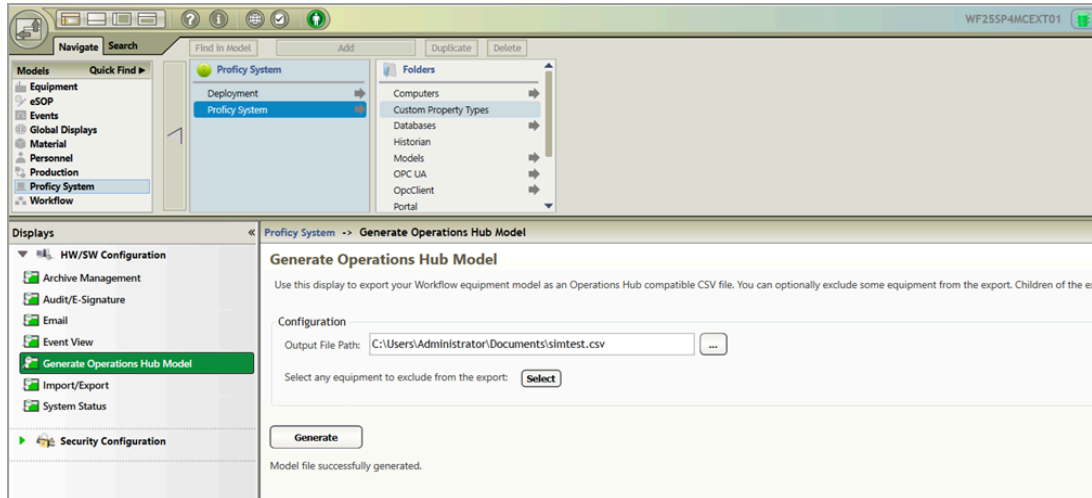
This topic describes how to enable the task client widget to operate in the Operations Hub web server environment.

Install the Workflow and the Operations Hub applications on different servers.

To configure the task client widget, equipment models from the Workflow application are exported to a .csv file, and imported into the Operations Hub application.

1. In the Workflow server, do the following:

- a. Select an equipment model you want to export, and then select **Generate Operations Hub Model**.
- b. Provide a location to save the exported file, and select **Generate**.



The equipment model data is exported to a .csv file format, and saved in the specified location.

2. In the Operations Hub server, do the following:

- a. Import the .csv file created in step 1 to Operations Hub. For steps, refer to the [Import Equipment Model \(on page 769\)](#) topic.
- b. In the main navigation menu, select **APPS**, and then select Workflow Tasklist application. The Pages workspace appears.
- c. Select **Tasklist View**.  
The pages associated to the task list appear in a container. `TASK LIST`, and `TASK COUNT` are system widgets that cannot be deleted.
- d. Select the **Task List** page in the container.  
The **GETASKLIST PROPERTIES** tab settings appears on the right pane.
- e. Provide **DATA** settings as specified in the table below:



**Note:**

Scroll down in the settings section to find the data settings after the general and display settings.



Parameter	Selection	Description
WorkflowServer	Manual	Enter the URL address of the Workflow server to connect.
RefreshRate	Manual	Enter the time in seconds at which rate the task client will refresh to get the latest data from the Workflow server (for example, 5).
Height	Manual	Enter the preferred height of the task client widget (for example, 600).

f. Select **Save App**.

The application settings are saved.

Log in to the Operations Hub web client to connect and work with the task client widget. Refer to the [Access the Task Client \(on page 770\)](#) topic.

## Import Equipment Model

By importing the Workflow equipment models, you can manage the tasks assigned to you from within the Operations Hub application.

Ensure that the Workflow equipment models are exported to a Web HMI model .csv file.


An equipment model is configured in the Workflow application. For more information, refer to the Equipment Model topic in the *Resource Information and Configuration* section of the complete Workflow user guide.

1. Access Operations Hub.
2. In the main navigation menu, select **ADMIN**.
3. In the Admin workspace, select **Import/Export**.

The **Model Import/Export** page appears.



**Tip:**

Select  to hide the navigation pane that overlaps the page.

4. To import, browse and select the exported .csv file from Workflow, and select **Import**.

The imported information is visible under Objects and Object Types in the Admin workspace.

## Access the Task Client

Use the Task Client widget to display task lists from the Workflow application in Operations Hub.

Create identical user accounts for the Operations Hub web server and the Workflow server. You must be able to log in to both the servers using the same username and password combination. Refer to the [Configure the Task Client \(on page 767\)](#) topic.

The Workflow Task List is integrated with Operations Hub. You do not have to log in to the Workflow application to manage your tasks. You can log in to the Operations Hub application, and connect to Workflow with the help of the task client widget to manage tasks.

1. Log in to the Operations Hub web client.

The login page to connect to the Workflow server appears.

Username: admin

Password: .....

Server Address: https://wftrunkl:8447/

Log On



2. Enter the details as specified in the following table:

Field Name	Description
Username	The account username that has permission to access the Workflow application.
Password	The password for the username you entered in the <b>Username</b> box.
Server Address	The URL address to connect to the Workflow server. This URL is populated based on the properties provided for the Task Client widget in Operations Hub.

3. Select **Log On**.

The task count icon indicates the status of your workflow connection.

Status	Description
	Indicates that the Workflow server is disconnected due to either of these reasons:

Status	Description
	<ul style="list-style-type: none"> <li>◦ You are not logged in to the server.</li> <li>◦ Internet connection is lost.</li> <li>◦ Workflow server is down.</li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;">  <b>Note:</b>            All tasks in Operations Hub remain disabled until a connection is established.         </div>
	Indicates that the Workflow server is connected.  Once connected, the task count shows the number of workflow tasks. If the count is 0, it means there are no workflows.

The user login credentials are encrypted and stored under **ENTITIES** in Operations Hub. You will not be prompted for login details again for the saved user accounts.






**Note:**

Whenever the Workflow server is down, or if there is no internet, the lost connection status is indicated in red. All tasks in Operations Hub remain disabled until a connection is established.

4. Select  to show the workflow equipment context navigation.

For more information, refer to the Equipment Context topic in the *Operator Task List in the Workflow Client* section of the complete Workflow user guide.

5. Select  or  to navigate and select any of these equipment contexts: Big Enterprise, Big Unit, or Big Area.








The equipment context set up shown in Operations Hub is created in the Workflow application. The list of tasks for the selected equipment context appears. Based on the list of tasks, the task count number  also gets updated.





**Note:**

Logged in users in Operations Hub can view only the tasks that are assigned to them in the Workflow application.

6. Use these options to work with the tasks:

Icon	Description
	Select to filter tasks or task steps by task name, priority, personnel assignment, step state, and expiry values. For more information, refer to the Task List Filtering topic in the <i>Operator Task List in the Workflow Client</i> section of the complete Workflow user guide.
	Select the <b>Tasks for Equipment</b> toggle to show or hide the tasks associated to the equipment location only.
	Select to start and run scheduled tasks. For more information, refer to the Start Task topic in the <i>Operator Task List in the Workflow Client</i> section of the complete Workflow user guide.
	Select to manually start a specific task step.
	Select to view and save a copy of the linked documents. For more information, refer to the Document(s) topic in the <i>Operator Task List in the Proficy Client</i> section of the complete Workflow user guide.
	Select to view the instructions to complete a task or task step. This option is available only when there are work instructions defined for the task or task steps.
	<p>Select to access the following menus, and perform task related actions:</p> <ul style="list-style-type: none"> <li>◦ <b>Set Priority:</b> You can set a priority number for the task to run.</li> <li>◦ <b>Jump to Task Step:</b> You can skip some steps and jump to a specific task step in a scheduled flow.</li> <li>◦ <b>Enter Expiry Comment:</b> You can enter a reason for the task delay. The option to add a comment is available only after the task or task step has expired.</li> <li>◦ <b>Cancel Task:</b> You can cancel running a specific task or task step.</li> <li>◦ <b>Reassign Personnel:</b> You can reassign specific task steps to a different person or equipment location.</li> <li>◦ <b>Acquire:</b> You can acquire a specific task step if it is available.</li> <li>◦ <b>Release:</b> You can only release those steps that you have acquired. When you release a task step, it is available for other operators to acquire.</li> </ul> <p>For more information, refer to the complete Workflow user guide.</p>

Icon	Description
	<p>Select to access the forms attached to a task step, and update them. For more information, refer to the <i>Forms and User Displays Authoring Guide</i> section of the complete Workflow user guide.</p> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; background-color: #E6F2FF;"> <p> <b>Note:</b> You can load only HTML forms in the Operations Hub Task Client. Windows presentation framework (WPF), Silverlight, and .NET rich client forms are not supported.</p> </div>

**Note:**

For added security, electronic signatures are configured in Workflow for specific tasks, task steps, or forms. In such cases, a dialog box appears requesting you to sign in for verification before accomplishing any task related action.

## Batch

### Batch Widgets Overview

This topic describes the widgets used for batch processing.

**Note:**

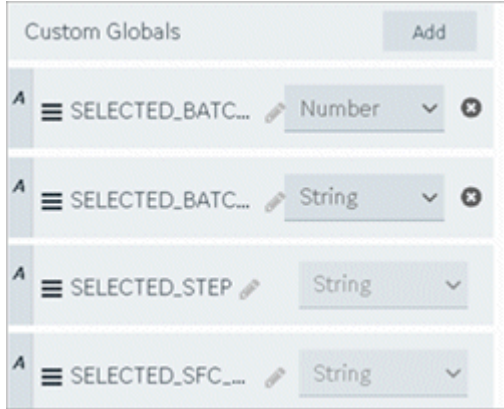
The batch widgets are available only in Operations Hub Classic version. Refer to [About Widgets \(Classic\) \(on page 494\)](#).


Within Operations Hub, the batch widgets provide the same functionality as [Proficy Batch Execution](#) thick client. Also refer to [Set up Batch \(on page 143\)](#). The batch widgets use their own data source.

1. [Batch Menu \(on page 776\)](#)
2. [Batch List \(on page 777\)](#)
3. [Batch SFC \(on page 777\)](#)
4. [Batch Prompt \(on page 778\)](#)
5. [Batch Binding Prompts \(on page 779\)](#)
6. [Batch Alarms \(on page 780\)](#)
7. [Batch Phase Control \(on page 781\)](#)
8. [Batch Control \(on page 782\)](#)

- 9. [Batch Parameter \(on page 785\)](#)
- 10. [Batch Recipe Info \(on page 785\)](#)
- 11. [Batch Reports \(on page 785\)](#)
- 12. [Batch Step Control \(on page 786\)](#)
- 13. [Batch Step List \(on page 787\)](#)

## Properties

Field Name	Description
Style Theme	Select either <b>Light</b> or <b>Dark</b> display theme for all the batch widgets across the application. Do not mix and match themes.
API Base URL	Enter the REST API base URL you want to access.
Data Source	Select the batch data source.
Source > Batch Serial Number	<p>Configure the properties to these global variables.</p> <ul style="list-style-type: none"> <li>• SELECTED_BATCH_SERIAL_NUMBER</li> <li>• SELECTED_BATCH_ID</li> <li>• SELECTED_BATCH_RECIPES_ID</li> <li>• SELECTED_STEP</li> <li>• SELECTED_SFC_BRANCH</li> <li>• SELECTED_PROCEDURE_ID</li> <li>• SELECTED_BATCH_CMD_MASK</li> <li>• SELECTED_STEP_CMD_MASK</li> <li>• SELECTED_BATCH_RECIPES_TYPE</li> </ul> <p>The global parameter values contain batch instance information to execute batch related operations. Global variable can be a string or a number.</p> 
Source > Procedure ID	
Source > API Batch ID	
Source > Batch Id	
Source > Step Id	
Source > Recipe ID	
Target > Selected Batch Serial Number	
Target > Selected Batch ID	
Target > Selected Batch Description	
Target > Selected Recipe ID	
Target > Selected Recipe Version	
Target > Selected Step	

Field Name	Description
Target > Selected Batch SFC Branch  Target > Selected Batch Procedure ID	
Enable hide columns	Select/Clear the check box to hide/show columns at runtime.
Request Interval (Seconds)	At runtime, the widget is updated with new information in the set amount of time in seconds.
eSignature Requirement	<p>By default, e-Signatures are turned off for batch widgets, which is <code>None</code>. To enable e-Signatures, select any of the following options:</p> <ul style="list-style-type: none"> <li>• <code>Performed By</code>: If you select this option, enter the user authorized to e-sign in the <b>Performed By</b> field.</li> <li>• <code>Performed By/Verified By</code>: If you select this option, enter the user/s authorized to e-sign and verify in the <b>Performed By</b> and <b>Verified By</b> field.</li> </ul> <div style="border: 1px solid #0070C0; border-radius: 10px; padding: 10px; margin-top: 10px;"> <p> <b>Note:</b> To e-sign and verify, user/s should be part of the Windows domain group on the Batch system.</p> </div> <p>e-Signature is available for Batch Control, Batch Step Control, Batch Parameter, Batch Phase Control, Batch Prompts, and Batch Binding Prompts.</p> <p>This is an example of an e-sign user name and password request at runtime:</p>

Field Name	Description
	<div> <p>Performed and Verified By <span style="float: right;">×</span></p> <hr/> <p>Batch Operation: <input type="text" value="Add Batch"/></p> <p><b>Performer Details</b></p> <hr/> <p>User Name: <input type="text" value="sys_user"/></p> <p>Password: <input type="password" value="*****"/></p> <p><b>Verifier Details</b></p> <hr/> <p>User Name: <input type="text" value="prod_user"/></p> <p>Password: <input type="password" value="*****"/></p> <p style="text-align: center;"> <input type="button" value="OK"/> <input type="button" value="Close"/> </p> </div>

## Batch Menu

Set up a navigation menu for other batch widgets.

Configure batch menu in Operations Hub designer:

1. Drag-and-drop **Batch Menu** to a container.
2. On the properties tab, go to the **BEHAVIOR** section.
3. To set up an action for each batch menu header, select **Go to page**, and then select the batch widget you want to link.

At runtime, the horizontal menu bar provides quick access to [Batch List \(on page 777\)](#), [Batch SFC \(on page 777\)](#), [Batch Prompts \(on page 778\)](#), [Batch Binding Prompts \(on page 779\)](#), [Batch Alarms \(on page 780\)](#), and [Batch Phase Control \(on page 781\)](#).



BATCH ID	RECIPE NAME	BATCH DESCRIPTION	START TIME	ELAPSED TIME	BATCH STATE	BATCH MODE
BATCH_ID1	MAKE_TOOTHPASTE	TOOTHPASTE WITH BAKING SODA BA...	1/17/2022 13:44:29	1:03:21	COMPLETE	O-AUTO
BATCH_ID2	MAKE_TOOTHPASTE	TOOTHPASTE WITH BAKING SODA BA...	1/17/2022 15:07:11	1:43:26	RUNNING	O-AUTO
BATCH_ID3	MAKE_TOOTHPASTE	TOOTHPASTE WITH BAKING SODA BA...	1/17/2022 15:10:05	1:40:16	RUNNING	O-AUTO

## Batch List

Provides a list of your batch instances at runtime.

Select a batch from the list and use the [Batch Control \(on page 782\)](#) widget to perform operations.

BATCH ID	RECIPE NAME	BATCH DESCRIPTION	START TIME	ELAPSED TIME	BATCH STATE	BATCH MODE
BATCH_ID1	MAKE_TOOTHPASTE	TOOTHPASTE WITH BAKING SODA BA...	1/17/2022 13:44:29	1:03:21	COMPLETE	O-AUTO
BATCH_ID2	MAKE_TOOTHPASTE	TOOTHPASTE WITH BAKING SODA BA...	1/17/2022 15:07:11	1:43:26	RUNNING	O-AUTO
BATCH_ID3	MAKE_TOOTHPASTE	TOOTHPASTE WITH BAKING SODA BA...	1/17/2022 15:10:05	1:40:16	RUNNING	O-AUTO
BATCH_OP_171	MAKE_TOOTHPASTE_DUP3	TOOTHPASTE WITH BAKING SODA BA...	1/17/2022 16:50:52	0:00:00	RUNNING	O-AUTO

## Batch SFC

Manage your batch instances in a sequential and controlled manner.

To set up the batch SFC page in Operations Hub designer:

1. In the main container, drag-and-drop **Batch Menu**.
2. Add a secondary container and drag-and-drop **Batch Step List**, **Batch SFC**, **Batch Reports** and **Batch Step Control**.
3. In the main container, drag-and-drop **Batch Parameter** and **Batch Recipe Info**.
4. Configure properties for all the widgets added to the SFC page.

At runtime, select the **SFC** tab to review batch related sequential tasks, and control their execution process. A flow chart provides a visual representation of the executed steps.

The screenshot displays the Operations Hub interface. On the left, there is a table with columns for 'STEP', 'STATE', 'MODE', 'STEP INDEX', and 'STEP PARAMETERS'. Below this is a table with columns for 'NAME', 'VALUE', and 'ENGINEERING UNITS'. A red arrow points to the 'ENGINEERING UNITS' column in this table. On the right, there is a process flow diagram with a 'TRUE' start node, two parallel paths labeled 'BASE:1' and 'ADDITIVE:1', a merge node with the condition '+ ADDITIVE:1 STATE = COMPLETE AND BASE:1 STATE = COMPLETE', a 'FINAL:1' node, and a final node with the condition '+ FINAL:1 STATE = COMPLETE'. A control panel on the far right includes buttons for START, RE-START, HOLD, ABORT, STOP, MANUAL, AUTO, and CLEAR FAILURES.

NAME	VALUE	ENGINEERING UNITS				
No data						
NAME	LOW	VALUE	HIGHLIGHT	ENGINEERING UNITS	TIME	ID
FLUORIDE_AHT	0	30	300		1	0
BKINGSOODA_AHT	0	30	300		1	0
GUM_AHT	0	30	300	LES	1	0
PH_AHT	0	30				
WATER_AHT	0	30				
FLAVOR_AHT	0	30				
FLAVOR				WINTERGREEN		

## Batch Prompts

Monitor and acknowledge prompts at runtime.

To set up the batch prompts page in Operations Hub designer:

1. In the main container, drag-and-drop **Batch Menu** and **Batch Prompts**.
2. Configure properties for all the widgets added to the prompts page.

At runtime, the **Prompts** tab is highlighted to indicate pending items for acknowledgment.

## Acknowledge Prompts

1. Select the **Prompts** tab.
2. Select the prompt you want to acknowledge.
3. If e-Signature is enabled, enter the user name and password to proceed.

The **Acknowledge Operator Prompt** screen appears.

4. Select a **Value** and select **OK**.

The screenshot shows a dialog box titled "Acknowledge Operator Prompt" with a close button (X) in the top right corner. The dialog contains five input fields: "Parameter" with the value "FLAVOR", "Minimum Value" with "0", "Maximum Value" with "0", "Unit" with "FLAVORS", and "Value" with a dropdown menu showing "WINTERGREEN". At the bottom, there are two buttons: "OK" (blue) and "Close" (gray).

A message appears on acknowledging the prompt.

## Batch Binding Prompts

Monitor and acknowledge binding prompts at runtime.

To set up the batch binding prompts page in Operations Hub designer:

1. In the main container, drag-and-drop **Batch Menu** and **Batch Binding Prompts**.
2. Configure properties for all the widgets added to the binding prompts page.

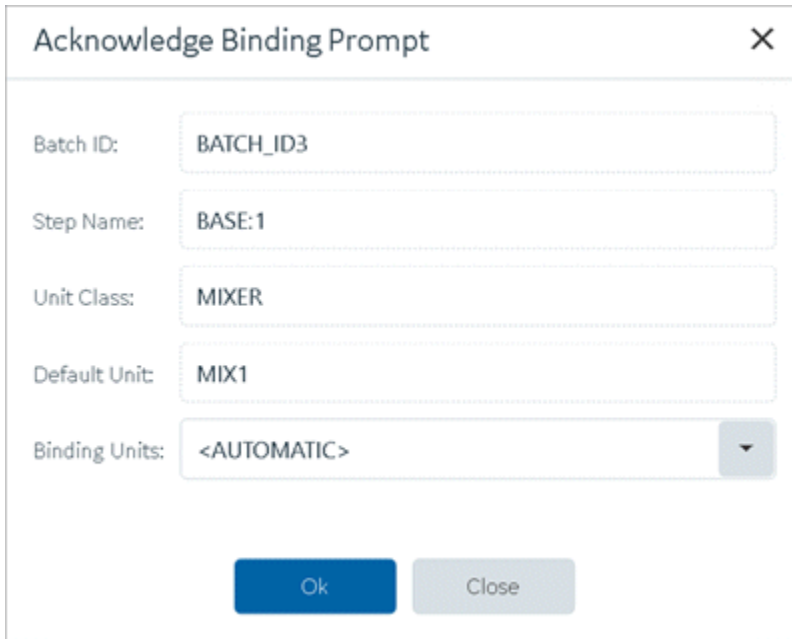
At runtime, the **Binding Prompts** tab is highlighted to indicate pending items for acknowledgment.

## Acknowledge Binding Prompts

1. Select the **Binding Prompts** tab.
2. Select the binding prompt you want to acknowledge.
3. If e-Signature is enabled, enter the user name and password to proceed.

The **Acknowledge Binding Prompt** screen appears.

4. Select **Binding Units** and select **OK**.



The screenshot shows a dialog box titled "Acknowledge Binding Prompt" with a close button (X) in the top right corner. The dialog contains five input fields, each with a label and a value:

- Batch ID: BATCH\_ID3
- Step Name: BASE:1
- Unit Class: MIXER
- Default Unit: MIX1
- Binding Units: <AUTOMATIC> (with a dropdown arrow)

At the bottom of the dialog, there are two buttons: "Ok" (blue) and "Close" (grey).

A message appears on acknowledging the binding prompt.

## Batch Alarms

Displays alarms triggered during batch processing.

To set up the batch alarms page in Operations Hub designer:

1. In the main container, drag-and-drop **Batch Menu** and **Batch Alarms**.
2. Configure properties for all the widgets added to the alarms page.

At runtime, the **Alarms** tab is highlighted to draw your attention to the triggered alarms.

BATCHID	UNIT NAME	PHASE NAME	PHASE STATE	FAILURE MESSAGE
	REACTPLAIN	XFER_IN_LNK2	<b>IDLE</b>	CONFIG ERROR - ORDINAL NOT DEFINED IN PHASE_FAILURES ENUMERATION SET - UNABLE TO LOCATE FAILURE DESCRIPTION: 1

## Batch Phase Control

Allows to individually execute a phase in a batch process.

To set up the batch phase control page in Operations Hub designer:

1. In the main container, drag-and-drop **Batch Menu** and **Batch Phase Control**.
2. Configure properties for all the widgets added to the phase control page.

At runtime,

1. Select the **Active Phases** tab.
2. Select a **Unit** and **Phase**.
3. Select **Acquire Phase**.

The screenshot shows the 'Active Phases' control panel. It features a top navigation bar with tabs for 'Batch List', 'SFC', 'Prompts', 'Binding Prompts', 'Alarms', and 'Active Phases'. The main panel is split into two sections: 'PHASE CONTROL' and 'PHASE STATUS'. In the 'PHASE CONTROL' section, there are two dropdown menus: 'Unit' (currently set to 'MIX3') and 'Phase' (currently set to 'ADD\_INGS3'). The 'PHASE STATUS' section includes a 'Batch ID' and 'Owner' header, followed by 'Paused' and 'Failed' buttons, and input fields for 'State' (set to 'IDLE') and 'Step Index' (set to '0'). There is also a 'Step Mode' checkbox and a large blue 'Acquire Phase' button at the bottom.

4. After acquiring the phase, select a **Command** to execute from the available commands for the phase.

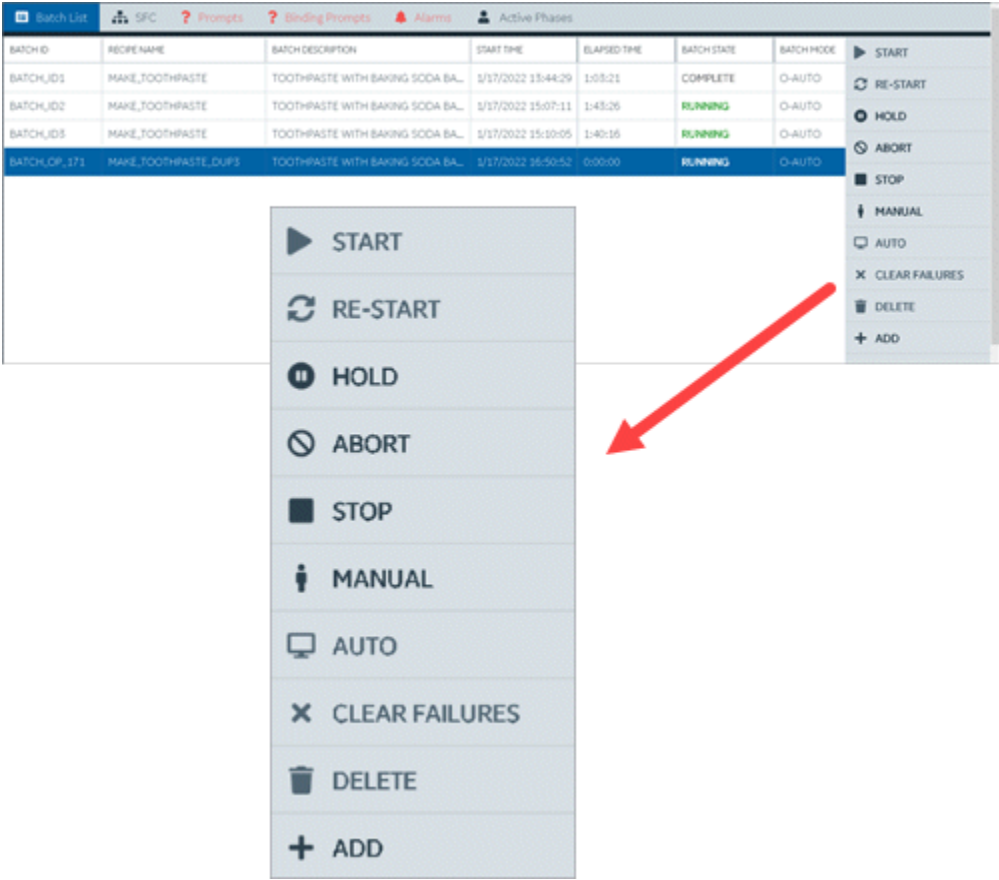
The commands are based on the status of the acquired phase.

5. Enter the batch ID for the phase and select **OK**.

Go to **Batch List** tab to verify that the phase is executed.

## Batch Control

Create and manage batch instances at runtime.



### Create a Batch

1. Select the **Batch List** tab.
2. Select **ADD**.

If e-Signature is enabled, you are prompted to enter user name and password to proceed.

The **Recipe List** screen appears.

3. Select a recipe and select **OK**.





6. If e-Signature is enabled, you are prompted to enter user name and password to proceed.

The batch state appears as **RUNNING**.

### Batch Parameter

Displays parameters for batch processing.

Select the **SFC** tab to review the parameters.

NAME	LOW	VALUE	HIGHLIGHT	ENGINEERINGUNITS	TYPE	ID
FLUORIDE_AMT	0	50	100	GAL	1	0
BAKINGSODA_AMT	0	50	100	LBS	1	0
GUM_AMT	0	50	100	LBS	1	0
PHL_AMT	0	50	100	LBS	1	0
WATER_AMT	0	50	100	GAL	1	0
FLAVOR_AMT	0	50	100	GAL	1	0
FLAVOR		WINTERGREEN		FLAVORS	5	0
WHITENER_AMT	0	50	100	GAL	1	0

### Batch Recipe Info

Displays batch recipe information.

Select the **SFC** tab to review the recipe information.

<b>Recipe Information</b>	<b>Procedure Information</b>
<b>Id:</b> MAKE_TOOTHPASTE	<b>Description:</b> TOOTHPASTE WITH BAKING SODA BASE
<b>Product Code:</b> 1002568790	<b>Abstract:</b>
<b>Version Information</b>	<b>Version Information</b>
<b>Version:</b> 1.0	<b>Audit Version:</b> 15
<b>Time Stamp:</b> 0:03:34 SATURDAY, AUGUST 28, 2010	
<b>Author:</b> PROCESS ENGINEER	

### Batch Reports

Generates a report for specified steps.

You can configure reports while creating your batch recipes. If a specific step in a batch is configured for reports, then a report is generated after the completion of the step at runtime.

Select the **SFC** tab to view reports.

The screenshot displays the SFC interface with a process flow diagram on the right and a data table on the left. A red arrow points from the 'COOL\_TEMP' row in the table to a detailed view of that row.

NAME	VALUE	ENGINEERING UNITS
COOL_TEMP	0	ENG. UNITS

## Batch Step Control

Run operations on selected batch steps at runtime.

Select the **SFC** tab to access step control options.

The screenshot displays the SFC (Sequential Function Chart) interface. On the left is a 'Batch Step List' table. The central area shows an SFC diagram with steps like 'MAKE', 'ADDITIVE', and 'FINAL'. On the right is a control panel with buttons for START, RE-START, HOLD, ABORT, STOP, MANUAL, AUTO, and CLEAR FAILURES. A red arrow points from the control panel to a dropdown menu containing the same set of control options.

STEP	STATE	MODE	STEP INDEX	REF PARAMETERS
+ MAKE_1	COMPLETE	0-AUTO	0	
+ MAKE_BASE_1			0	
ADD_INGRS_1			0	FLAVOR = WNT
AGSTATE_1			0	SPEED = 0 RPM
COOL_1			0	
QA_TEST_1			0	
SFER_OUT_LNK_1			0	
+ ADDITIVE_1			0	
+ MAKE_ADDITIVE_1			0	
ADD_INGRS_1			0	
AGSTATE_1			0	
SFER_OUT_LNK_1			0	
+ FINAL_1			0	

NAME	VALUE	ENGINEERING UNITS
No data		

NAME	LOW	HIGH	HIGH UNIT	ENGINEERING UNITS	TIME	ID
FLUORIDE_AHT	0	50	100	GAL	1	0
BKINGSODA_AHT	0	50	100	LBS	1	0
GLU_AHT	0	50	100	LBS	1	0
PH_AHT	0	50	100		0	0
WATER_AHT	0	50	100		0	0
FLAVOR_AHT	0	50	100		0	0
FLAVOR				WINTERGREEN		

- START
- RE-START
- HOLD
- ABORT
- STOP
- MANUAL
- AUTO
- CLEAR FAILURES

### Batch Step List

Displays the status of each step in a batch process.

Select the **SFC** tab to review batch related steps.

The screenshot displays an HMI interface for a process control system. On the left, there is a table with columns for STEP, STATE, MODE, STEP INDEX, and KEY PARAMETER. A red arrow points to the 'VALUE' column in this table. In the center, a process flow diagram shows a sequence of steps: MAKE, ADDITIVE, and FINAL, with intermediate steps like MAKE\_ADDITIVE and ADD\_INGS. On the right, there is a control panel with buttons for START, RE-START, HOLD, ABORT, STOP, MANUAL, AUTO, and CLEAR FAILURES. Below the main table, there is a detailed view of the table data.

STEP	STATE	MODE	STEP INDEX	KEY PARAMETER:
▷ BATCH_ID1	COMPLETE	O-AUTO	0	
▷ BASE:1			0	
▷ MAKE_BASE:1			0	
ADD_INGS:1			0	FLAVOR = WIN
AGITATE:1			0	SPEED = 0 RPM
COOL:1			0	
QA_TEST:1			0	
XFER_OUT_LNK:1			0	
▷ ADDITIVE:1			0	
▷ MAKE_ADDITIVE:1			0	
ADD_INGS:1			0	
AGITATE:1			0	
XFER_OUT_LNK:1			0	

## HMI Graphics

## HMI Graphics

## About HMI Graphics

HMI graphics are accessible only in the latest version of Operations Hub layout.

Use the HMI graphic plug-ins to design a pictorial setup of your industrial system. The plug-ins can be animated based on their configured tag data values. Operators can experience a real world layout while

monitoring the changing status of the system. The HMI graphics are scalable, and can be resized to fit into your application design.

[08292023%20Hmi%20Walkthrough.mp4](#)

The following table provides an overview on how to get started with HMI graphics.

Feature	Additional Information
<p>Create categories to efficiently organize and manage your HMI graphics.</p>	<p>Refer to these topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Create Category (on page 798)</a></li> <li>• <a href="#">Rename Category (on page 799)</a></li> <li>• <a href="#">Delete Category (on page 799)</a></li> </ul>
<p>With the Operations Hub installation, you get a list of <a href="#">out-of-the-box HMI Graphics (on page 223)</a> (not available in Operations Hub Classic). You can use the system HMI graphics to get started, and create custom graphics for varied applications.</p>	<p>Refer to these topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Create New Graphic (on page 791)</a></li> <li>• <a href="#">Duplicate Graphic (on page 791)</a></li> <li>• <a href="#">Edit Graphic (on page 793)</a></li> <li>• <a href="#">Rename Graphic (on page 793)</a></li> <li>• <a href="#">Delete Graphic (on page 797)</a></li> </ul>
<p>Distribute HMI graphics across different Operations Hub systems using the export/import feature.</p>	<p>Refer to these topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Export Graphic (on page 796)</a></li> <li>• <a href="#">Import Graphic (on page 796)</a></li> </ul>
<p>Easily import SVGs created using third-party tools into Operations Hub. The option to import an SVG file is located on the graphic editor's top toolbar.</p>	<p>Refer to these topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Import Third-Party SVGs (on page 820)</a></li> <li>• <a href="#">Troubleshooting SVGs Created with Third-Party Editors (on page 901)</a></li> </ul>
<p>Use the editor to design and manipulate Scalable Vector Graphics (SVG) elements. In the Graphics Editor, you can draw, modify, and arrange the SVG objects to create visual elements for your applications.</p> <p>The Operations Hub Graphics Editor provides all the essential tools to build graphics from scratch.</p>	<p>Refer to <a href="#">SVG Editor Tools (on page 818)</a></p>

Feature	Additional Information
<p>You can add SVG objects such as lines, shapes, and text via the side toolbar. Styling options, including color, borders, text formatting, size, position, rotation, and grouping, are available through the top and bottom toolbars.</p>	
<p>Link data items to graphical elements for real-time insights.</p> <p>For example, a gauge that shows the temperature of a machine might update its needle position according to the data item representing the temperature sensor reading.</p>	<p>Refer to <a href="#">Create Data Item (on page 800)</a></p>
<p>Add animations to highlight important information dynamically. By animating key elements or data points in SVGs, you can draw attention to critical information and elevate the user experience of your application.</p>	<p>Refer to these topics:</p> <ul style="list-style-type: none"> <li>• <a href="#">Add Datalink Animation (on page 802)</a></li> <li>• <a href="#">Add Color Animation (on page 804)</a></li> <li>• <a href="#">Add Fill Animation (on page 807)</a></li> <li>• <a href="#">Add Visibility Animation (on page 809)</a></li> <li>• <a href="#">Add Click Zone Animation (on page 812)</a></li> <li>• <a href="#">Add Rotation Animation (on page 814)</a></li> <li>• <a href="#">Delete Animation (on page 817)</a></li> </ul>
<p>In Operations Hub, you can easily add HMI graphics to your <a href="#">applications (on page 265)</a> by simply dragging and dropping them onto the <a href="#">page (on page 450)</a>.</p> <p>Binding data to the HMI graphics is same as with other widgets/plugin-ins within Operations Hub. Associating data with the graphical elements help to display relevant information, monitor systems, or provide real-time updates.</p>	<p>Refer to <a href="#">Bind Your Data to Plug-ins (on page 237)</a></p>
<p>To ensure consistent adaptation of HMI applications across different devices and screen sizes, make sure to enable the preservation of aspect ratio at the card level for responsive pages.</p>	<p>Refer to <a href="#">Coordinate Card (on page 248)</a></p>

## Duplicate Graphic

This topic describes how to duplicate and create a new HMI graphic.

You cannot create a graphic with duplicate names in the same folder.

1. You can duplicate all HMI graphics under system and custom.

Go to <b>System &gt; HMI Graphics &gt; High Performance</b> .
---

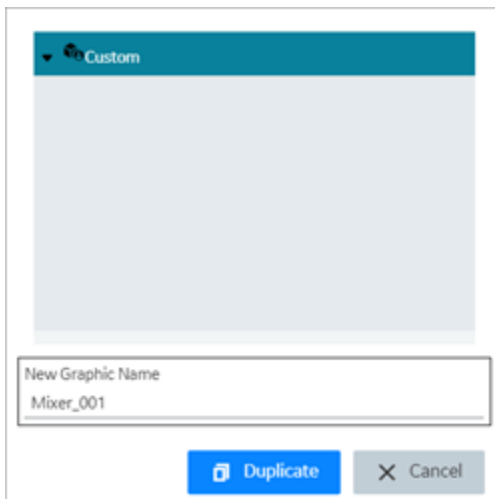
Go to <b>Custom &gt; HMI Graphics</b>
---------------------------------------

A list of HMI graphics appear.

2. Right-click the graphic you want to duplicate, and select **Duplicate Graphic**.

A pop-up screen appears.

3. Do the following:
  - a. Select a custom location path to save the new graphic.
  - b. Enter a new name for the graphic.
  - c. Select **Duplicate**.



You can access the newly created graphic under the custom plug-ins category.

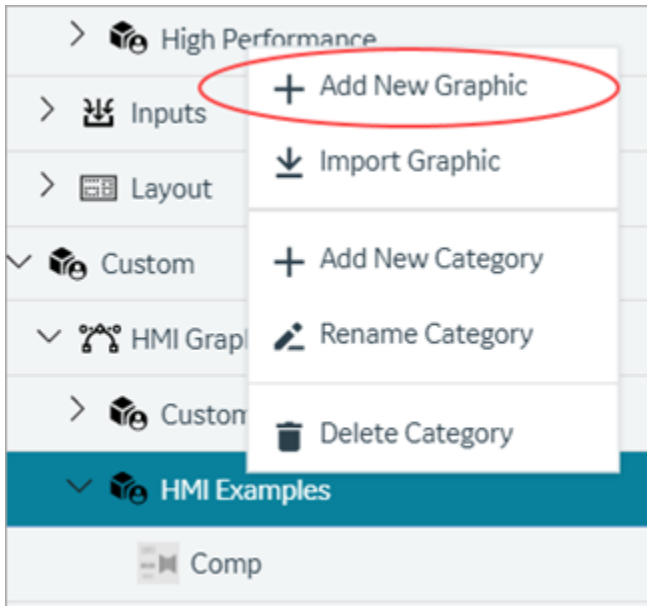
## Create New Graphic

This topic describes how to create a new HMI graphic.

Using the SVG editor, you can create new HMI graphics from scratch apart from [duplicating existing graphics \(on page 791\)](#).

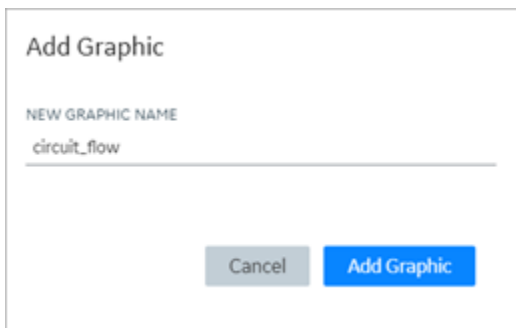
The following steps create a new SVG file. You can open the file in the editor to create interactive elements of an HMI graphic using the basic shapes, lines, etc.

1. Under custom graphics, select the folder category where you want to create and save the new graphic.
2. Right-click the folder and select **Add New Graphic**.



The **Add Graphic** screen appears.

3. Enter a name for the new graphic.
4. Select **Add Graphic**.



A blank SVG file is created with the name.

The newly created file is saved to the selected folder category.

1. Use the [edit option \(on page 793\)](#) to open the file in the SVG editor.
2. Use the [SVG editor tools \(on page 818\)](#) to create HMI graphics.

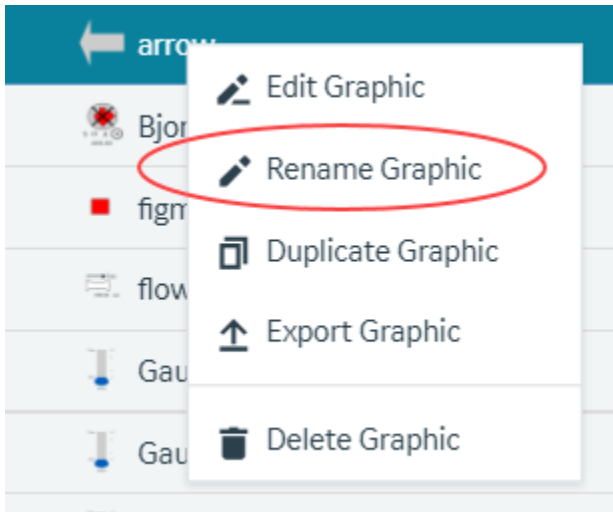


## Rename Graphic

This topic describes how to rename a newly created HMI graphic plug-in.

[Duplicate Graphic \(on page 791\)](#)

1. Under **Custom** plug-ins, right-click the graphic you want to rename.
2. Select **Rename Graphic**.



A confirmation dialog appears.

3. Enter a new name for the graphic.
4. Select **Rename** to save.

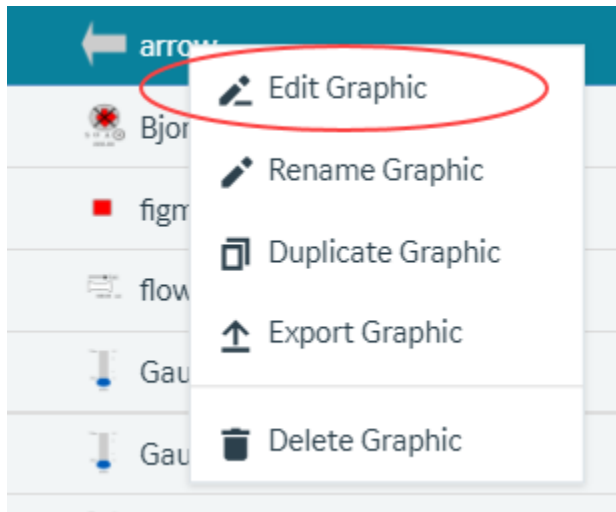
The graphic is updated with a new name.

## Edit Graphic

This topic describes how to modify a HMI graphic.

You can modify custom HMI graphics only.

1. Under **Custom** plug-ins, right-click the graphic you want to modify.
2. Select **Edit Graphic**.



The graphic opens in an SVG editor.

3. On the components panel, access the following tabs to modify the graphic:

<p><b>Graphic Tree</b></p>	<p>On this tab, you can view the hierarchy of SVG elements and corresponding animations. You can add or delete animations from this tree only. Refer to the following topics:</p> <ul style="list-style-type: none"> <li>◦ <a href="#">Add Datalink Animation (on page 802)</a></li> <li>◦ <a href="#">Add Color Animation (on page 804)</a></li> <li>◦ <a href="#">Add Fill Animation (on page 807)</a></li> <li>◦ <a href="#">Add Visibility Animation (on page 809)</a></li> <li>◦ <a href="#">Add Click Zone Animation (on page 812)</a></li> <li>◦ <a href="#">Add Rotation Animation (on page 814)</a></li> <li>◦ <a href="#">Delete Animation (on page 817)</a></li> </ul>
<p><b>Graphics List</b></p>	<p>On this tab, you can access all the plug-ins listed under the custom category. Refer to the following topics:</p> <ul style="list-style-type: none"> <li>◦ <a href="#">Create Category (on page 798)</a></li> <li>◦ <a href="#">Rename Category (on page 799)</a></li> <li>◦ <a href="#">Delete Category (on page 799)</a></li> </ul>

4. Save the changes made to the graphic.



**Note:**

Modifying graphic templates in an application affect the rendering of data and animations in the runtime environment. You need to manually replace the instances of the graphic template with its latest version in all affected pages. Refer to the table:

Graphic Template Modifications	What To Do
Added new animation	Update graphic instances to see the new animations.
Deleted existing animation	Update graphic instances to reflect the changes.
Modified visual elements (adding shapes, changing colors, etc.)	No manual action required. Changes are automatically recognized by graphic instances in the runtime.

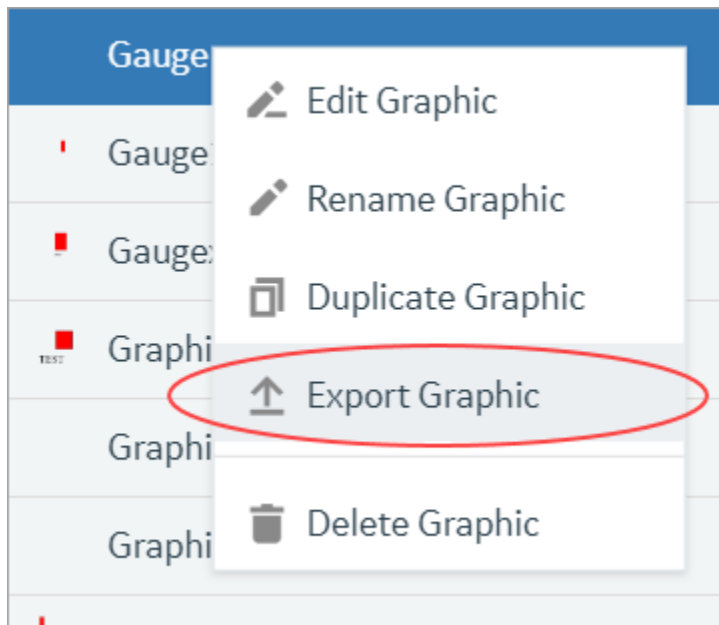
## Export Graphic

This topic describes how to export a HMI graphic.

You can export and save graphics to re-use them across different systems. For example, a system integrator builds a valve graphic and implements it for various customers.

To import/export SVGs, refer to [SVG Editor Tools \(on page 818\)](#).

1. Under **Custom** plug-ins, right-click the graphic you want to export.
2. Select **Export Graphic**.



The export graphic screen appears.

3. Select **Export**.

The file is exported and saved as a JSON file.

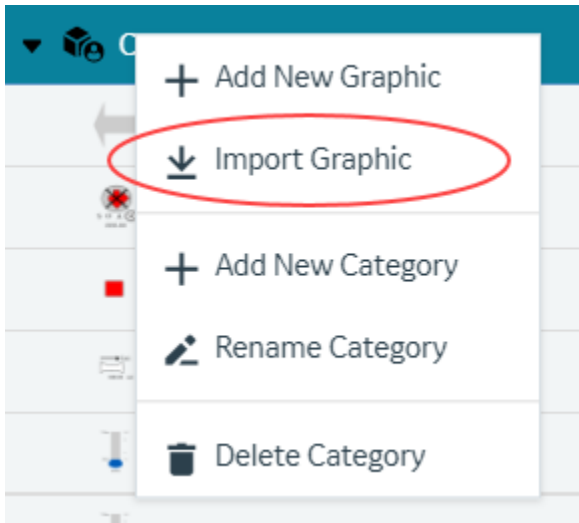
## Import Graphic

This topic describes how to import a HMI graphic.

HMI graphics are a combination of SVGs (visual shapes/text, etc.) and animated content stored in a JSON file. This file can be distributed across different Operations Hub systems using the export/import feature. Invalid JSON files will not get imported to Operations Hub.

To import/export SVGs, refer to [SVG Editor Tools \(on page 818\)](#).

1. Under **Custom** plug-ins, right-click the folder where you want to import a graphic.
2. Select **Import Graphic**.



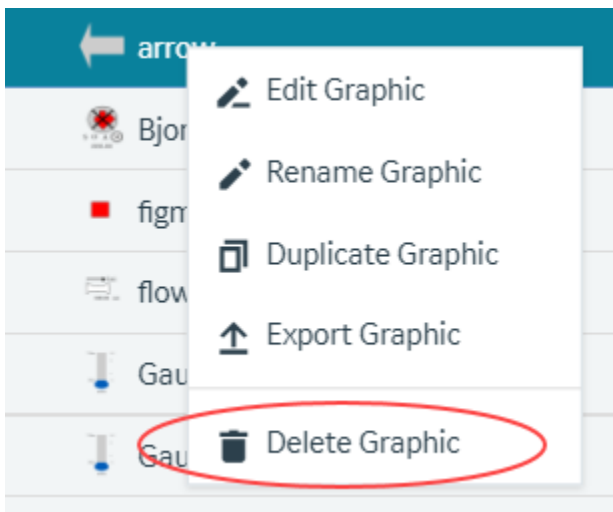
3. Browse the system and locate the JSON file you want to import.
4. Select **Import**.

The file is imported to the folder.

## Delete Graphic

This topic describes how to delete a HMI graphic plug-in.

1. Under **Custom** plug-ins, right-click the graphic you want to delete.
2. Select **Delete Graphic**.



A confirm dialog appears.

3. Select **Yes**

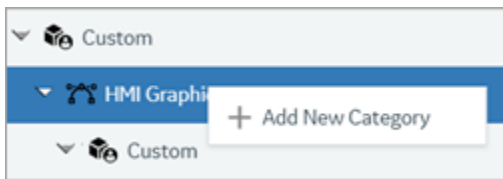
The graphic is deleted from Operations Hub.

## Create Category

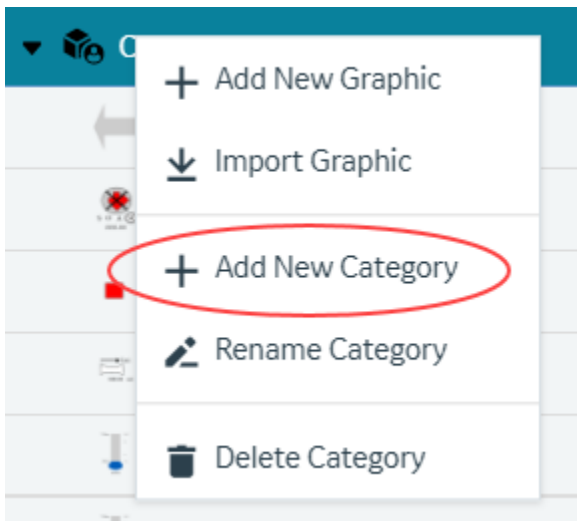
This topic describes how to create folders and sub-folders to categorize custom graphics.

You can also create categories on the components panel while [editing graphics \(on page 793\)](#).

1. To create a category for the first time under **Custom**, right-click **HMI Graphics** and select **Add New Category**.



Hereafter, you can create categories at every level. Right-click the folder where you want to create a category and select **Add New Category**.



The **Add Category** screen appears.

2. Enter a name for the new category.
3. Select **Add Category**.

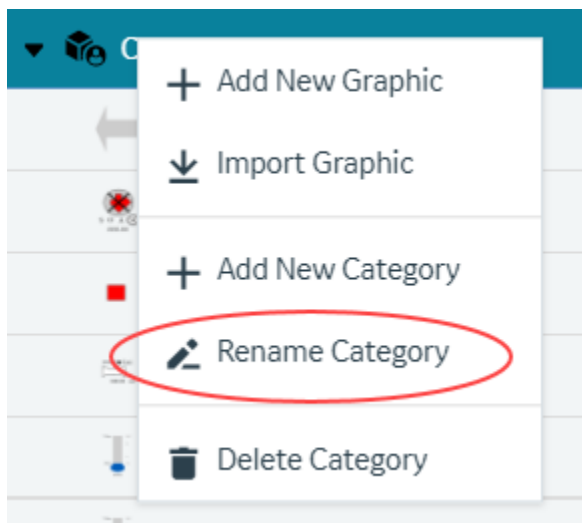
A folder with the given name is created.

## Rename Category

This topic describes how to rename the folder categories.

[Create Category \(on page 798\)](#)

1. Right-click the folder you want to rename and select **Rename Category**.



A screen appears with the current folder name.

2. Enter a new name and select **Rename**.

The folder category is saved with the new name.

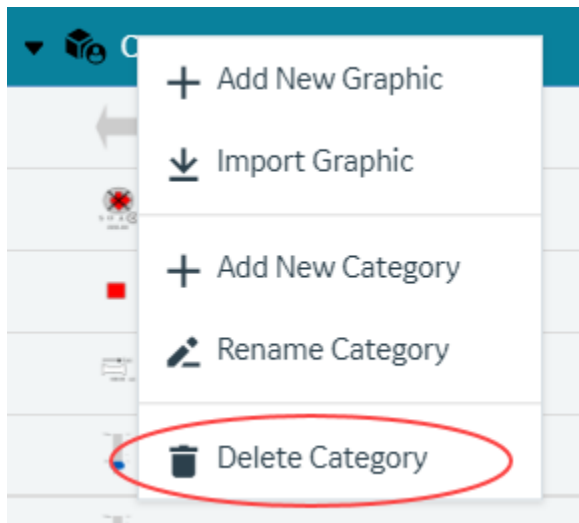
## Delete Category

This topic describes how to delete the folder categories.

[Create Category \(on page 798\)](#)

If you want to delete any custom folder/sub-folder, first delete the graphics within the folder.

1. Right-click the folder you want to delete and select **Delete Category**.



A confirmation screen to confirm the delete action appears.

2. Select **Yes**.

The folder category is deleted.

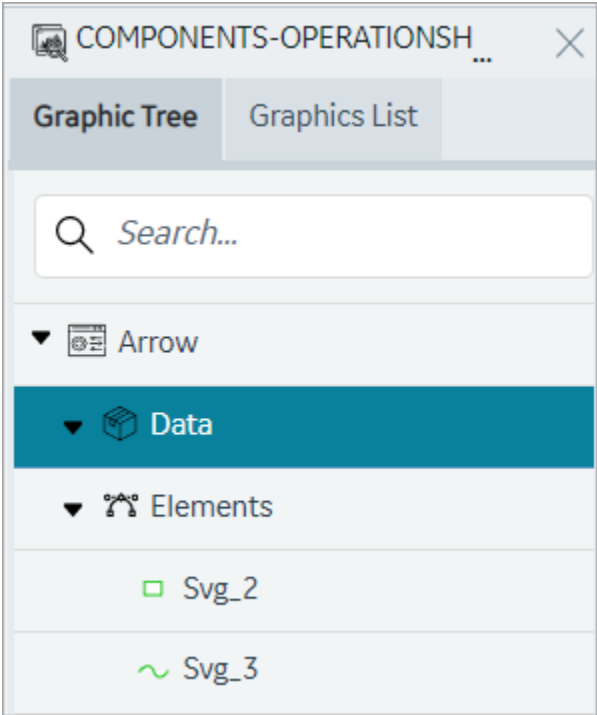
## Create Data Item

This topic describes how to create data items for SVG graphics.

You can create only one data item for each graphic. By default, every graphic has a data item attached to it. You can modify or delete the default data item. In the following steps, you can create a data item in case you deleted the default data item.

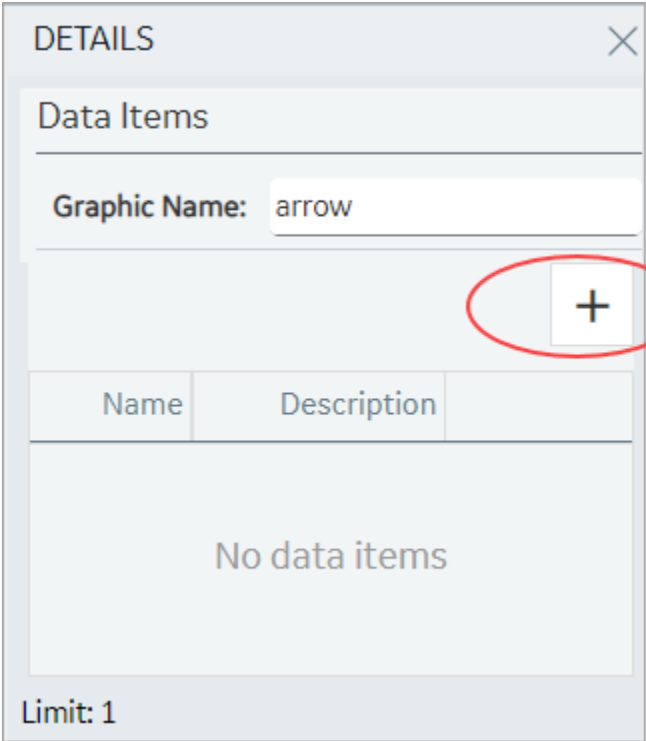
1. Open the graphic in the SVG editor.  
See [Edit Graphic \(on page 793\)](#).
2. On the components panel, navigate to **Graphic Tree > Data**





**Data Items** appears on the details panel.

3. Select + icon.



4. Enter a **Name** and **Description** for the data item.
5. Select **Update**.

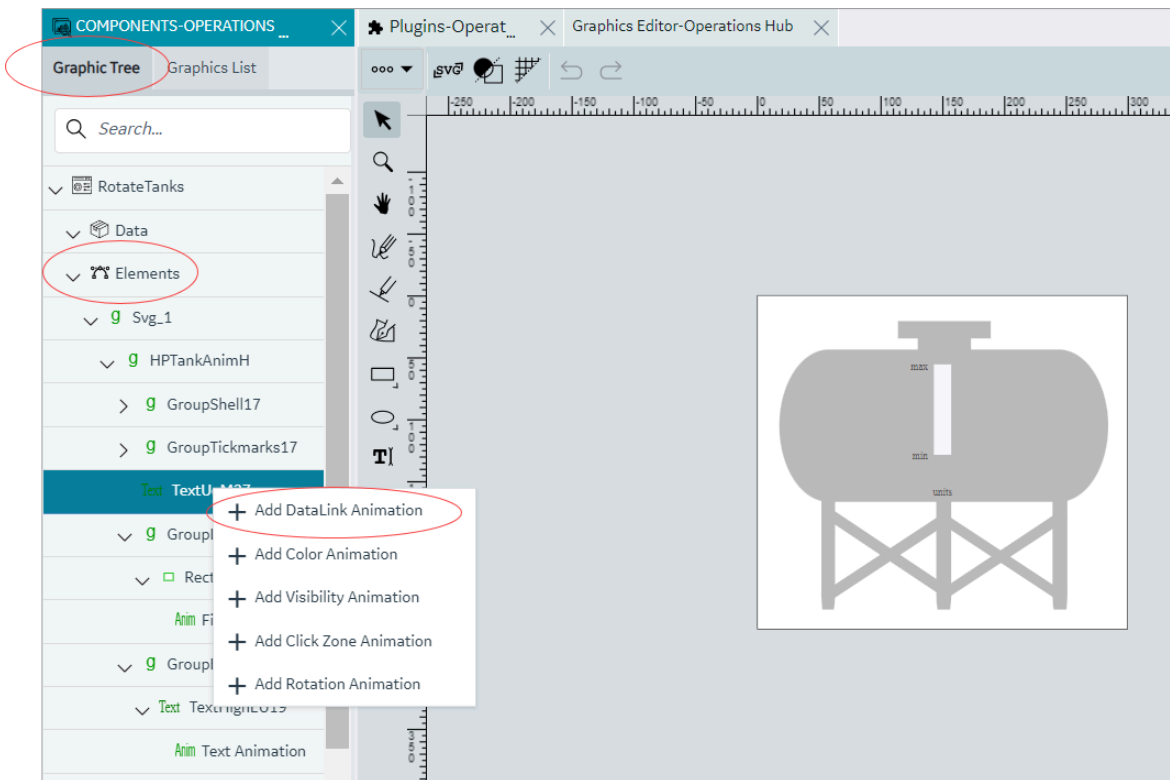
The data item is created with options to modify and delete the item.

## Add Datalink Animation

This topic describes how to animate text for SVG graphics.

You can create text elements and animate them. You can also use input data to create dynamic and interactive animations by linking data to the animation properties. At runtime, the animation is executed based on the data. For example, change in color of an element based on data values.

1. Open the graphic to modify.
  - See [Edit Graphic \(on page 793\)](#).
2. Navigate to **Graphic Tree > Elements** and right-click the text element you want to animate.
3. Select **Add DataLink Animation**.



Adds an entry for text animation under the element.

4. On the Details panel, access the text animation properties for the entry.
5. Enter information in the following fields:

Field Name	Description
Animation Name	Provide a name for reference.
Data Type	Choose from these data types to configure animation properties: <ul style="list-style-type: none"> <li>◦ <code>Text</code></li> <li>◦ <code>Decimal</code></li> <li>◦ <code>Integer</code></li> </ul>
Data Item	Select the data item you want to apply to the element. For example, the water level in the HMI tank dynamically rises or falls based on the sensor reading data item.  See <a href="#">Create Data Item (on page 800)</a> .
Attribute	The drop-down list contains several attributes, which can be associated with the data item in order to animate the HMI Graphic. The animation will apply to the selected attribute.
Default Value	Enter a default value for the selected attribute.  This default value is used only when the data source is set to <b>Manual</b> in page designer. See <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .
Zero Fill	Select this check box if you want to fill unused digits with zeroes.  For example, if the graphic can display a maximum of four digits and the current value is 25, it is displayed as "0025" when zero fill is enabled.
Integer Digits	If <b>Zero Fill</b> is enabled, enter the number of digits for display.
Group Digits	Select this check box if you want to group the digits in a graphic display making it easy to read.  For example, 123456 can be grouped as "123,456".
Scientific	Select this check box if you want to display numbers in scientific notation. This option is useful for displaying very large numbers in a more compact and readable format.

Field Name	Description
Decimal Digits	Enter the number of decimal places to display a number. This option helps to avoid displaying unnecessary decimal places or rounding errors.

6. On the toolbar, select **Save**.

The animation is applied.



**Note:**

Modifying graphic templates in an application affect the rendering of data and animations in the runtime environment. You need to manually replace the instances of the graphic template with its latest version in all affected pages. Refer to the table:

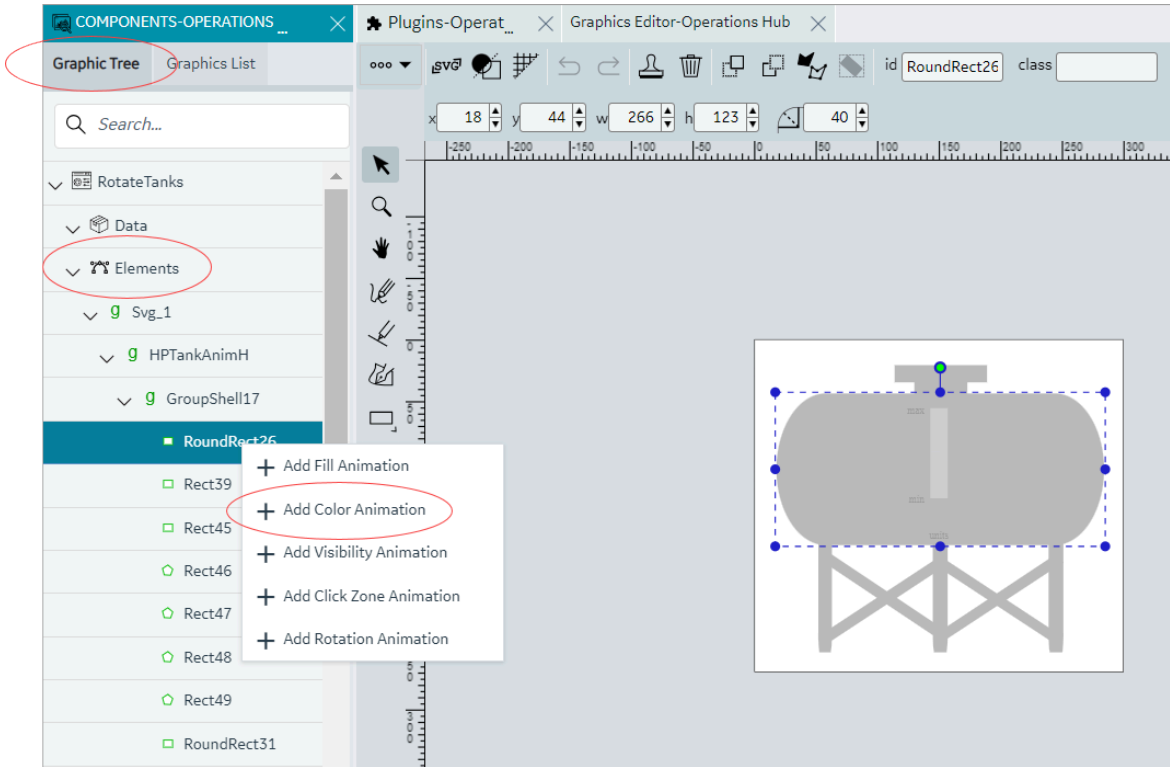
Graphic Template Modifications	What To Do
Added new animation	Update graphic instances to see the new animations.
Deleted existing animation	Update graphic instances to reflect the changes.
Modified visual elements (adding shapes, changing colors, etc.)	No manual action required. Changes are automatically recognized by graphic instances in the runtime.

## Add Color Animation

This topic describes how to create color animation for SVG graphics.

You can animate to change the color of the SVG graphic element.

1. Open the graphic to modify.  
See [Edit Graphic \(on page 793\)](#).
2. Navigate to **Graphic Tree > Elements** and right-click the element you want to animate.
3. Select **Add Color Animation**.



Adds an entry for color animation under the element.

4. On the Details panel, access the color animation properties for the entry.
5. Enter information in the following fields:

Field Name	Description
Animation Name	Provide a name for reference.
Data Item	Select the data item you want to apply to the element. For example, a machine status indicator light changes color based on the machine's operational state.  See <a href="#">Create Data Item (on page 800)</a> .
Attribute	The drop-down list contains several attributes, which can be associated with the data item in order to animate the HMI Graphic. The animation will apply to the selected attribute.
Default Value	Enter a default value for the selected attribute.  This default value is used only when the data source is set to <b>Manual</b> in page designer. See <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .

Field Name	Description
Color Table	<p>Configure one or more colors to change the color based on a specific value.</p> <p>To configure a color:</p> <ol style="list-style-type: none"> <li>Select the + icon.</li> <li>Select a logical <b>Operator</b>. For example, &lt;</li> <li>Enter a <b>Value</b> (numerical or string). <ul style="list-style-type: none"> <li>Numerical example: If the value is less than 50, turn green. (OR)</li> <li>String example: If the value is Low, turn green.</li> </ul> </li> <li>Choose a <b>Color</b>. For example, green.</li> <li>Select <b>Update</b>.</li> </ol> <p>Similarly, add another value to the table that is &gt;= 50 (or High) with red color.</p> <p>Result: If the value is less than 50 (or Low), the element's color remains green. If the value is greater than or equal to 50 (or High), the element's color turns red.</p> <p>Configured colors appear in a table with options to modify and delete the colors. You can also drag-to-reorder the list of colors in a table.</p>

6. On the toolbar, select **Save**.


The animation is applied.



**Note:**

Modifying graphic templates in an application affect the rendering of data and animations in the runtime environment. You need to manually replace the instances of the graphic template with its latest version in all affected pages. Refer to the table:

Graphic Template Modifications	What To Do
Added new animation	Update graphic instances to see the new animations.
Deleted existing animation	Update graphic instances to reflect the changes.

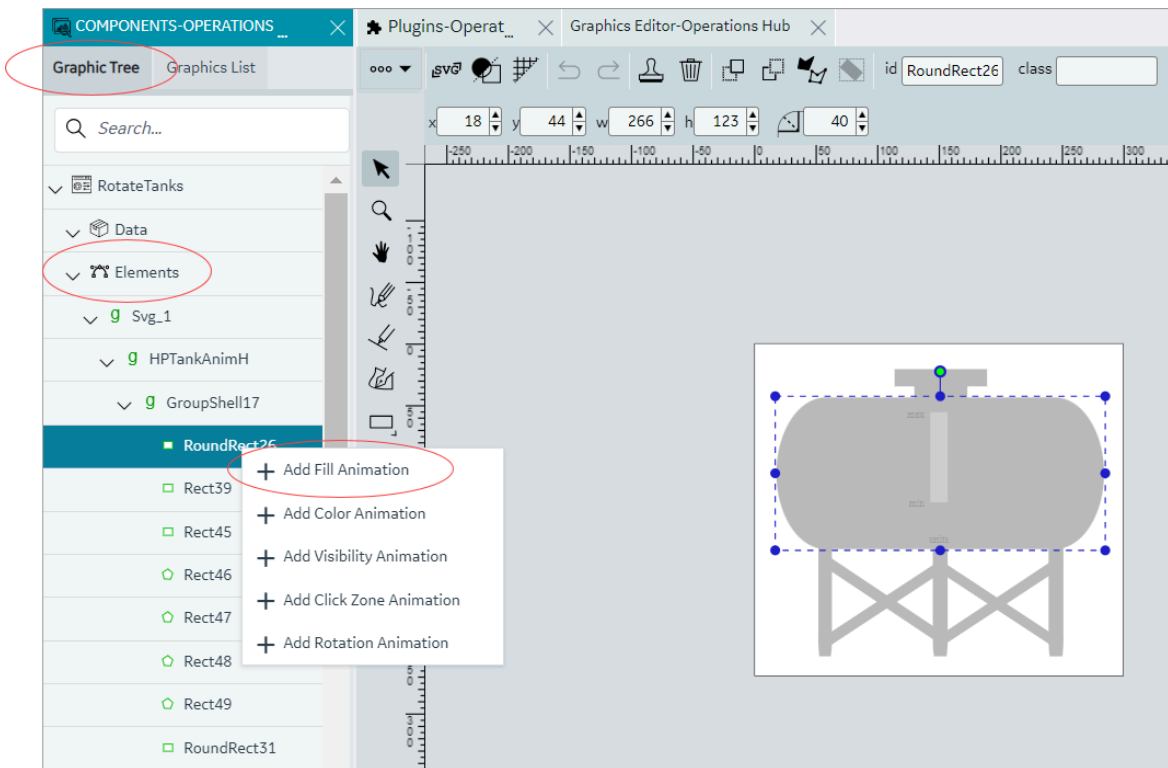
	Graphic Template Modifications	What To Do
	Modified visual elements (adding shapes, changing colors, etc.)	No manual action required. Changes are automatically recognized by graphic instances in the runtime.

## Add Fill Animation

This topic describes how to create fill animation for SVG graphics.

You can animate the fill color of the SVG graphic element.

1. Open the graphic to modify.  
See [Edit Graphic \(on page 793\)](#).
2. Navigate to **Graphic Tree > Elements** and right-click the element you want to animate.
3. Select **Add Fill Animation**.



Adds an entry for fill animation under the element.

4. On the Details panel, access the fill animation properties for the entry.
5. Enter information in the following fields:

Field Name	Description
Animation Name	Provide a name for reference.
Color	Select a color to fill the SVG element. For example, sets the color of the liquid or the substance represented by the SVG tank.
Fill Direction	Select from these directional modes, in which a gauge or pump is filled with data: <ul style="list-style-type: none"> <li>◦ left-to-right</li> <li>◦ right-to-left</li> <li>◦ bottom-to-top</li> <li>◦ top-to-bottom</li> </ul>
Level	The values entered in this section apply to an object's fill-level, such as the progress of a loading bar or the level of a liquid in a container.
Minimum	The values entered in this section apply to minimum values of a range. For example, minimum levels of a gauge.
Maximum	The values entered in this section apply to maximum values of a range. For example, maximum levels of a gauge.
Data Item	Select the data item you want to apply to the element. For example, the HMI tank's fill level changes based on the water level data item.  See <a href="#">Create Data Item (on page 800)</a> .
Attribute	The drop-down list contains several attributes, which can be associated with the data item in order to animate the HMI Graphic. The animation will apply to the selected attribute.
Default Value	Enter a default value for the selected attribute.  This default value is used only when the data source is set to <b>Manual</b> in page designer. See <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .

6. On the toolbar, select **Save**.

The animation is applied.



**Note:**

Modifying graphic templates in an application affect the rendering of data and animations in the runtime environment. You need to manually replace the instances of the graphic template with its latest version in all affected pages. Refer to the table:

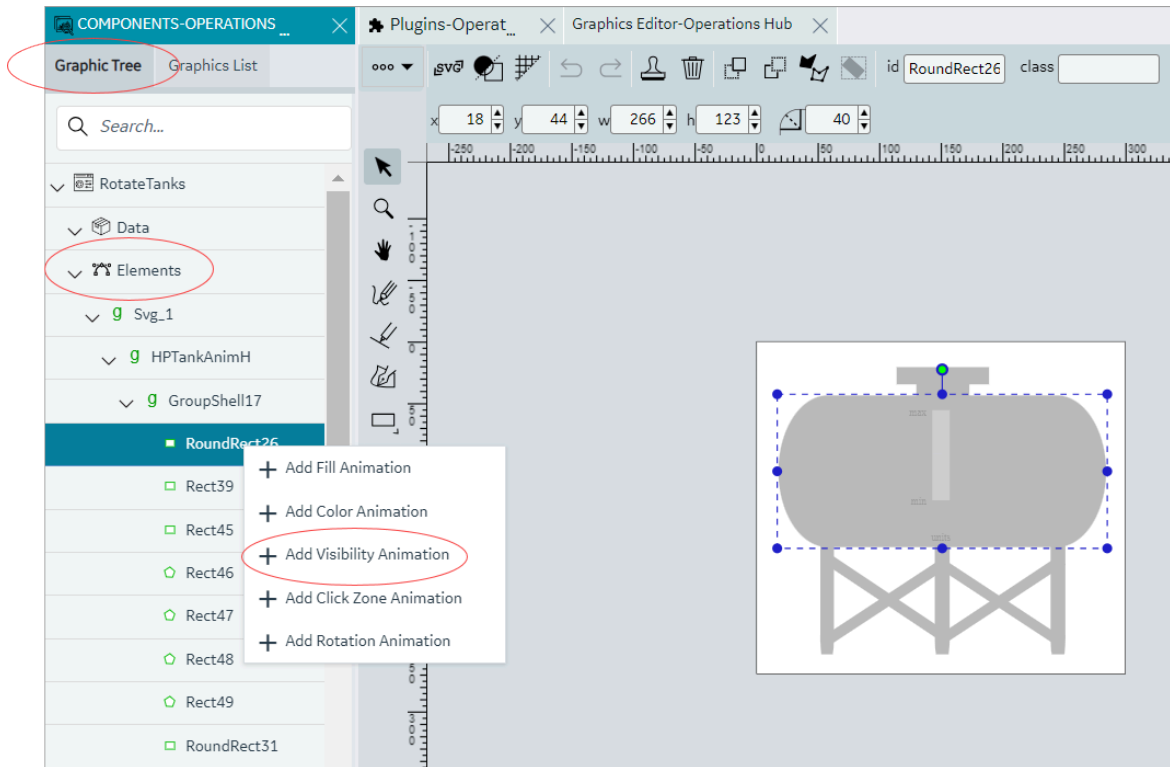
Graphic Template Modifications	What To Do
Added new animation	Update graphic instances to see the new animations.
Deleted existing animation	Update graphic instances to reflect the changes.
Modified visual elements (adding shapes, changing colors, etc.)	No manual action required. Changes are automatically recognized by graphic instances in the runtime.

## Add Visibility Animation

This topic describes how to create visibility animation for SVG graphics.

Lets you control the visibility of graphical elements.

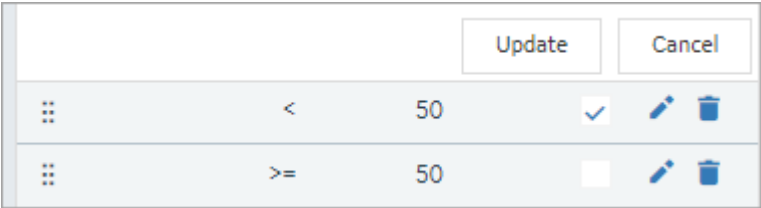
1. Open the graphic to modify.  
See [Edit Graphic \(on page 793\)](#).
2. Navigate to **Graphic Tree > Elements** and right-click the element you want to animate.
3. Select **Add Visibility Animation**.



Adds an entry for visibility animation under the element.


4. On the Details panel, access the visibility animation properties for the entry.
5. Enter information in the following fields:


Field Name	Description
Animation Name	Provide a name for reference.
Data Item	Select the data item you want to apply to the element. For example, a warning icon becomes visible if a temperature sensor data item exceeds a critical value.  See <a href="#">Create Data Item (on page 800)</a> .
Attribute	The drop-down list contains several attributes, which can be associated with the data item in order to animate the HMI Graphic. The animation will apply to the selected attribute.
Default Value	Enter a default value for the selected attribute.  This default value is used only when the data source is set to <b>Manual</b> in page designer. See <a href="#">Bind Your Data to Plug-ins (on page 237)</a> .

Field Name	Description
Visibility Table	<p>Configure one or more values to animate the visibility status of the element.</p> <p>To configure visibility status:</p> <ol style="list-style-type: none"><li>Select the + icon.</li><li>Select a logical <b>Operator</b>. For example, &lt;</li><li>Enter a <b>Value</b> (numerical or string).<ul style="list-style-type: none"><li>Numerical example: If the value is less than 50, show the element.</li><li>String example: If the value is LoLo, show the element.</li></ul></li><li>Select the check box for <b>Visible</b>.</li><li>Select <b>Update</b>.</li></ol> <p>Similarly, add another value to the table that is &gt;= 50 (or HiHi) with visible check box cleared.</p>  <p>Result: The element is visible only when the value is less than 50 (or LoLo). If the value is greater than or equal to 50 (or HiHi), the element is hidden.</p> <p>The visibility configuration values appear in a table with options to modify and delete them. You can also drag-to-reorder the visibility list.</p>

6. On the toolbar, select **Save**.

The animation is applied.

 **Note:** Modifying graphic templates in an application affect the rendering of data and animations in the runtime environment. You need to manually replace the instances of the graphic template with its latest version in all affected pages. Refer to the table:

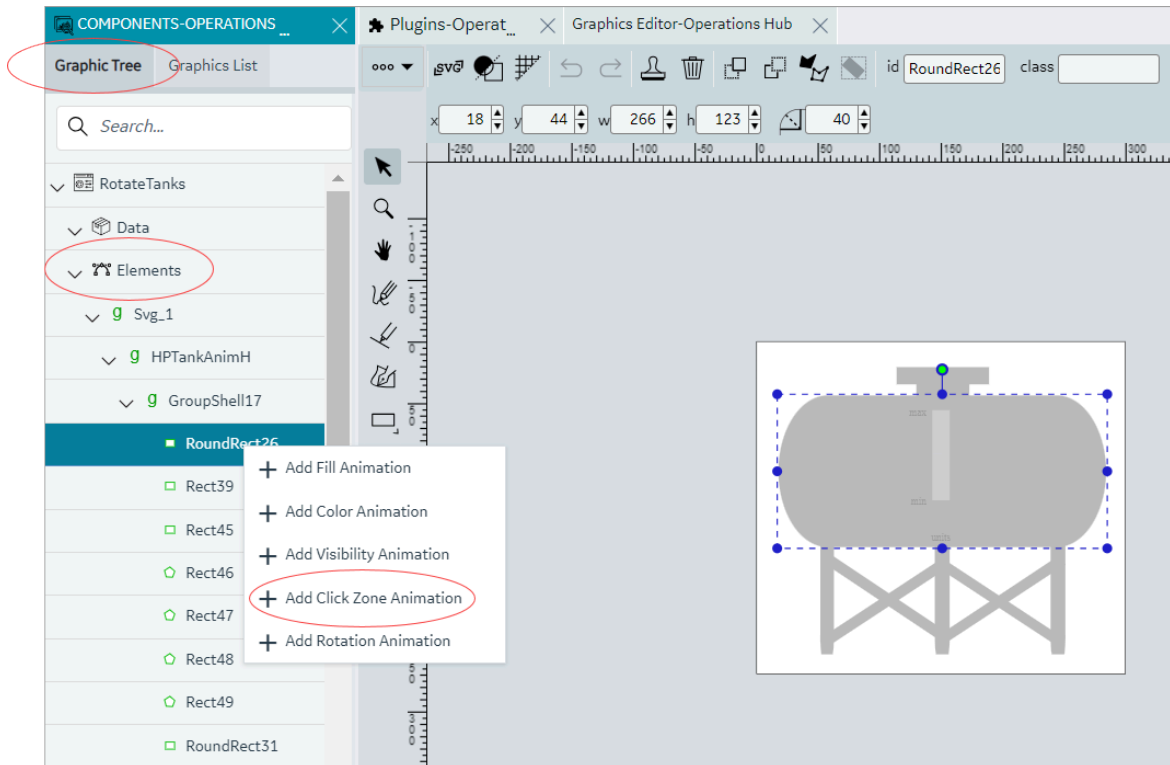
 <b>Graphic Template Modifications</b>	<b>What To Do</b>
Added new animation	Update graphic instances to see the new animations.
Deleted existing animation	Update graphic instances to reflect the changes.
Modified visual elements (adding shapes, changing colors, etc.)	No manual action required. Changes are automatically recognized by graphic instances in the runtime.

## Add Click Zone Animation

This topic describes how to trigger animations when a user clicks on a specific area.

Identify the element area and set up a click zone animation that responds to user clicks.

1. Open the graphic to modify.  
See [Edit Graphic \(on page 793\)](#).
2. Navigate to **Graphic Tree > Elements** and right-click the element you want to animate.
3. Select **Add Click Zone Animation**.



Adds an entry for click zone animation under the element.

4. On the Details panel, access the click zone animation properties for the entry.

5. Enter information in the following fields:

Field Name	Description
Animation Name	<p>Provide a unique name for the animation.</p> <p>This name can be used to reference or identify the animation, making it easier to manage and control multiple animations on a single page.</p>
Actions	<p>Add one or more action values to animate specific areas in an element.</p> <p>To add an action:</p> <ol style="list-style-type: none"> <li>Select the + icon.</li> <li>Select an action to define what happens when a user interacts with a specific area. For example, the <code>URL</code> action opens the specified web page, (OR) <code>Go To Page</code> leads to the specified page.</li> <li>Select <b>Update</b>.</li> </ol> <p>You have the option to modify or delete all the action values added to a specific area. You can also drag-to-reorder the actions list.</p>
Data Item	<p>Select the data item you want to apply to the element. For example, clicking on the HMI tank opens a detailed view showing historical water level data, leveraging the data item associated with the sensor.</p> <p>See <a href="#">Create Data Item (on page 800)</a>.</p>
Attribute	<p>The drop-down list contains several attributes, which can be associated with the data item in order to animate the HMI Graphic. The animation will apply to the selected attribute.</p>
Default	<p>Enter a default value for the selected attribute.</p> <p>This default value is used only when the data source is set to <b>Manual</b> in page designer. See <a href="#">Bind Your Data to Plug-ins (on page 237)</a>.</p>

6. On the toolbar, select **Save**.

The animation is applied.

**Note:**

Modifying graphic templates in an application affect the rendering of data and animations in the runtime environment. You need to manually replace the instances of the graphic template with its latest version in all affected pages. Refer to the table:

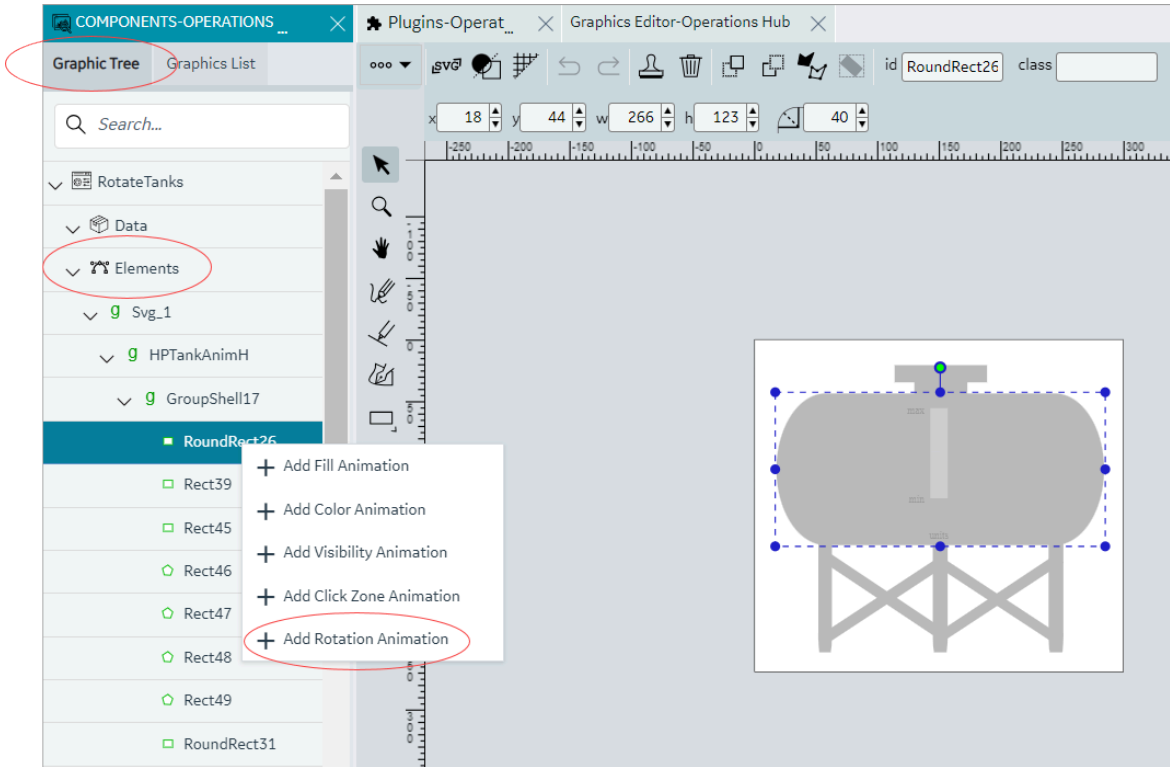
Graphic Template Modifications	What To Do
Added new animation	Update graphic instances to see the new animations.
Deleted existing animation	Update graphic instances to reflect the changes.
Modified visual elements (adding shapes, changing colors, etc.)	No manual action required. Changes are automatically recognized by graphic instances in the runtime.

## Add Rotation Animation

This topic describes how to rotate SVG graphics.

Rotation animation in SVG graphics allows you to make elements turn or spin around a fixed point.

1. Open the graphic to modify.  
See [Edit Graphic \(on page 793\)](#).
2. Navigate to **Graphic Tree > Elements** and right-click the element you want to animate.
3. Select **Add Rotation Animation**.



Adds an entry for rotation animation under the element.

4. On the Details panel, access the rotation animation properties for the entry.
5. Enter information in the following fields:

Field Name	Description
Animation Name	<p>Provide a unique name for the animation.</p> <p>This name can be used to reference or identify the animation, making it easier to manage and control multiple animations on a single page.</p>
Input Bindings	<p>Configure dynamic input values that can control the rotation behavior of the element.</p> <ul style="list-style-type: none"> <li>◦ Value: Specify the tag that provides the actual input data value from a data source.</li> <li>◦ Minimum: Represents the minimum value associated with the specified tag.</li> </ul>

Field Name	Description
	<ul style="list-style-type: none"> <li>◦ <b>Maximum:</b> Represents the maximum value associated with the specified tag.</li> </ul> <p>The rotation angle of the element is determined through linear scaling of the input value between the specified input min/max, and mapping it to the output min/max values.</p>
Output Angle	<p>Specify the range within which the element can rotate.</p> <ul style="list-style-type: none"> <li>◦ <b>Minimum:</b> Enter the starting point of rotation angle. For example, <code>0</code> degrees could mean the tank (HMI graphic) is in its default upright position.</li> <li>◦ <b>Maximum:</b> Enter the end point of rotation angle. For example, setting this to <code>180</code> degrees might represent the tank being fully tilted or rotated to its maximum allowed position.</li> </ul>
Use Shape Center	<p>Determines the pivot point for the rotation.</p> <p>If this check box is <b>enabled</b>, the rotation will occur around the center of the SVG element, eliminating the need to manually specify the pivot point coordinates.</p> <p>If this check box is <b>disabled</b>, you need to manually specify the <b>X</b> and <b>Y</b> coordinates of the pivot point for the rotation.</p>
Data Item	<p>Select the data item you want to apply to the element. For example, wind turbine blades rotate according to wind speed data item, (OR) a HMI valve handle rotates to indicate its open or closed position based on a data item.</p> <p>See <a href="#">Create Data Item (on page 800)</a>.</p>
Attribute	<p>The drop-down list contains several attributes, which can be associated with the data item in order to animate the HMI Graphic. The animation will apply to the selected attribute.</p>
Default Value	<p>Enter a default value for the selected attribute.</p> <p>This default value is used only when the data source is set to <b>Manual</b> in page designer. See <a href="#">Bind Your Data to Plug-ins (on page 237)</a>.</p>

6. On the toolbar, select **Save**.



The animation is applied.



**Note:**

Modifying graphic templates in an application affect the rendering of data and animations in the runtime environment. You need to manually replace the instances of the graphic template with its latest version in all affected pages. Refer to the table:

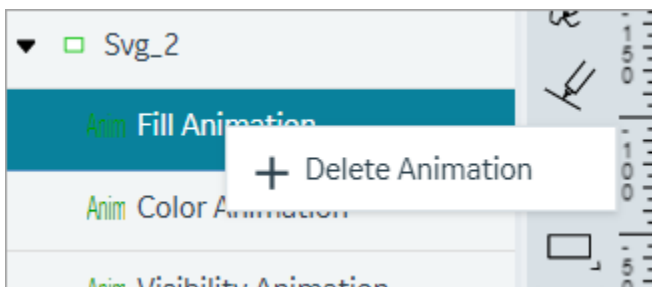
Graphic Template Modifications	What To Do
Added new animation	Update graphic instances to see the new animations.
Deleted existing animation	Update graphic instances to reflect the changes.
Modified visual elements (adding shapes, changing colors, etc.)	No manual action required. Changes are automatically recognized by graphic instances in the runtime.

## Delete Animation

This topic describes how to delete animation for SVG graphics.

You can delete text, color, fill, click zone, rotate, and visibility animation.

1. Open the graphic in the SVG editor.  
See [Edit Graphic \(on page 793\)](#).
2. Navigate to **Graphic Tree > Elements**.
3. Right-click the animation you want to delete.
4. Select **Delete Animation**.



The animation is deleted.



**Note:**

Modifying graphic templates in an application affect the rendering of data and animations in the runtime environment. You need to manually replace the instances of the graphic template with its latest version in all affected pages. Refer to the table:

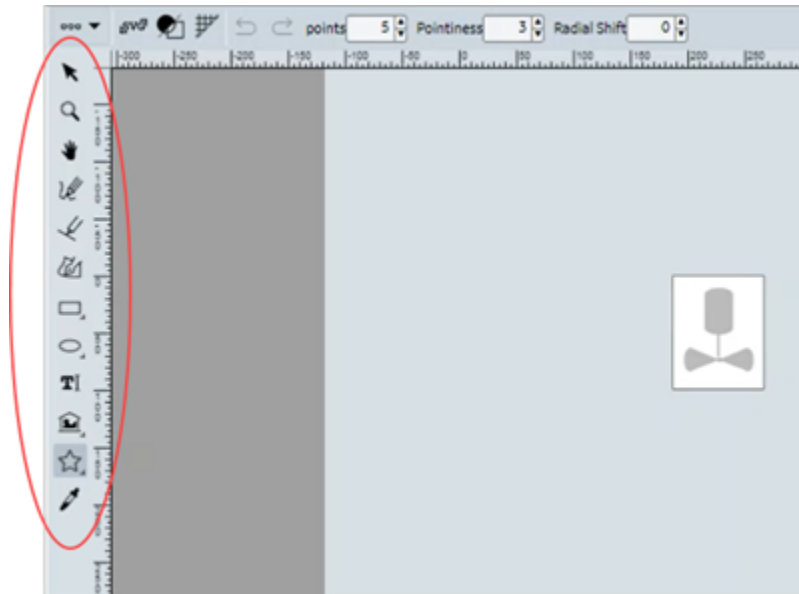
Graphic Template Modifications	What To Do
Added new animation	Update graphic instances to see the new animations.
Deleted existing animation	Update graphic instances to reflect the changes.
Modified visual elements (adding shapes, changing colors, etc.)	No manual action required. Changes are automatically recognized by graphic instances in the runtime.

## SVG Editor Tools

This topic describes SVG editor tools.

You can modify SVG files using the SVG editor's user-friendly interface.

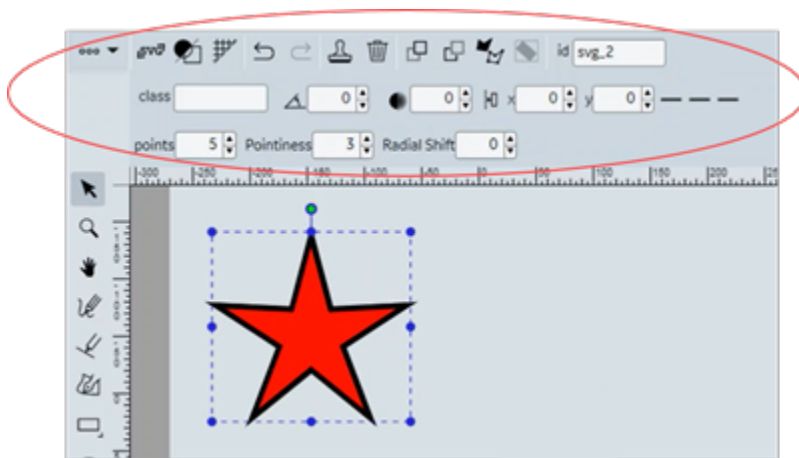
### Side Toolbar Options



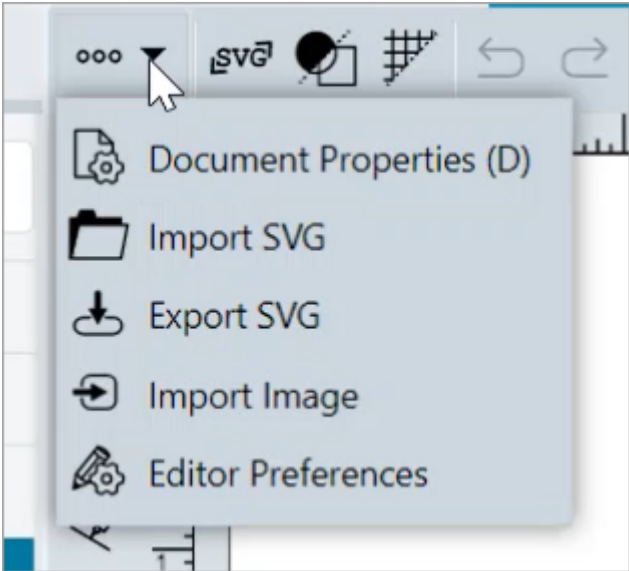
Tool	Description
Select Tool	Allows you to select and move objects within the editing area.

Tool	Description
Zoom Tool	Zoom in/out to view objects at different levels of detail. It helps to perform precise edits and adjustments.
Panning	Helps to pan around when used along with the zoom tool.
Pencil Tool	Use this tool to create any shape or design. You can draw and create custom shapes by dragging the mouse.
Line Tool	To create a perfectly vertical or horizontal straight line, hold down the Shift key while drawing the line.
Path Tool	Use the tool to draw a path creating additional points along the way. A path has a start point, end point, and curve parameters of the path. To create the shape you want, mouse-click and drag. To end the path, double-click.
Square/Rectangle Tool	Create squares or rectangles of different sizes. Useful for creating basic geometric shapes. Hold down the Shift key while drawing to create a perfect shape.
Ellipse/Circle Tool	Create ellipses or circles of different sizes.
Text Tool	Allows you to add and edit text within the editing area. Useful for adding labels, annotations, etc.
Shape library	Contains ready-to-use shapes such as geometric shapes, mathematical shapes, flowchart shapes, etc.
Polygon/Star Tool	<p>The polygon tool allows you to create polygon shapes.</p> <p>The star tool allows you to create star shapes. You can resize these shapes without losing their sharpness and quality.</p>
Eye Dropper Tool	Use the tool to pick a color from an existing object. You can now use the picked color for other elements as well.

## Top Toolbar Options



The options in the top toolbar may vary based on the selected objects.

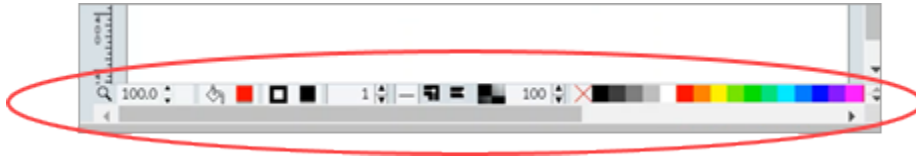
Tool	Description
Document Properties	<p>In the document properties dialog, you can modify the SVG document settings.</p> 
Import SVG	<p>Allows to select and import an SVG file containing shapes, text, and/or images to Operations Hub and add interactive animation using our SVG editor.</p> <p>This option allows you to use SVG files created using third party tools, such as Microsoft Powerpoint, Adobe Illustrator, Inkscape, Figma, etc. These are fixed SVG images and do not contain any animation. Such</p>

Tool	Description
	<p>SVGs when imported may get slightly altered to match our SVG format. For example, <code>tspan</code> elements are converted to <code>&lt;text&gt;</code> elements.</p> <p>You can also modify third party SVGs by editing its source code.</p>
Export SVG	Allows to export the SVG file and save as HMI graphic.
Import Image	Allows to import an image file. For example, PNG, JPEG, etc.
Editor Preferences	In the editor preferences dialog, you can modify the SVG background, units of measurement, and grid settings.
Edit Source	Opens a code editor, wherein you can make changes to the source code and save it.
Wireframe Mode	When you switch to the wireframe mode, visual distractions such as color, texture, and other design elements are removed. This helps to focus on the layout, positioning, and hierarchy of elements, and make adjustments as necessary. Once the basic structure is in place, you can switch back to the normal mode, and continue working on other design elements.
Show/Hide Grid	Shows/hides the grid layout.
Undo and Redo	These buttons allow you to undo or redo changes you've made to the canvas.
Duplicate Element	Duplicates the selected element.
Delete Element	Deletes the selected element.
Bring to Front	When objects overlap on the page, brings the selected object to the front.
Send to Back	When objects overlap on the page, sends the selected object to the back.
Convert to Path	<p>You can convert an object to a path. This option is used along with the path editing tools to turn a simple shape/text into a complex vector shape. Consider these points when using the tool:</p> <ul style="list-style-type: none"> <li>• Once you convert an object to a path, you cannot easily convert it back to its original form.</li> <li>• Converting an object to a path can make the file size larger.</li> </ul>

Tool	Description
Reorient Path	Allows you to change the orientation or direction of a path for the selected object, either clockwise or counterclockwise. It is useful when you want to change the starting point or direction of a path without having to redraw it.
Identify the element	When using multiple objects in SVG, this option identifies the selected object within the editing area.
Element class	You can use defined classes to apply styles or behaviors to various elements in SVG file.
Change rotation angle	Rotates the selected object to the selected degrees.
Change gaussian blur value	Increases the blur effect on the object based on the increasing value.
Align	Use the alignment options to position objects within the editing area. Select one or more objects you want to align, and then choose the appropriate alignment option.
Change X/Y coordinate	<p>Enter the X and Y coordinates of an object to move it to a new position within the editing area.</p> <ul style="list-style-type: none"> <li>• X coordinate represents the horizontal position of the object.</li> <li>• Y coordinate represents the vertical position of the object.</li> </ul>
Link Control Points	Applies to curved paths. You can link the control points to create complex curves and adjust the shape of a path.
Change node's X/Y coordinate	Applies to nodes in a path. Nodes are the points that define the shape of a path. This option allows you to select a node and set its X and Y coordinates within the path.
Clone Node	Clones the selected node.
Delete Node	Deletes the selected node.
Text formatting tools	<p>Select the text element to access tools to perform the following functions:</p> <ul style="list-style-type: none"> <li>• Choose from a variety of fonts available in the editor.</li> <li>• Adjust the size of your text to make it larger or smaller.</li> <li>• Change the style of your text to bold, italic, underlined, etc.</li> </ul>

Tool	Description
	<ul style="list-style-type: none"> <li>• Align your text.</li> <li>• Adjust the spacing between letters and lines.</li> </ul>

### Bottom Toolbar Options



Tool	Description
Change zoom Level	Allows you to zoom in and out of the editing area for more precise editing. Use the preset options to apply the zoom level.
Change fill Color	To change the fill color, select the shape/object and from the color palette, choose a color to fill the shape/object.
Change stroke Color	To change the stroke color, select the shape/object and from the color palette, choose a color to apply to the shape/object.
Change stroke width by 1, shift-click to change by 0.1	Allows to change the width of the stroke.
Change stroke dash style	Select the line/shape to change its stroke dash style and apply a new style (dots, dashes, etc.) from the available preset options.
Linejoin	<p>You can set any of these linejoin options to set the corners of a shape/line:</p> <ul style="list-style-type: none"> <li>• Miter: At the meeting point of two lines, applies a pointed corner.</li> <li>• Round: At the meeting point of two lines, applies a rounded corner.</li> <li>• Bevel: At the meeting point of two lines, applies a flat and beveled corner.</li> </ul>
Linecap	You can set any of these linecap options to set the ends of a line:

Tool	Description
	<ul style="list-style-type: none"> <li>• Butt: Applies a flat end to the line that is perpendicular to the direction of the line.</li> <li>• Square: Applies a flat end to the line that is slightly wider than the line itself.</li> <li>• Round: Applies a rounded end to the line.</li> </ul>
Change selected item opacity	Select the item (shape, line, group of objects, or any other element in your SVG file) for which you want to modify the opacity. Set the opacity percentage for the item.
Click to change fill color, shift-click to change stroke color	Allows to change the color.

## General Reference

### Page Components (Classic)

This topic describes the various UI components that you can use to design your page and configure the data.

Design your application pages using various [widgets/plugin-ins \(on page 494\)](#). Drag and drop them on to the page to configure their properties.

### Configure Properties

To access the properties of a plug-in component, select the component (a container, graph, or a breadcrumb).



**Note:**

Some of these fields are displayed based on the selected component. This list is not comprehensive.


Field Name	Description
Label	The text that appears for components such as check boxes and drop-down list boxes.



Field Name	Description
Global Data	Allows the data to be available globally for use by other components or query inputs. This check box is enabled only after you specify an <b>Id</b> for the component.
Allow Export	Indicates whether data that appears in the component can be exported. By default, this check box is cleared.
Tooltips	Indicates whether data in a table cell should contain tooltips displaying the content. By default, this check box is cleared.
Type	The data type of an input component. If you are configuring the settings of an component of the type graph or gauge, this field contains a list of graph or gauge types.
Style	The style of a meter-type gauge component.
Conditions	<p>Applies a condition that executes an action at runtime. For example, you can create a condition for the component/widget to display a control button or a warning image if the temperature recorded by the sensor exceeds 40 degrees Celsius.</p> <p>Select <b>Add conditions</b> to <a href="#">build and apply conditions (on page 828)</a>.</p>
Hidden	<p>Select the check box to hide the component/widget at runtime. By default, this check box is cleared.</p> <p>When a component/widget is marked as hidden, it can be shown only on associating with a <a href="#">button (on page 506)</a> using the toggle show/hide action.</p> <p>As a best practice, either use <b>Conditions</b> or <b>Hidden</b>. Avoid using these properties together.</p>
Show on	Indicates that the component/widget is visible in the selected devices. By default, the options Mobile, Tablet, and Desktop are selected.
X-axis Label	The label of the horizontal axis of an component of the type graph.
Y-axis Label	The label of the vertical axis of an component of the type graph.
Required	Indicates whether it is mandatory to enter a value for the component that is used as an input to a query. By default, this check box is cleared.

Field Name	Description
Target Data	The query input that is the target for the value of the component.
Source	<p>The source from which data should be retrieved to initialize the component. If you are configuring the settings of an input component, you can select one of the following options:</p> <ul style="list-style-type: none"> <li>• Data: Fetches data that from a global variable or the output value of a query.</li> <li>• Manual: Allows you to enter a value manually.</li> <li>• Formula: Allows you to create a formula using global variables and the output values of a query.</li> </ul> <p>If you are configuring the settings of a display component, you can select one of the following options:</p> <ul style="list-style-type: none"> <li>• Data: Displays data from a global variable or the output value of a query.</li> <li>• Manual: Allows you to enter a value manually.</li> <li>• Formula: Allows you to create a formula using global variables and output values of a query.</li> <li>• URL: Displays an image from a URL.</li> <li>• File: Allows you to upload an image for the component.</li> </ul>
Group By	Enables to group the data in a graph by the selected tag name.
Options	Indicates whether the values in the component are hard-coded or displayed dynamically from a query.
Actions	The action that should be triggered when the component is selected.
First Option	The first option that appears in an component of the type drop-down list box (for example, select an asset).
Step	The step value used for a slider component.
Minimum	The minimum value for an component that contains a range (such as a slider or a gauge).
Maximum	The maximum value for an component that contains a range (such as a slider or a gauge).
True Label	Customized text that appears when a toggle or an indicator is active.


Field Name	Description
False Label	Customized text that appears when a toggle or an indicator is inactive.
Width	The width of the component of the type toggle.
Show <number> rows at a time	The number of rows that can appear at a time in an component of the type grid.
Validation	<p>The validations to be applied on the value entered in an input component. You can select the following options:</p> <ul style="list-style-type: none"> <li>• Capital: Select this check box if you want application users to enter a value only in uppercase.</li> <li>• Minimum character: Select this check box if you want to set a minimum character limit to values entered in the component, and then enter the number of minimum characters that application users must enter in the component.</li> <li>• Range Limit: Select this check box if you want to set the maximum and minimum values that can be entered in a numeric, date, or time input component.</li> </ul>
Disabled	Indicates whether you want the component to appear as disabled in the application.
Range Limit	The range of values that application users can enter in the component.
Stacked	Indicates whether the bars displayed in an component of the type graph should be stacked. By default, this check box is cleared.
Rounded Corners	Applies rounded corners for the selected component.
Custom Colors	<p>Select the check box to set these options:</p> <ul style="list-style-type: none"> <li>• Add text color.</li> <li>• Add container background color.</li> <li>• Add container border color, width, and style.</li> </ul>
Horizontal Alignment	Aligns the component left, right, or center.
Columns/Rows	Allows to create a grid layout to design your pages. You can split the page into vertical columns and horizontal rows for better organization of page components. Enter the number of columns/rows in the text box. You can add upto 36 columns and 6 rows.





Field Name	Description
	<div style="border: 1px solid #ccc; border-radius: 10px; padding: 10px; background-color: #e6f2ff;"> <p> <b>Tip:</b></p> <ul style="list-style-type: none"> <li>• Use minimal columns while designing for smaller devices such as, tablets and mobile phones.</li> <li>• If adding more than 12 columns, avoid using nested containers.</li> <li>• For pages with more columns, it is recommended to test them across devices to ensure good user experience.</li> <li>• Consider the column gutter space and margins while planning your page layout. Columns with no content are added to the DOM and occupy few pixels of screen space.</li> </ul> </div>
Responsive Pattern	Select how the container layout must respond on web pages.

## Apply Conditions


Build conditional statements that execute actions at runtime.


Create an application page, and add widget/s to a container.

1. Select the widget for which you want to add a condition.
2. Navigate to the widget's properties tab, then under **DISPLAY**, select . The conditions screen for the widget appears.
3. Create a condition using these options:

Populates values from the query/entity added to the component/widget.	Select the first value, which is used to build a conditional statement.
Use the operators to express the relationship between two values and return results that match.	<ul style="list-style-type: none"> <li>◦  returns true if the value on the left is <i>equal to</i> the value on the right.</li> <li>◦  returns true if the value on the left is <i>greater than</i> the value on the right.</li> <li>◦  returns true if the value on the left is <i>less than</i> the value on the right.</li> <li>◦  returns true if the value on the left is <i>greater than or equal to</i> the value on the right.</li> </ul>

	<ul style="list-style-type: none"> <li>◦ <code>&lt;=</code> returns true if the value on the left is <i>less than or equal to</i> the value on the right.</li> <li>◦ <code>&lt;&gt;</code> returns true if the value on the left is <i>less than or greater than</i> the value on the right.</li> <li>◦ <code>Has value</code> returns true if the value on the left has any value.</li> <li>◦ <code>Doesn't have value</code> returns true if the value on the left is NULL.</li> </ul>
Manual	Allows to enter a hardcoded value.
Flow	Allows to select a value from a query.

To delete a condition, select  next to it.

4. **Optional:** Select  to create more conditional statements and combine them.
  - Select `AND` to get values that satisfy two or more conditions.
  - Select `OR` to get values that satisfy atleast one from the multiple conditions specified.
5. Select **Done** to save and add the condition/s to the widget.

## Globals

Globals are variables with a global scope, and are available to use with all the widgets/plugin in Operations Hub.

Globals are applied outside of a query. A global enables multiple widgets/plugin to access the same data. You can also declare globals as:

- Page Global: Indicated with **P**, this global variable is applicable only to the page.
- App Global: Indicated with **A**, this global variable is applicable to all the pages in an application.



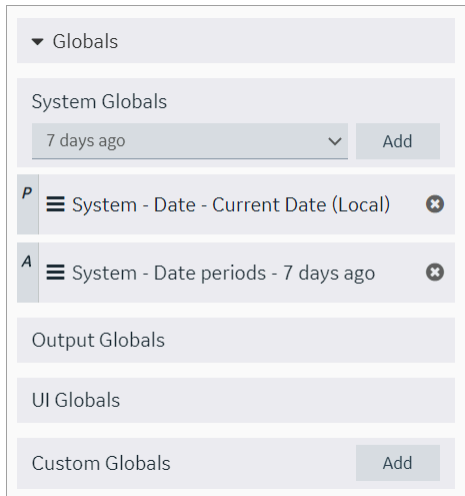
### Note:

If multiple widgets/plugin use the same Source Input (query), then the target global must be unique. The global is applicable to the last assigned widget/plugin.

- For example, consider `abc`, `xyz`, and `123` as globals. You can assign each of these global variables as input only once on a page.
- If you first assign `abc` to a radio button as input, and assigned it later to a slider as input, then `abc` is applicable as input for the slider plugin.

However, multiple widgets/plugin can use the same global as Output Target.

To modify an added global, select to switch between Page Global and App Global.



You can create the following types of globals in Operation Hub:

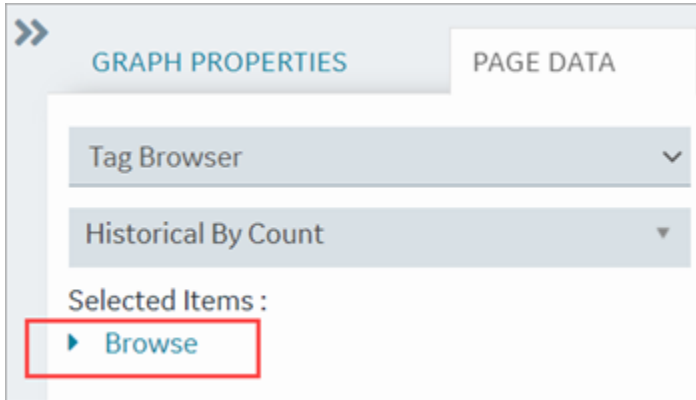
- **System Globals:** These are global variables used to store computer system related information such as system-wide settings, or configuration parameters.
- **Output Globals:** These are global variables meant to be used as an output. The output global can be used to store the result of a query. This output global can be accessed and used without having to run the query again.
- **UI Globals:** These are global variables that can be used on any part of the user interface (UI). For example, a UI global can contain the current user's name and be used to display the user's name in multiple parts of the UI.
- **Custom Globals:** These are global variables defined by the user. For example, a custom global can be used to store a configuration setting, or a shared resource.
- **URL Parameters:** These are global variables that store the parameters added towards the end of a URL, which pass additional information to a web server. A URL parameter global can be used to pass information that is required by multiple web pages. For example, the current user's session ID or a referral code.

## Sample Page with Historical Data

This topic describes how to create a sample page using historical data.

1. [Create an application \(on page 265\)](#).
2. [Create a page \(on page 450\)](#).
3. Design a page layout using widgets such as a gauge, line graph, etc.  
Refer to [Page Components \(Classic\) \(on page 824\)](#).
4. Select the graph in the page container to access its **PAGE DATA**.

5. Under the page data tab, select **Tag Browser** from the dropdown list.  
A list of data options appear.
6. Select Historical data from the dropdown list.
7. Select **Browse** to [search the data source and select tags \(on page 442\)](#).



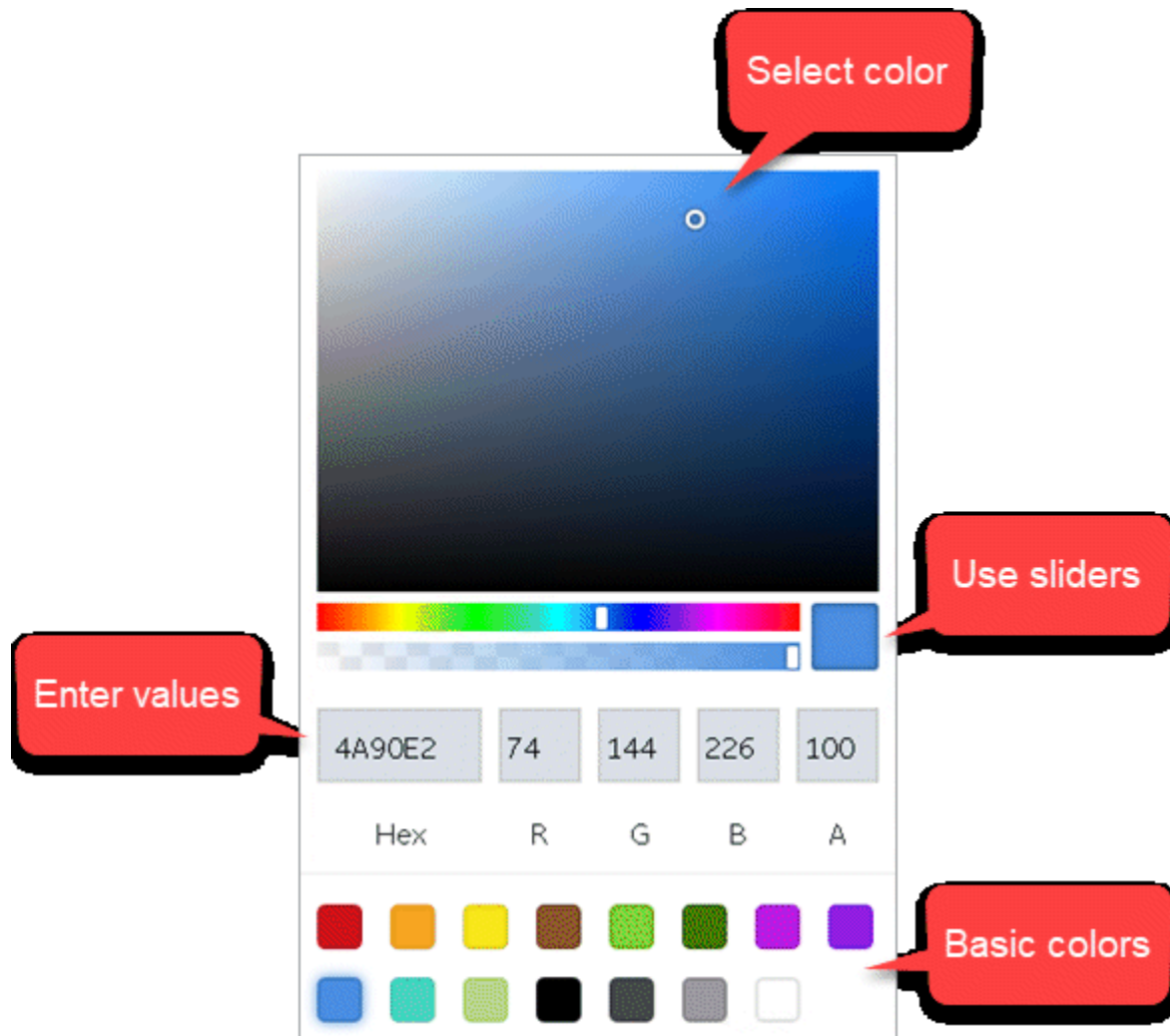
8. Drag this data and drop it on the graph.  
A message appears that the data is bound successfully.
9. Select **Save App**.
10. Select **Open App**.  
The application page opens in a web browser.

## Select Colors

Use the color picker to select and apply a color to text, borders, and backgrounds.

You can:

- Select and apply a basic color scheme.
- Slide across the color wheel and make it lighter or darker.
- Enter the hexadecimal or RGB values to get the exact color.
- Use the alpha (A) value to set the transparency of the color.



## LIKE Operator with Wildcards

The LIKE operator is used with wildcard characters to compare a string to a pattern, and return matched values from the database.

You can use these wildcards with LIKE to build your pattern:

- % The percent symbol stands for zero or more characters in a sequence.
- \_ The underscore symbol stands for only one character. This single character can also be a number or any punctuation character.



**Note:**

If using the MS Access database, use these wildcards instead of % (percent) and \_ (underscore):





- \* Asterisk to represent zero or more characters in a sequence.
- ? Question mark to represent a single character.

The LIKE pattern is case insensitive, and is set in single quotes. Employ % and \_ with any other characters (denoted by XY in the table) to search through your database. The wild cards can also be used in combination.

Pattern	Description
LIKE '%X'	Returns values that end with X. These values can have zero or more characters before X.
LIKE '%XY'	Returns values that end with XY.
LIKE 'X%'	Returns values that start with X. These values can have zero or more characters after X.
LIKE '%X%'	Returns values that contain X. These values can have the X character in any position (start, end, second, fourth, etc.)
NOT LIKE '%X%'	Returns values that do not contain X.
LIKE 'X%Y'	Returns values that start with X and end with Y. These values can have zero or more characters between X and Y.
LIKE 'X_'	Returns values that start with X and has one character after X.
LIKE 'X__'	Returns values that start with X and has three characters (3 underscores) after X.
LIKE 'X_Y'	Returns values that start with X and end with Y, and has two characters (2 underscores) between X and Y.
LIKE 'X__%'	Returns values that start with X and has two characters (2 underscores) after X, followed by zero or more characters.
LIKE '%_X_%'	Returns values that contain X if matches with these rules: <ul style="list-style-type: none"> <li>• X cannot be in the first or last position.</li> <li>• Implies atleast 3 characters including X.</li> <li>• Can have zero or more characters before and after the 3 characters.</li> </ul>

## Whitelist Websites

Operations Hub allows to load content from whitelisted URLs.

With Operations Hub v2.1 release, third party websites are no longer allowed to use iframe to embed End Apps into their pages because of security considerations.

Starting with Operations Hub v2.1 SIM2, it is possible to whitelist trusted sites to use iframe with End Apps. Note at this time, this whitelist applies to all End Apps.

1. Gather a list of one or more websites that you want to use iframe to embed EndApps.

a. Format each website URL as follows with the actual hostname and port number:

```
https://hostname:port
```

b. For hostname, enter simple names or fully qualified domain names (FQDNs). It is recommended to include all referenced aliases.

c. Ignore the port if it is 443.

2. On the host machine where Operations Hub is installed, add an environment variable

```
TRUSTED_FRAME_SITES.
```

a. Open the Windows Run command.

b. Enter `sysdm.cpl` and select **OK**.

The **System Properties** window appears.

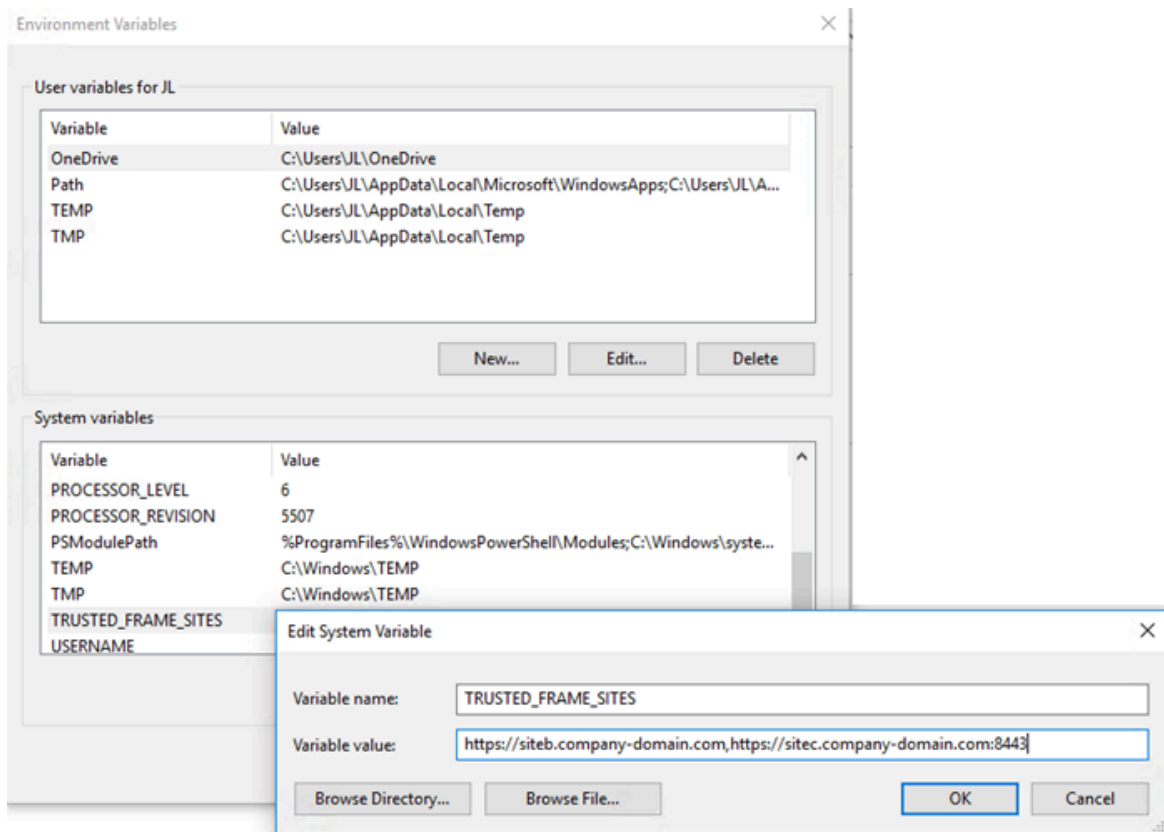
c. On the **Advanced** tab, select **Environment Variables**

The **Environment Variables** window appears.

d. Select **New** to create a system variable with **Variable name** `TRUSTED_FRAME_SITES`.

e. For **Variable value**, enter a comma-separated list of the sites gathered in the previous step.

For example, `https://siteb.company-domain.com,https://sitec.company-domain.com:8443`



3. Save and close all the windows.
4. Restart GE Operations Hub IQP EndApp service for this change to take effect.

You have successfully set up a list of whitelisted websites.



**Note:**

- An End App authenticates users for access. Recent versions of Chrome have enforced a default SameSite policy on cookies. Hence, sites that embed an End App must be on the same parent domain as the Operations Hub's host domain. For example, if Operations Hub is on domain `ophub.company-domain.com`, then `foo.company-domain.com` is acceptable, but not `bar.company.local`.
- By default, Operations Hub End Apps can embed 3rd party contents using iframes without restriction. However, customers may choose to whitelist such 3rd party contents using an environment variable `TRUSTED_FRAME_SOURCES` similar to `TRUSTED_FRAME_SITES`. In such cases, ensure that the certificates used for https protocol by 3rd party websites are trusted on client (browser) nodes.

## Language Support

Updated language support is provided with a SIM, which includes additional translated strings for all languages. Operations Hub currently supports these languages:

- Chinese
- Czech
- English
- French
- German
- Italian
- Japanese
- Korean
- Portuguese (Brazilian)
- Russian
- Spanish
- Turkish

You need to update your browser settings to translate in your preferred language. For example, to change the language in Chrome browser:

1. Open Chrome **Settings**.

```
chrome://settings/
```

2. From the menu, go to **Advanced > Languages**.
3. In the languages screen, select **Language** to expand.
4. If your preferred language is not listed, select **Add languages**.
5. Select the check box for the language you want to show up in the list.
6. Select the *More actions* icon next to your preferred language.
7. Select the check box for **Display Google Chrome in this language**.
8. Restart Chrome to apply the changes.

## APIs

### Operations Hub M2M Device RESTful APIs

Operations Hub allows sensors to connect directly to the Operations Hub server using RESTful services to broadcast sensor data and receive commands. The connection to the Operations Hub server uses Standard REST POST calls.

The Operations Hub gateway identifies the information source based on the following parameters::

- Remote Device Unique Identifier: By remote device, we refer to gateways of any type supporting an http connection. Usually, the best way to create a unique ID is by using the gateway's MAC address.
- Remote Sensor/Controller Unique Name: Any name can be used as long as it is unique to the gateway. It could be a logical name (for example, Sensor1 or the address of the sensor (if it has one)).
- The Operations Hub Account: Account username and password.

## API Handshakes

The handshakes define the message structure and message types exchanged between the device and the Operations Hub cloud. The Operations Hub API supports 3 types of request:

- Login: The device asks to be authenticated.
- Publish: The device sends new sensor data to Operations Hub.
- Subscribe: The device requests new commands or control instructions from Operations Hub.

## JSON Message Format

Messages exchanged between the Operations Hub server and the device client are in the JSON format. JSON is a string representation of data; it is lighter than XML, and hence, it is more suitable for M2M messages. JSON messages are formatted as name/value pairs: `"variable name": "variable value"`

Messages can contain more than one variable using a comma as the delimiter: `{"variable name1": "variable value1", "variable name2": "variable value2"}`

The variable value can be a list of parameters, enclosed in curly braces `{}` using a comma as the delimiter.

For example: `{"variable name": {"parameter1": "value1", "parameter2": "value2"}}`

## Client Login

Before communicating with the Operations Hub server, the device client must login to the server. The login URL is: `https://<Operations Hub_Site_URL>/app/iqp/rest/login`

1. To login, the client sends a login request: `{"handshake": {"stage": "login"}, "login": {"username": "user name of the user", "password": "password of the user"}}`
2. The server responds with a success or failure message: If authentication succeeds; the server responds with code 1 and provides the client with a token: `{"handshake": {"stage": "login", "code": "1"}, "token": "token number"}`. If authentication fails, the server

responds with code 0: `{"handshake":{"stage":"login","code":"0"}}`. If the login fails, the client must request the login again.

- The token returned by the server is a unique identifier, which serves to identify the client during further communications with the server. The token must be included in all the publish and subscribe messages from the client to the server. The token remains valid as long as the client communicates with the server. If the device is inactive for 20 minutes or longer, the token will expire. If the client attempts to communicate with the server using the token after it has expired, an unauthorized message will be returned by the server. When this happens, the client must login again to receive a new token.

## Publishing M2M Data

The publish stage is used by the Gateway/Device/Sensor to send new data to the Operations Hub server. The publish URL is: `https://Operations Hub site URL/app/iqp/rest/publish`. The published data is in the form of a JSON string. Each message contains the following information:

- **Data Channel:** The Data Channel tells the server where the data is coming from. The source is represented as a data source path, which is composed of 3 parameters, a combination of its Account name/Gateway id/Sensor id. For example: `"REST_DEMO/01-23-45-67-89-ab/temperature0"`.
  - For the Gateway id, it is recommended to use the device MAC Address or IMEI number.
  - The Sensor id can be any logical name. The name must be unique to this gateway.



### Note:

The application developer in Operations Hub will use the sensor name to build their application. For this reason, it is recommended to use a logical name describing the sensor or device. For example, if the device represents a temperature sensor, use the word temperature in the name and add a number to make it unique: temperature9



### Important:

For HTTP requests, avoid using spaces in names and ids.

- **Metrics:** The Metric Data Message defines a set of data from the sensor/device as a series of keyname:value pairs. The "keyname" in the keyname value pair defines the field in the Operations Hub M2M\_data entity where the "value" will be stored. The following Keynames are supported.

Keyname	M2M_data Field	Storage	Format
met	metric	String	Developer-defined String (compulsory field)
val	data	String	Developer-defined value (compulsory field)
lat	latitude	String	WGS84 recommended for online map compatibility (common field)
long	longitude	String	WGS84 recommended for online map compatibility (common field)
time	timestamp	DateTime	ISO 8601 "YYYY-MM-DDThh:m-m:ss.sss±TZ" (common field)
alt	altitude	String	Developer-defined value (common field)
desc	description	String	Developer-defined string
type	data_type	String	Data type of the data field "String" or "Number"
gen1	generic_1	String	Developer-defined string or value
gen2	generic_2	String	Developer-defined string or value

- All Operations Hub payload messages must contain the metric and data keyname value pairs.
  - All other keyname value pairs are optional.
  - The order of the keyname value pairs in the payload is not compulsory.
  - If included, Timestamps must be formatted according to the ISO 8601 format specified above.
  - The Data Type entry can be used in cases where Operations Hub does not automatically identify the data type correctly.
- The Publish request process: To publish a message to the server, the client uses the following format:

```

{"handshake":{"stage":"publish"},"token":"token number","messages":[
    {
      "dc":"data channel","cloud":"cloud server timestamp","data":[]
    }
  ]
}

```

```

    {"alt":"value","lat":"value","long":"value","time":"timestamp recorded in the
device","mets":[

{"met":"value","val":"value","type":"value","desc":"value","gen1":"value","gen2":"value"},

]

}

}]}
```

The server will respond with a success failure message: `{"handshake": {"stage":"publish","code":<0/1>,"dc":"data channel"}}`, where code=1 represents success, and code=0 represents failure to process the message. The returned Data channel is the channel that was sent in the publish request that the response is replying to.

- **Sending Multiple Metrics:** Multiple metric data entries can be sent in a single publish message using the JSON array format. Arrays in JSON are in the format of "[array data]". For example: one published payload could contain several messages for a car's speed, engine temperature, fuel level, odometer, etc. or from an intermediary data server, it could contain multiple messages from several different devices. An example of a JSON publish request containing several entries:

```

{"handshake":{"stage":"publish"},"token":"00000000-00000000-00409DFF-FF521DB2", "messages":[

    {"dc":"Operations

Hub_Testing/REST_Device/Vehicle2","cloud":"2015-03-26T18:46:38.237+09:00","data":[

{"alt":"1234","lat":"35.587562","long":"139.668916","time":"2015-03-26T18:44:38.195+09:00","mets":[

    {"met":"Speed","val":"100","type":"double","desc":"kmh"},

    {"met":"Heading","val":"180","type":"double","desc":"degrees"},

    {"met":"Temperature","val":"98","type":"double","desc":"degrees"}

]

},

{"alt":"1240","lat":"35.587565","long":"139.668920","time":"2015-03-26T18:45:38.195+09:00","mets":[

    {"met":"Speed","val":"75","type":"double","desc":"kmh"},

    {"met":"Heading","val":"237","type":"double","desc":"degrees"},

    {"met":"Temperature","val":"96","type":"double","desc":"degrees"}

]

}

]

}]}
```



## Subscribing to receive M2M commands

The subscribe stage is used by the Gateway/Device/Sensor to check the Operations Hub server for commands. The subscribe URL is: `https://<Operations_Hub_Site_URL>/app/igp/rest/subscribe`. In the M2M world, Gateways/Devices can lose connection to the server from time-to-time. For this reason, the Operations Hub server does not push commands to devices. It is up to the embedded code in the device to periodically check with the server for any available commands. Subscribe requests use the following information:

- Data channel: The Gateway/Device asks the server for all commands available for a Data channel. Command requests may be for specific sensors, for all commands for a Gateway/Device or all commands for an account. The corresponding Data channel formats are as follows:
  - Specific sensor: `Account_name/Gateway_ID/Sensor_ID`
  - Specific Gateway: `Account_name/Gateway_ID`
  - Specific account: `Account_name`
- Request type: The request type identifies what stage of the subscription process we are in. The available request types are:
  - subscribe: The client requests for available commands.
  - command\_list: The server sends a list of the commands.
  - no\_commands: The server notifies the client that no commands are available.
  - result: The server replies to confirm whether or not the request has been processed correctly.
- Commands: The command or commands to execute. Commands are usually vendor-specific or device-specific. The commands could be AT commands or client code specific implementation commands.

Subscribe requests have the following stages.

1. Client to Server: The client requests for available commands. The client initiates the process by sending a subscribe request to the server: `{"handshake":{"stage":"subscribe"},"token":"<token>","payload":{"dc":"<channel>","request_type":"subscribe"}}`
2. Server to Client: The server sends a list of commands to the client. If the server has commands available for the device, it will return a command list: `{"handshake":{"stage":"subscribe"},"payload":{"request_type":"command_list","commands":[{"dc":"<channel>","command":"<command>"}]}}`

**Important:**

The server will return an array of channel specific commands. If the subscribe request was for all available commands for an account Data channel. The server response will be an array of commands where the Data channel for each command is specific to the gateway, device, or sensor that the command is assigned to.

If the server has no commands available for the device, it will return a `no_commands` response:

```
{ "handshake": { "stage": "subscribe" }, "token": "<token>", "payload": { "request_type": "no_commands", "dc": "<channel>" } }
```

The datachannel, in this case, is the channel of the original request. For example, if it was for a device, it would be `account/device`.

## M2M Device API Error codes

If an error occurs while processing requests, the server will return the following message: `{ "handshake": { "stage": "error", "code": "<code>" } }`

Possible error codes are:

- 1: Bad JSON Format
- 2: Unauthorized user

## Operations Hub REST APIs for Integration

In addition to the existing APIs that allow devices to send data to the `M2M_data` entity, Operations Hub provides REST Integration APIs that enable 3rd party servers to pull data from the `M2M_data` entity. There are also APIs for pulling data from any custom entity in the Operations Hub database and for inserting data into custom entities.

### Authentication

Before using the integration APIs, the client system must pass authentication on the Operations Hub server. The integration API login URL is `https://<Operations Hub_Site_URL>/app/iqp/api/rest/login`.

Message sent by the client: `{ "username": "<user>", "password": "<pass>" }`

Response of the server:

- If authentication succeeds, the server responds with code 1 and provides a token for the client to use in further communications: `{"code" : "1" , "token" : "<token>"}`
- If authentication fails, the server responds with code 0 and provides a reason for the failure: `{"code" : "0" , "reason" : "<reason>"}`. If the authentication fails, the client will need to request for authentication again before proceeding.

## Get M2M data

The Get M2M data API allows a 3rd party server to retrieve data from the Operations Hub M2M\_data entity: The URL for the API is: `https://<Operations Hub_Site_URL>/app/iqp/api/rest/iot/data`

Message sent by the client:

```
{ "token": "<token>", "filters":
  [
    { "filter_type": "<column_name>", "value": "<search_value>", "value_type": "<type>", "operator": "<operator>" }
  ]
}
```

- "`<token>`": The token provided to the client at login.
- "`<column_name>`": The name of a valid field in the M2M\_data entity.
- "`<search_value>`": The value to search for in the selected field.
- "`<type>`": The data type of the selected field. The following values are supported:
  - Boolean
  - Number
  - Real
  - String
  - Long string
  - Free text
  - Date
  - Time
  - DateTime
  - File
- "`<operator>`": The operator to use in the search. The following values are supported:
  - =
  - >
  - <
  - >=
  - <=

- <>
- LIKE (on page 832)

**Tip:**

If required, multiple filters can be provided to filter the search results. All filters are treated as {filter\_1} AND {filter\_2} AND ... {filter\_n}.

An example of a request to retrieve all M2M\_data for the device "REST\_Device" after 12:00pm on 2015-03-19:

```
{ "token": "08ad9058-9ec9-4363-85f1-c9071004d9992", "filters":
  [
    { "filter_type": "device_id", "value": "REST_Device", "value_type": "String", "operator": "=" },
    { "filter_type": "iqp_timestamp", "value": "2015-03-19T12:00:00.000Z", "value_type": "DateTime", "operator": ">" }
  ]
}
```

Response of the server:

- If there is data to match the search results, the server will respond with all of the matching rows in the following format:

```
{ "rows":
  [
    { "row": [ <list of <column_name>:<value> pairs for all M2M_data columns > ] },
    { "row": [ <list of <column_name>:<value> pairs for all M2M_data columns > ] },
    ...
  ]
}
```

- If there is no data to match the search results, the server will respond with an empty list:

```
{ "rows": [] }
```

## Get Entity data

The Get Entity data API allows a 3rd party server to retrieve data from any custom entity in the Operations Hub database: The URL for the API is [https://<Operations\\_Hub\\_Site\\_URL>/app/iqp/api/rest/DB/data/get](https://<Operations_Hub_Site_URL>/app/iqp/api/rest/DB/data/get).

Message sent by the client:

```

{"token": "<token>", "entity_name": "<entity_name>", "filters":
  [
    { "filter_type": "<column_name>", "value": "<search
value>", "value_type": "<type>", "operator": "<operator>" }
  ]
}

```

- "**<token>**": The token provided to the client at login.
- "**<entity\_name>**": The name of a valid custom entity.
- "**<column\_name>**": The name of a valid field in the specified entity.
- "**<search\_value>**": The value to search for in the selected field.
- "**<type>**": The data type of the selected field. The following values are supported:
  - Boolean
  - Number
  - Real
  - String
  - Long string
  - Free text
  - Date
  - Time
  - DateTime
  - File
- "**<operator>**": The operator to use in the search. The following values are supported:
  - =
  - >
  - <
  - >=
  - <=
  - <>
  - [LIKE \(on page 832\)](#)


**Tip:**

If required, multiple filters can be provided to filter the search results. All filters are treated as

```
{filter_1} AND {filter_2} AND ... {filter_n}.
```

An example of a request to retrieve all data from the custom entity "MathsData", where the value in the column "Angle" is between "180" and "270" degrees:

```
{ "token": "5aad6209-bd6f-440c-9581-26ea80ec6fd32", "entity_name": "MathsData", "filters":
  [
    { "filter_type": "Angle", "value": "180", "value_type": "number", "operator": ">=" },
    { "filter_type": "Angle", "value": "270", "value_type": "number", "operator": "<=" }
  ]
}
```

An example of a request to retrieve all rows of data from the custom entity “MathsData” with no conditions:

```
{ "token": "5aad6209-bd6f-440c-9581-26ea80ec6fd32", "entity_name": "MathsData", "filters": [] }
```

Response of the server:

- If there is data to match the search, the server will respond with all of the matching rows in the following format:

```
{ "entity_name": "<entity_name>", "rows":
  [
    { "row":
      [
        { "col_name": "<column_name>", "type": "<column_type>", "value": "<value>" },
        { "col_name": "<column_name>", "type": "<column_type>", "value": "<value>" },
        ...
      ]
    }
    ...
  ]
}
```

- “<entity\_name>”: The name of the entity the data was retrieved from.
  - “<column\_name>”: The name of the field this value is from.
  - “<column\_type>”: The data type of the field as specified in the entity.
  - “<value>”: The value of the field.
- If there is no data to match the search, the server will respond with a blank list:

```
{ "entity_name": "<entity_name>", "rows": [] }
```

## Insert Entity data

The Insert Entity data API allows a 3rd party server to insert data into any custom entity in the Operations Hub database: The URL for the API is `https://<Operations Hub_Site_URL>/app/igp/api/rest/DB/data/insert`.

Message sent by the client:

```
{ "token": "<token>", "entity_name": "<entity_name>", "rows":
  [
    { "row":
      [
        { "col_name": "<column_name>", "type": "<type>", "value": "<value>" },
        { "col_name": "<column_name>", "type": "<type>", "value": "<value>" },
        ...
      ]
    }
    ...
  ]
}
```

- "`<token>`": The token provided to the client at login.
- "`<entity_name>`": The name of the custom entity that you want to insert data into.
- "`<column_name>`": The name of the field in the specified custom entity that this value will be inserted into.
- "`<type>`": The data type of the specified field. The following values are supported:
  - Boolean
  - Number
  - Real
  - String
  - Long string
  - Free text
  - Date
  - Time
  - DateTime
  - File

**Note:**

The type specified in the API call must be the same as the type specified for the field in the entity.

- "`<value>`": The value to insert into the field.

An example of a message to insert 2 rows of data into the custom entity "MathsData":

```
{ "token": "9eb64909-3d08-43e8-b5ed-eae57bce32402", "entity_name": "MathsData", "rows":
  [
    { "row":
      [
        { "col_name": "Angle", "type": "number", "value": "370" },
        { "col_name": "SIN", "type": "real", "value": "0.1736" },
        { "col_name": "COS", "type": "real", "value": "0.9848" },
        { "col_name": "TAN", "type": "real", "value": "0.1763" }
      ]
    },
    { "row":
      [
        { "col_name": "Angle", "type": "number", "value": "380" },
        { "col_name": "SIN", "type": "real", "value": "0.342" },
        { "col_name": "COS", "type": "real", "value": "0.9397" },
        { "col_name": "TAN", "type": "real", "value": "0.364" }
      ]
    }
  ]
}
```

Response of the server:

- If the insert is successful, the server will respond with code 1: `{ "code" : "1" }`
- If the insert fails, the server will respond with code 0 and a reason: `{ "code" : "0", "reason" : "<reason>" }`



## Operations Hub REST APIs for App, Group, and Page Permissions

Operations Hub provides REST APIs for App, Group, and Page Permissions. The following sections outline what these APIs are and how they work.

### Authentication

For proper authentication, obtain a valid UAA token with a valid scope that includes `iqp.developer`.

### Import App

The Import App API takes a zip or xml file (same as from the UI) and returns the application id of the imported App.

- If the App is not already present, the type parameter is not required.
- If the App is already present and the type parameter is not provided, then the default is to duplicate.
- The type parameter can be explicitly provided as `replace` or `duplicate`.

Sample request for HTTP POST is as follows:

```
https://<hostname>/site/api/apps/import
https://<hostname>/site/api/apps/import?type=replace
https://<hostname>/site/api/apps/import?type=duplicate
```

The zip or xml file is part of the Request body with the key as `file`.

Sample response:

```
Http 200 Ok
{
  "uuid": <app id>
}
```

### Get Apps

The Get Apps API returns all Apps from within Operations Hub .

Sample request for HTTP GET is as follows:

```
https://<hostname>/site/api/apps
```

The Get Apps API returns all of the Apps that are present.

Sample response:

```

Http 200 Ok
[
  {
    "name": "app name",
    "uuid": "app id"
  },
  {
    "name": "app name",
    "uuid": "app id"
  }
]

```

To filter a single App by name, the name parameter is used.

Sample request for HTTP GET is as follows:

```
https://<hostname>/site/api/apps?name={appname}
```

Sample response:

```

Http 200 ok
[
  {
    "name": "appname",
    "uuid": "app id"
  }
]

```

## Get App Details for App Id

This API takes the App Id and returns the details of the App, including the UAA permitted groups.

Sample request for HTTP GET is as follows:

```
https://<hostname>/site/api/apps/{app id}
```

Sample response:

```

{
  "name": "app name",
  "id": "appid",
  "permittedUaaGroups": [],

```

```

"pages": [
  {
    "id": "pageid",
    "name": "page name",
    "permittedUaaGroups": [],
    "queries": [
      {
        "id": "query id",
        "name": "query name",
        "permittedUaaGroups": [
          {
            "id": "id",
            "displayName": "group name"
          }
        ]
      }
    ]
  }
]
}

```

- Empty permission groups for App denotes **NONE** of the groups have permission to access the App.
- Empty permission groups for Page denotes **ALL** the groups have permission to access the Page.
- Empty permission groups for query denoted **ALL** the groups have permission to access the query.

## Update App UAA Group Permissions

This API takes the application's universally unique identifier (UUID) and the list of UAA permissions to be updated. The permissions provided will overwrite the permission list already existing in Operations Hub.

Group id and name should match UAA group id and group name.

Sample request for HTTP POST is as follows:

```
https://<hostname>/site/api/apps/{app id}/permittedUaaGroups
```

Request body

```

[
  {
    "id": "group id",
    "displayName": "group name"
  }
]

```

```

    },
    {
      "id": "group id",
      "displayName": "group name"
    }
  ]

```

Sample response:

```
Http 204 No content.
```

## Update Page UAA Group Permissions

This API takes page's universally unique identifier (UUID) and the list of UAA permissions to be updated. The permissions provided will overwrite the permission list already existing in Operations Hub.

Group id and name should match UAA group id and group name.

Sample request for HTTP POST is as follows:

```
https://<hostname>/site/api/pages/{page id}/permittedUaaGroups
```

Request body

```

[
  {
    "id": "group id",
    "displayName": "group name"
  },
  {
    "id": "group id",
    "displayName": "group name"
  }
]

```

Sample response:

```
Http 204 No content.
```

## Update Query UAA Group Permissions

This API takes the query's universally unique identifier (UUID) and the list of UAA permissions to be updated. The permissions provided will overwrite the permission list already existing in Operations Hub.

Group id and name should match UAA group id and group name.

Sample request for HTTP POST is as follows:

```
https://<hostname>/site/api/queries/{query id}/permittedUaaGroups

Request body

[
  {
    "id": "group id",
    "displayName": "group name"
  },
  {
    "id": "group id",
    "displayName": "group name"
  }
]
```

Sample response:

```
Http 204 No content.
```

## Get Query Id from Query Name

This API takes the query name and returns the query id.

Sample request for HTTP GET is as follows:

```
https://<hostname>/site/api/queries?name={query name}
```

Sample response:

```
Http 200 OK

{
  "uuid": <query id>
}
```

## Get Query UAA Permissions for Query Id

This API takes the query id and returns the UAA permission group list present in Operations Hub.

Sample request for HTTP GET is as follows:

```
https://<hostname>/site/api/queries/{query id}/permittedUaaGroups
```

Sample response:

```
Http 200 Ok

[
  {
    "id": "group id",
    "displayName": "group name"
  },
  {
    "id": "group id",
    "displayName": "group name"
  }
]
```

## Delete App

The Delete App API removes the application from Operations Hub.

Sample request is as follows:

```
https://<hostname>/site/api/apps/{app id}
```

Sample response:

```
Http 204 no content.
```

## Message Queuing Telemetry Transport (MQTT) APIs

### Operations Hub MQTT Message Broker

Operations Hub includes an MQTT client. In the Operations Hub administrative console, the MQTT client can be pointed at any MQTT broker that is accessible from the network where the Operations Hub platform is installed. If there is no existing MQTT broker, a local broker can optionally be installed on the Operations Hub server during the Operations Hub installation. Refer to the Deployment section of the document.

### Operations Hub MQTT implementation

Operations Hub receives status messages from devices and stores the information in the M2M\_Data entity. Operations Hub defines a standard for the MQTT topic structure and how the payload is formatted in order to allow the server to identify the device source and correctly store the M2M data.

The messages contain the following information:

- **Cloud ID:** When a Operations Hub tenant account is created, it is assigned a unique cloud ID on the server. The cloud ID allows Operations Hub to control how the data from the device is collected and stored.
- **Device ID:** A device or asset could be a single machine with one or more sensors communicating directly with Operations Hub. Alternatively, a device could be a gateway device on a production line, acting like a router to forward data from multiple machines along the line to Operations Hub. All devices have unique IDs that often represent network card numbers, IMEI numbers, or MAC addresses. The device ID is the minimum requirement for Operations Hub to identify the data source.
- **Instance:** If you have multiple assets connected to Operations Hub through a single gateway device, the instance name provides the ability to identify which asset from which the data has been sent. The instance name is usually a logical name uniquely identifying the asset or sensor.
- **Metric:** The metric is a term used by Operations Hub to define the nature of the data send from a device (for example, temperature, speed, air pressure, fuel level). Metrics in the M2M\_Data entity allow the application developer to define queries and events for retrieving data and triggering responses to specific conditions.

## Operations Hub MQTT Topic Structure

When Operations Hub receives a message, it needs to identify the message source. The MQTT message format is defined as: <topic> <payload>

Operations Hub defines a standard topic format so that the server knows the source of the message.

The Operations Hub topic structure contains the following three components in the given order:

- **Cloud\_ID:** This value must be the cloud\_id defined in the entity cloud\_users.
- **Device\_ID:** This value can be anything. Normally, it identifies a specific device or gateway.
- **Instance\_Name:** This value can be anything. Normally, it identifies a specific asset. It is optional.

A topic with an instance name appears as follows: <Cloud\_ID>/<Device\_ID>/<Instance\_Name>

A topic without an instance name appears as follows: <Cloud\_ID>/<Device\_ID>

## Operations Hub MQTT Payload Structure

For each message, Operations Hub needs to identify the metric. (For example, identify whether 32 is the reading for temperature or light.)

Operations Hub supports the following basic formats for the payload:

- **Basic Payload format:** The basic Operations Hub payload is usually used for simple sensors. The Operations Hub payload is formatted using keyname value pairs: `keyname=<value>`. The keyname value pairs are separated by a Tilde character (~). The basic Operations Hub Payload message uses two keyname value pairs to indicate the metric and the data. `met=<value>~data=<value>`

Example: `met=Temperature~data=32`

- **Multi Sensor Device/Gateway Payload format:** For devices or gateways with multi sensor capability the Operations Hub payload supports extra keyname value pairs to allow them to send extra data.

Supported keynames: The following table provides the keynames that are supported.

Keyname	M2M_data Field	Storage	Format
Met	metric	String	Developer-defined string
Data	data	String	Developer-defined string
Lat	latitude	String	WGS84-recommended for online map compatibility
Long	longitude	String	WGS84-recommended for online map compatibility
Time	timestamp	DateTime	ISO 8601 "YYYY-MM-DDThh:m-m:ss.sss±TZ"
Alt	altitude	String	Developer-defined value
Desc	description	String	Developer-defined string
Type	data_type	String	Data type of the data field String or Number
gen1	generic_1	String	Developer-defined string or value
gen2	generic_2	String	Developer-defined string or value



**Note:**

- All Operations Hub payload messages must contain the metric and data keyname value pairs. All other fields are optional.
- The order of the keyname value pairs in the payload is not compulsory.





- If included, Timestamps must be formatted according to the ISO 8601 format specified above.
- Data Type can be specified in cases where Operations Hub does not automatically identify the data type correctly. For example if you are sending a numeric ID, it should be treated as a String.

The keynames in the keyname value pairs define the field in the Operations Hub M2M\_data entity where the value will be stored.

**Note:**

The latitude and longitude values are also combined and added to the M2M\_data LatLong field.

## Payloads with location and timestamp information

Some devices also have a built-in GPS (for example, a car). These devices can also send GPS latitude and longitude co-ordinates indicating the location of the reading. Many modern devices can also include the timestamp for the date and time the data was recorded. In this case, the payload is formatted as a set of keyname value pairs such as

```
met=Speed~data=120~lat=35.678~long=135.678~time=2014-12-23T07:14:30.546+09:00
```

## Payloads with multiple metrics

In order to reduce the number of calls required to send data from the device, a device that collects several metrics can send multiple metrics in a single payload. For example, a car device may send speed, odometer reading, and fuel level as one payload. This can be achieved by concatenating multiple metrics together in the payload using a semi-colon (;) as the delimiter.

A payload with three metrics appears as follows:

```
met=Temperature~data=32;met=Pressure~data=12;met=Wind Speed~data=5.
```

A payload for two metrics with GPS co-ordinates appears as follows:

```
met=Speed~data=120~lat=35.678~long=135.678;met=Fuel~data=12~lat=35.678~long=135.678.
```

A payload including GPS and time details from a multi-sensor weather device appears as follows:

```
met=Temperature~data=36~lat=35.388628~long=139.673573~time=2014-12-23T07:14:30.546+09:00;
met=Humidity~data=70~lat=35.388628~long=139.673573~time=2014-12-23T07:14:30.546+09:00;
met=Pressure~data=1.2~lat=35.388628~long=139.673573~time=2014-12-23T07:14:30.546+09:00
```

## Custom Plug-in API

### EMBED Object Functions

This topic introduces a set of methods that plug-in developers can use to create their own custom plugins.

Proficiency Operations Hub includes a JavaScript API, which allows developers to create custom controls that can be imported into the application. These custom controls can interact with any data that is available within Operations Hub. The API provides access to end-user configurable settings and bi-directional data transfer.

#### Core Functionality

Useful for basic operations across the application:

- [EMBED.getComponent \(\) \(on page 859\)](#)
- [EMBED.getRootElement \(\) \(on page 859\)](#)

#### Themes and Styles

Help to customize the look and feel of the user interface:

- [EMBED.getTheme \(\) \(on page 860\)](#)
- [EMBED.getStyle \(\) \(on page 860\)](#)

#### Actions/Commands

[EMBED.executeAction \(on page 861\)](#)

#### Page Information

[EMBED.getPageData \(on page 861\)](#)

#### Data Access

Useful for working with the data source and data target fields:

- [EMBED.fieldTypelsQuery \(on page 862\)](#)
- [EMBED.fieldTypelsGlobal \(on page 863\)](#)
- [EMBED.fieldTypelsFormula \(on page 863\)](#)
- [EMBED.getGlobalData \(on page 864\)](#)
- [EMBED.getFormulaData \(on page 865\)](#)

- [EMBED.subscribeFieldToFormulaChange](#) (on page 865)
- [EMBED.subscribeFieldToGlobalChange](#) (field, callback) (on page 866)
- [EMBED.subscribeFieldToQueryChange](#) (field, callback) (on page 867)
- [EMBED.getQueryOutput](#) (field) (on page 868)
- [EMBED.submitTarget](#) (field, value) (on page 869)

## Navigation

[EMBED.registerNavChanged](#) (id, callback) (on page 870)

## Miscellaneous

[EMBED.subscribeToScreenSizeChange](#) (id, callback) (on page 870)

## EMBED.getComponent ()

This method retrieves a JSON object, which contains information about the current instance of a plug-in.

The `schema.data` subset of the JSON object contains all the data items defined for the current instance.

## Parameters

None

## Return Value

JSON object

## Example

```
let data = EMBED.getComponent().schema.data;  
let styling = data.styling; // retrieve the styling information from the manifest
```

## EMBED.getRootElement ()

This method retrieves a jQuery object, which represents the root HTML element of the current instance of a plug-in.

This method provides a way to access a specific instance of the plugin, regardless of how many other instances of the same plugin are present on the page.

## Parameters

None

## Return Value

jQuery object

## Example

```
let element = EMBED.getRootElement();  
let containerElem = element.find("#iContainer");
```

## EMBED.getTheme ()

This method retrieves a JSON object, which contains information about the current theme applied to Operations Hub.

## Parameters

None

## Return Value

JSON object

## Example

```
let theme = EMBED.getTheme()
```

## EMBED.getStyle ()

This method retrieves a string, which contains information about the styles that are currently being used by the application.

## Parameters

None

## Return Value

String

## Example

```
let styles = EMBED.getStyle()
```

## EMBED.executeAction

This method executes a specific action (as defined by id in the manifest).

The operation performed by the action is set in the Operations Hub designer (set global, change page, navigate to a URL, etc.).

### Parameters

(string) commandId

### Return Value

None

### Example

```
var doAction = function()
{
  EMBED.executeAction('onClicked')
}
```

### Manifest Information

```
"commands": [
  {
    "title": "Click Event",
    "id": "onClicked"
  }
],
```

## EMBED.getPageData

This method retrieves all sources of data available on the page, including information about any inputs, outputs, query names, etc.

Note that this is for the entire page, not just your specific plugin. It will list all queries and globals available on the page.

### Parameters

None

## Return Value

JSON object

## Example

```
let pageData = EMBED.getPageData();
```



## EMBED.fieldTypeIsQuery

Passing in a data source field from your component, will return if the data source configured is of type *Query*.

## Parameters

(JSON Object) field

## Return Value

Boolean

## Example

```

let data = EMBED.getComponent().schema.data;

let input = data.inputValue

if (EMBED.fieldTypeIsQuery(input))

{

  console.log('field type is Query');

}

```

## Related Manifest field

```

"inputValue": {
  "title": "Input Value",
  "type": "number",

```

```
"$ref": "#/definitions/dataSource"
}
```

## EMBED.fieldTypeIsGlobal

Passing in a data source field from your component, will return if the data source configured is of type *Global*.

### Parameters

(JSON Object) field

### Return Value

Boolean

### Example

```
let data = EMBED.getComponent().schema.data;
let input = data.inputValue
if (EMBED.fieldTypeIsGlobal(input))
{
  console.log(`field type is Global`);
}
```

### Related Manifest field

```
"inputValue": {
  "title": "Input Value",
  "type": "number",
  "$ref": "#/definitions/dataSource"
}
```

## EMBED.fieldTypeIsFormula

Passing in a data source field from your component, will return if the data source configured is of type *Formula*.

### Parameters

(JSON object) field

## Return Value

Boolean

## Example

```
let data = EMBED.getComponent().schema.data;
let input = data.inputValue
if (EMBED.fieldTypeIsFormula(input))
{
  console.log('field type is Formula');
}
```

## Related Manifest field

```
"inputValue": {
  "title": "Input Value",
  "type": "number",
  "$ref": "#/definitions/dataSource"
}
```

## EMBED.getGlobalData

This method retrieves the current value of an Operations Hub global variable.

## Parameters

(JSON Object) field

## Return Value

(variant)

## Example

```
let data = EMBED.getComponent().schema.data;
let input = data.inputValue

if (EMBED.fieldTypeIsGlobal(input))
{
  let value = EMBED.getGlobalData(input);
}
```



```
console.log(`value: `, value);  
}
```

## EMBED.getFormulaData

This method retrieves the current value of an Operations Hub Formula.

### Parameters

(JSON Object) field

### Return Value

(variant)

### Example

```
let data = EMBED.getComponent().schema.data;  
let input = data.inputValue  
  
if (EMBED.fieldTypeIsFormula(input))  
{  
  let value = EMBED.getFormulaData(input);  
  console.log(`value: `, value);  
}
```

## EMBED.subscribeFieldToFormulaChange

This method creates a subscription to a data source of *Formula* type.

Whenever the data changes, the callback function will be called with the updated value.

### Parameters

(JSON Object) field

(function) callback(data)

### Return Value

None

## Example

```
let data = EMBED.getComponent().schema.data;

let inputValue = data.inputValue

function cb(data)
{
  console.log('data', data);
}

if(EMBED.fieldTypeIsFormula(inputValue))
{
  // Fetch data

  var value = EMBED.getFormulaData(inputValue);

  // update plugin when first executed
  cb(value);

  EMBED.subscribeFieldToFormulaChange(inputValue, function(data)
  {
    // update plugin every time the data changes
    cb(data);
  });
}
```

## EMBED.subscribeFieldToGlobalChange (field, callback)

This method creates a subscription to a data source of *Global* type.

Whenever the data changes, the callback function will be called with the updated value.

### Parameters

(JSON Object) field

(function) callback(data)

### Return Value

None

## Example

```

let data = EMBED.getComponent().schema.data;

let inputValue = data.inputValue

function cb(data)
{
  console.log('data', data);
}

if(EMBED.fieldTypeIsGlobal(inputValue))
{
  // Fetch data

  var value = EMBED.getGlobalData(inputValue);

  // update plugin when first executed
  cb(value);

  EMBED.subscribeFieldToGlobalChange(inputValue, function(data)
  {
    // update plugin every time the data changes
    cb(data);
  });
}

```

## EMBED.subscribeFieldToQueryChange (field, callback)

This method creates a subscription to a data source of *Query* type.

Whenever the data changes, the callback function will be called with the updated value. Unlike *Global* and *Formula*, the data object in the callback will be an array of JSON objects. For example, if retrieving historical data, you will get back an array of timestamp, name, value, quality values.

### Parameters

(JSON object) field

(function) callback(data)

### Return Value

None

## Example

```
let data = EMBED.getComponent().schema.data;

let inputValue = data.inputValue

function cb(data)
{
  console.log('data', data);
}

if(EMBED.fieldTypeIsQuery(inputValue))
{
  EMBED.subscribeFieldToQueryChange(inputValue, function(data)
  {
    // update plugin every time the data changes
    cb(data);
  });
}
```

## EMBED.getQueryOutput (field)

Provided an input field, will return a list of all the outputs of the query, in an array of JSON objects.

### Parameters

(JSON object) field

### Return Value

JSON object array

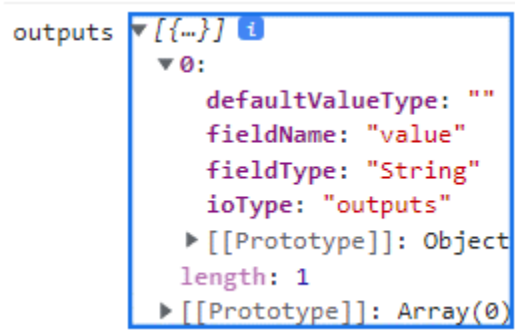
## Example

```
let data = EMBED.getComponent().schema.data;

let inputValue = data.inputValue

let outputs = EMBED.getQueryOutput(inputValue);

console.log('outputs', outputs);
```



## EMBED.submitTarget (field, value)

This method sends data from your plug-in back to an Operations Hub data target.

For example, your plugin has a text entry value, and you want to send that value back to a SQL data source via an Operations Hub query.

### Parameters

(JSON Object) field

(variant) value

### Return Value

None

### Example

```
let data = EMBED.getComponent().schema.data;

let outputValue = data.outputValue

function updateOutput(value)
{
  // Push the value from the Plugin back to Operations Hub
  //
  EMBED.submitTarget(outputValue, value);
}

updateOutput('new value');
```

## EMBED.registerNavChanged (id, callback)

This method provides a callback, which informs the plug-in that the page is closing/changing.

This allows the plug-in to do any cleanup required, save information, etc. Be sure to unregister your subscription in the callback function.

### Parameters

(string) id

(function) callback

### Return Value

None

## EMBED.subscribeToScreenSizeChange (id, callback)

This method creates a subscription, which will trigger a callback whenever the Operations Hub runtime detects a screen size change (such as resizing the browser).

### Parameters

(element) elementId

(function) callback

### Return Value

None

### Example

```
const rootElement = EMBED.getRootElement();
const elementId = rootElement.attr('id');

function resize ()
{
  // adjust your plugin for responsiveness
}

EMBED.subscribeToScreenSizeChange(elementId, resize);
```

# Troubleshooting

## Basic Troubleshooting

This topic contains information to help you troubleshoot issues.

- [Resolving Extension Query Error \(on page 871\)](#)
- [Tags are Not Displayed with an OPC UA Data Source \(on page 872\)](#)
- [Domain Redirect Error \(on page 872\)](#)
- [Importing App Creates Duplicate Data Sources \(on page 872\)](#)
- [Resolving SQL Connector EndApp Performance Issues \(on page 872\)](#)
- [Unable to Access Data Sources on Single Machine Install \(on page 873\)](#)
- [Invalid Token Fix \(on page 873\)](#)
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To troubleshoot errors returned for OPC UA and Historian out-of-the-box (OOTB) queries, refer to [Error Codes \(on page 877\)](#) description.

To troubleshoot data source test connection errors, refer to [Error Messages \(on page 895\)](#) description.

## Resolving Extension Query Error

If you do not have sufficient privileges to read or write operations, you may run into an error when attempting to execute the extension query in the end application. The error displays a generic message.

For example on a write failure, the console shows the following message:

```
{"status":{"success":false,"code":9998,"reason":"Data distributor response: Write request failed: Fail"}}
```

The Data Distributor log (`dataDistributor.log`) located at `C:\ProgramData\OphubLogs\DataDistributor` displays the following message:

```
Failed to write to NodeId ns=2;s=Channell.teststr.ss on server
urn:CHEWY:Intellution.IntellutionGatewayOPCServer:UA%20Server with OPC UA error BadUserAccessDenied. Connection to
server failed.
```

To resolve this issue, validate your data source connection, and the credentials to connect to the data source. In the above example, you would need to check the OPC UA server.

## Tags are Not Displayed with an OPC UA Data Source

If tags are not getting displayed when you browse your correctly configured OPC UA data source, you may have to restart the GE Operations Hub OPC UA Browse Service in your Services console to resolve this issue.

## Domain Redirect Error

DNS issue occurs while trying to access Operations Hub from different machines. To avoid the error, add `hostname` and `ip address` of the machine (where Operations Hub is installed) on to your host file located here: `windows/system32/drivers/etc/hosts`.

## Importing App Creates Duplicate Data Sources

If you import the application on a clean install, duplicate data sources are created in Operations Hub. This occurs when Operations Hub does not have a model. When you import an application containing a model (in a .csv file) and some datasources (in the .xml file), all the data sources (containing details) that were exported during application export, are also imported. The model is also imported, which leads to the import of data sources again (without the details for the OPC UA data sources). This leads to some data sources appearing twice (once from the model, once from the app xml file).

**Workaround:** Configure the data source without the alias string for restoring application connectivity. Delete the duplicate (containing the alias string) if required. The model is associated with the data sources imported from the model file i.e the ones without the alias name.

## Resolving SQL Connector EndApp Performance Issues

Implement these changes to achieve the best performance for your end applications using the SQL connection database.

1. Browse to the location directory on the machine where Operations Hub is installed: `..\ProgramData\GE\Operations Hub\iqp-config\IQP\app`
2. Open the `setting.conf` file in a text editor.
3. Enter `sqlconnector_runtime_simplejdbcall_lifetime=60000` in a new line at the end of the file.



This means that the stored procedure meta data cache is refreshed every 60000 milliseconds (one minute). You can modify the refresh time to your requirement, but enter its value in milliseconds.

4. Search for `sqlconnector_maxConnectionPoolSize=10` and increase the pool size to your requirement.

Currently, the pool size indicates that you can configure 10 connections for your SQL end application.

5. Save and close the file.
6. Restart the Operations Hub machine for the changes to take effect.

## Unable to Access Data Sources on Single Machine Install

If you installed Historian followed by Operations Hub on the same machine, you were not able to access [DATASOURCES \(on page 421\)](#) in Operations Hub. An error message appears stating, *Unable to load data sources*.

The error occurs only when the host name in the URL has mixed/upper-case letters, which get converted to lower case. To resolve this issue, modify the registry.

1. Run **regedit** to open the Registry Editor.
2. Navigate to `\HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\Apache Software Foundation\Procrun 2.0\WebhmiTomcat\Parameters\Java`.
3. In the right pane, double-click **Options**.

The **Edit Multi-String** dialog appears.

4. Modify the property `-Dwebhmi.services.auth.fastTokenServices.trustedIssuers=https://pp-hist3/uaa/oauth/token` to append a new URL entry based on the mixed/upper-case host name.

The property is a comma-separated list of multiple URLs. For example, a URL with upper-case `PP-HIST3` is appended to the list here:

```
-Dwebhmi.services.auth.fastTokenServices.trustedIssuers=https://pp-hist3/uaa/oauth/token,https://PP-HIST3/uaa/oauth/token).
```

5. Restart the GE Operations Hub WebHMI Tomcat Web Server service.

## Invalid Token Fix

If upgrading from 2.0 to 2.1, restart the WebClient services to allow the Plant Applications Web Client to connect successfully to Operations Hub.

- If using Enterprise WebClient version, restart the Docker service.
- If using Standard WebClient version, restart the GE PlantApps WebClient Master Control service.

## Services Not Starting After Reboot

If services do not start up on rebooting a machine, visit the link for steps to modify the registry and fix the issue:

<https://docs.microsoft.com/en-US/troubleshoot/windows-server/system-management-components/service-not-start-events-7000-7011-time-out-error>

The operating system related issue may vary from system to system depending on the resources being utilized at start up.

## Error While Loading Data Sources

After installing Operations Hub 2.1, the error "Can't load DataSources" appears while trying to access the data sources screen. This issue may occur due to any of the following reasons:

- A Java class cache file may have been corrupted. This file once created, does not change until it is deleted.
  1. Stop the webhmi tomcat service.
  2. Delete the only file in this location folder `C:\ProgramData\GE\Operations Hub\webhmi-tomcat\j9aot`
  3. Start the webhmi tomcat service.
- There may be a mismatch of letter case in the UAA host name. The hostname should be ideally in lowercase. But, if UAA (standalone or as a part of Historian install) is installed with a mixed case or capital case, the mismatch can occur leading to the issue.
- IQP tomcat can start up much quicker than webhmi during system start up. It is possible that the delayed webhmi tomcat start up is interfering with accessing the web UI. A generous wait period usually resolves this issue.

## Resolving Proficy Authentication Issue During Workflow Task Client Install

Proficy Authentication (UAA) server validation fails during installation of Workflow Task Client due to the change made to UAA for TLS 1.2.

**Workaround:** To successfully install Workflow Task Client with Operations Hub 2022, do the following:

1. [Modify Registry for TLS 1.2 \(on page 900\)](#).
2. Install the Workflow Task Client plugin from the Workflow installer on your Operations Hub Server host.

## Resolving External Proficy Authentication Issue During Operations Hub Install

The test button used to test connectivity to an external Proficy Authentication instance fails with a message `Could not create SSL/TLS secure channel`.

**Workaround:** To successfully test connectivity to an external Proficy Authentication instance, do the following:

1. [Modify Registry for TLS 1.2 \(on page 900\)](#).
2. Install Operations Hub 2022 referencing the external Proficy Authentication instance.

## Workflow Task Client is unable to connect to the Proficy Server

If user upgrades from an older version of Operations Hub (still using TLS 1.1) that has the Task Client widget, and then upgrades to version 2022 or greater (which supports only TLS 1.2), then Task Client is unable to connect to the Proficy Server.

**Workaround:** To resolve the connectivity issue, perform the steps provided in the topic [Modify Registry for TLS 1.2 \(on page 900\)](#).

## Resolving Operations Hub Blank Login Screen

If using an older version of Chrome or Firefox, you may be presented with a blank login page.

To resolve this issue, go to your browser's settings to download the latest version of your browser, or download and install the latest updates.

## Resolving 2022.4.1 Uninstallation Fail

Uninstallation of Operations Hub 2022.4.1 fails due to error in kafka uninstallation.

**Workaround:** Stop `iqp-kafka` service, and proceed to uninstalling Operations Hub 2022.4.1 on your machine.

## Events with Device Conditions are not Triggered

In case events are not generated, it is recommended to do the following:

1. Stop the Operations Hub services, in particular:

- `iqpTomcat`
- `iqpKafka`
- `iqpZookeeper`

2. Delete the log files in these data log folders:

- `C:\ProgramData\OphubLogs\iqp-kafka`
- `C:\ProgramData\OphubLogs\iqp-zookeeper`

3. Restart all services.

## Timestamp from SQL Database gets converted to Local Time

The issue does not occur if using Operations Hub to store DateTime data into the SQL database. Because Operations Hub expects DateTime data to be in UTC and reads as UTC from the SQL database. The issue occurs only in the following conditions:

- If using a third party application to store DateTime data into the SQL database, wherein DateTime data is in local timezone, and
- DateTime data is read in Operations Hub via relational database query, wherein Operations Hub expects DateTime to be in UTC.

**Workaround:** Follow these steps to access and modify the stored procedure in your database:

1. Launch SQL Server Management Studio.
2. Log in to the SQL Server.
3. Navigate to your application database to access the stored procedures.
4. Right-click the DateTime stored procedure and select **Modify**.

For the DateTime column, enter `at time zone` in select statement and provide the local timezone of the machine where Operations Hub is installed. Example:

```
SELECT [DateTime] at time zone "Eastern Standard Time" from [dbo].[DateTime]
```

## Missing Plug-in Properties after Upgrade

After upgrading Operations Hub, some of the plug-ins are missing properties. Clearing the cache and performing a hard reload using the Inspect tool in a web browser can help resolve issues with web pages not loading correctly or displaying outdated content. Do the following to clear the cache and perform a hard reload:

1. Right-click anywhere on the page and select **Inspect**. This action enables the browser's refresh icon to display more options.
2. Right-click the refresh icon and select **Empty Cache and Hard Reload**.

In case you want to use a third party tool to clear the cache, then reload the browser after clearing the cache.

## OPC UA Browse References Call Failures and Resolution

During OPC UA operations, the OPC UA Browse References call intermittently fails to produce the expected outcome. Tags are not displayed within the OPC UA Browse pop-up, accompanied by 401 and 412 errors.

**Workaround:** To mitigate the issue, do the following:

1. Go to `C:\Program Files\Proficy\Operations Hub\BrowseService`.
2. Locate and open `opcua-browse-config.json` file in a text editor.
3. In the file, search for the `secure` parameter.

If set to `true`, then change it to `false`.

```
{
  "port": "4856",
  "maxReadRequestObjects": 5000,
  "maxBrowseRequestObjects": 5000,
  "maxBrowseResultObjects": 5000,
  "UaaTokenKeyUrl": "https://sbbuaahco.meridium.com/uaa/token_key",
  "UaaTokenIntrospectUrl": "https://sbbuaahco.meridium.com/uaa/introspect_token",
  "secure": true,
  "ClientId": "admin",
  "ClientSecret": "admin",
  "logging": {
    "path": "C:/ProgramData/OphubLogs/BrowseService/opcua-browse-config.log",
    "level": "info",
    "max-size": 5242880,
    "max-files": 3,
    "flush-seconds": 10
  }
}
```

4. Save and close the `opcua-browse-config.json` file.
5. Restart **GE Operations Hub OPC UA Browse Service** for the changes to take effect.

## Error Codes

The following table outlines the error codes returned to Operations Hub from OPC UA and the Data Distributor. These codes are returned for OPC UA and Historian out-of-the-box (OOTB) queries as integers, and can be useful in troubleshooting.

**Note:**

- Make sure your Operations Hub logged in user matches with the user configured in the CIMPLICITY project or iFIX node.
- For inline writes to an iFIX or CIMPLICITY mimic with direct tag bindings, make sure that your data source matches with that of the CIMPLICITY project or iFIX node name.

Code	Integer	String	Description
0x80010000	2147549184	BadUnexpectedError	An unexpected error occurred.
0x80020000	2147614720	BadInternalError	An internal error occurred as a result of a programming or configuration error.
0x80030000	2147680256	BadOutOfMemory	Not enough memory to complete the operation.
0x80040000	2147745792	BadResourceUnavailable	An operating system resource is not available.
0x80050000	2147811328	BadCommunicationError	A low level communication error occurred.
0x80060000	2147876864	BadEncodingError	Encoding halted because of invalid data in the objects being serialized.
0x80070000	2147942400	BadDecodingError	Decoding halted because of invalid data in the stream.
0x80080000	2148007936	BadEncodingLimitsExceeded	The message encoding/decoding limits imposed by the stack have been exceeded.
0x80B80000	2159542272	BadRequestTooLarge	The request message size exceeds limits set by the server.
0x80B90000	2159607808	BadResponseTooLarge	The response message size exceeds limits set by the client.
0x80090000	2148073472	BadUnknownResponse	An unrecognized response was received from the server.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x800A0000	2148139008	BadTimeout	The operation timed out.
0x800B0000	2148204544	BadServiceUnsupported	The server does not support the requested service.
0x800C0000	2148270080	BadShutdown	The operation was cancelled because the application is shutting down.
0x800D0000	2148335616	BadServerNotConnected	The operation could not complete because the client is not connected to the server.
0x800E0000	2148401152	BadServerHalted	The server has stopped and cannot process any requests.
0x800F0000	2148466688	BadNothingToDo	There was nothing to do because the client passed a list of operations with no elements.
0x80100000	2148532224	BadTooManyOperations	The request could not be processed because it specified too many operations.
0x80DB0000	2161836032	BadTooManyMonitoredItems	The request could not be processed because there are too many monitored items in the subscription.
0x80110000	2148597760	BadDataTypeIdUnknown	The extension object cannot be (de)serialized because the data type id is not recognized.
0x80120000	2148663296	BadCertificateInvalid	The certificate provided as a parameter is not valid.
0x80130000	2148728832	BadSecurityChecksFailed	An error occurred verifying security.
0x81140000	2165571584	BadCertificatePolicyCheckFailed	The certificate does not meet the requirements of the security policy.
0x80140000	2148794368	BadCertificateTimeInvalid	The certificate has expired or is not yet valid.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x80150000	2148859904	BadCertificateIssuerTimeInvalid	An issuer certificate has expired or is not yet valid.
0x80160000	2148925440	BadCertificateHostNameInvalid	The HostName used to connect to a server does not match a HostName in the certificate.
0x80170000	2148990976	BadCertificateUriInvalid	The URI specified in the Application-Description does not match the URI in the certificate.
0x80180000	2149056512	BadCertificateUseNotAllowed	The certificate may not be used for the requested operation.
0x80190000	2149122048	BadCertificateIssuerUseNotAllowed	The issuer certificate may not be used for the requested operation.
0x801A0000	2149187584	BadCertificateUntrusted	The certificate is not trusted.
0x801B0000	2149253120	BadCertificateRevocationUnknown	It was not possible to determine if the certificate has been revoked.
0x801C0000	2149318656	BadCertificateIssuerRevocationUnknown	It was not possible to determine if the issuer certificate has been revoked.
0x801D0000	2149384192	BadCertificateRevoked	The certificate has been revoked.
0x801E0000	2149449728	BadCertificateIssuerRevoked	The issuer certificate has been revoked.
0x810D0000	2165112832	BadCertificateChainIncomplete	The certificate chain is incomplete.
0x801F0000	2149515264	BadUserAccessDenied	User does not have permission to perform the requested operation.
0x80200000	2149580800	BadIdentityTokenInvalid	The user identity token is not valid.
0x80210000	2149646336	BadIdentityTokenRejected	The user identity token is valid but the server has rejected it.
0x80220000	2149711872	BadSecureChannelIdInvalid	The specified secure channel is no longer valid.



<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x80230000	2149777408	BadInvalidTimestamp	The timestamp is outside the range allowed by the server.
0x80240000	2149842944	BadNonceInvalid	The nonce does appear to be not a random value or it is not the correct length.
0x80250000	2149908480	BadSessionIdInvalid	The session id is not valid.
0x80260000	2149974016	BadSessionClosed	The session was closed by the client.
0x80270000	2150039552	BadSessionNotActivated	The session cannot be used because ActivateSession has not been called.
0x80280000	2150105088	BadSubscriptionIdInvalid	The subscription id is not valid.
0x802A0000	2150236160	BadRequestHeaderInvalid	The header for the request is missing or invalid.
0x802B0000	2150301696	BadTimestampsToReturnInvalid	The timestamps to return parameter is invalid.
0x802C0000	2150367232	BadRequestCancelledByClient	The request was cancelled by the client.
0x80E50000	2162491392	BadTooManyArguments	Too many arguments were provided.
0x810E0000	2165178368	BadLicenseExpired	The server requires a license to operate in general or to perform a service or operation, but existing license is expired.
0x810F0000	2165243904	BadLicenseLimitsExceeded	The server has limits on number of allowed operations / objects, based on installed licenses, and these limits where exceeded.
0x81100000	2165309440	BadLicenseNotAvailable	The server does not have a license which is required to operate in general or to perform a service or operation.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x002D0000	2949120	GoodSubscriptionTransferred	The subscription was transferred to another session.
0x002E0000	3014656	GoodCompletesAsynchronously	The processing will complete asynchronously.
0x002F0000	3080192	GoodOverload	Sampling has slowed down due to resource limitations.
0x00300000	3145728	GoodClamped	The value written was accepted but was clamped.
0x80310000	2150694912	BadNoCommunication	Communication with the data source is defined, but not established, and there is no last known value available.
0x80320000	2150760448	BadWaitingForInitialData	Waiting for the server to obtain values from the underlying data source.
0x80330000	2150825984	BadNodeIdInvalid	The syntax of the node id is not valid.
0x80340000	2150891520	BadNodeIdUnknown	The node id refers to a node that does not exist in the server address space.
0x80350000	2150957056	BadAttributeIdInvalid	The attribute is not supported for the specified Node.
0x80360000	2151022592	BadIndexRangeInvalid	The syntax of the index range parameter is invalid.
0x80370000	2151088128	BadIndexRangeNoData	No data exists within the range of indexes specified.
0x80380000	2151153664	BadDataEncodingInvalid	The data encoding is invalid.
0x80390000	2151219200	BadDataEncodingUnsupported	The server does not support the requested data encoding for the node.
0x803A0000	2151284736	BadNotReadable	The access level does not allow reading or subscribing to the Node.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x803B0000	2151350272	BadNotWritable	The access level does not allow writing to the Node.
0x803C0000	2151415808	BadOutOfRange	The value was out of range.
0x803D0000	2151481344	BadNotSupported	The requested operation is not supported.
0x803E0000	2151546880	BadNotFound	A requested item was not found or a search operation ended without success.
0x803F0000	2151612416	BadObjectDeleted	The object cannot be used because it has been deleted.
0x80400000	2151677952	BadNotImplemented	Requested operation is not implemented.
0x80410000	2151743488	BadMonitoringModelInvalid	The monitoring mode is invalid.
0x80420000	2151809024	BadMonitoredItemIdInvalid	The monitoring item id does not refer to a valid monitored item.
0x80430000	2151874560	BadMonitoredItemFilterInvalid	The monitored item filter parameter is not valid.
0x80440000	2151940096	BadMonitoredItemFilterUnsupported	The server does not support the requested monitored item filter.
0x80450000	2152005632	BadFilterNotAllowed	A monitoring filter cannot be used in combination with the attribute specified.
0x80460000	2152071168	BadStructureMissing	A mandatory structured parameter was missing or null.
0x80470000	2152136704	BadEventFilterInvalid	The event filter is not valid.
0x80480000	2152202240	BadContentFilterInvalid	The content filter is not valid.
0x80C10000	2160132096	BadFilterOperatorInvalid	An unrecognized operator was provided in a filter.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x80C20000	2160197632	BadFilterOperatorUnsupported	A valid operator was provided, but the server does not provide support for this filter operator.
0x80C30000	2160263168	BadFilterOperandCountMismatch	The number of operands provided for the filter operator was less than expected for the operand provided.
0x80490000	2152267776	BadFilterOperandInvalid	The operand used in a content filter is not valid.
0x80C40000	2160328704	BadFilterElementInvalid	The referenced element is not a valid element in the content filter.
0x80C50000	2160394240	BadFilterLiteralInvalid	The referenced literal is not a valid value.
0x804A0000	2152333312	BadContinuationPointInvalid	The continuation point provided is no longer valid.
0x804B0000	2152398848	BadNoContinuationPoints	The operation could not be processed because all continuation points have been allocated.
0x804C0000	2152464384	BadReferenceTypeIdInvalid	The reference type id does not refer to a valid reference type node.
0x804D0000	2152529920	BadBrowseDirectionInvalid	The browse direction is not valid.
0x804E0000	2152595456	BadNodeNotInView	The node is not part of the view.
0x81120000	2165440512	BadNumericOverflow	The number was not accepted because of a numeric overflow.
0x804F0000	2152660992	BadServerUriInvalid	The ServerUri is not a valid URI.
0x80500000	2152726528	BadServerNameMissing	No ServerName was specified.
0x80510000	2152792064	BadDiscoveryUrlMissing	No DiscoveryUrl was specified.
0x80520000	2152857600	BadSemaphoreFileMissing	The semaphore file specified by the client is not valid.
0x80530000	2152923136	BadRequestTypeInvalid	The security token request type is not valid.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x80540000	2152988672	BadSecurityModeRejected	The security mode does not meet the requirements set by the server.
0x80550000	2153054208	BadSecurityPolicyRejected	The security policy does not meet the requirements set by the server.
0x80560000	2153119744	BadTooManySessions	The server has reached its maximum number of sessions.
0x80570000	2153185280	BadUserSignatureInvalid	The user token signature is missing or invalid.
0x80580000	2153250816	BadApplicationSignatureInvalid	The signature generated with the client certificate is missing or invalid.
0x80590000	2153316352	BadNoValidCertificates	The client did not provide at least one software certificate that is valid and meets the profile requirements for the server.
0x80C60000	2160459776	BadIdentityChangeNotSupported	The server does not support changing the user identity assigned to the session.
0x805A0000	2153381888	BadRequestCancelledByRequest	The request was cancelled by the client with the Cancel service.
0x805B0000	2153447424	BadParentNodeIdInvalid	The parent node id does not refer to a valid node.
0x805C0000	2153512960	BadReferenceNotAllowed	The reference could not be created because it violates constraints imposed by the data model.
0x805D0000	2153578496	BadNodeIdRejected	The requested node id was rejected because it was either invalid or server does not allow node ids to be specified by the client.
0x805E0000	2153644032	BadNodeIdExists	The requested node id is already used by another node.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x805F0000	2153709568	BadNodeClassInvalid	The node class is not valid.
0x80600000	2153775104	BadBrowseNameInvalid	The browse name is invalid.
0x80610000	2153840640	BadBrowseNameDuplicated	The browse name is not unique among nodes that share the same relationship with the parent.
0x80620000	2153906176	BadNodeAttributesInvalid	The node attributes are not valid for the node class.
0x80630000	2153971712	BadTypeDefinitionInvalid	The type definition node id does not reference an appropriate type node.
0x80640000	2154037248	BadSourceNodeIdInvalid	The source node id does not reference a valid node.
0x80650000	2154102784	BadTargetNodeIdInvalid	The target node id does not reference a valid node.
0x80660000	2154168320	BadDuplicateReferenceNotAllowed	The reference type between the nodes is already defined.
0x80670000	2154233856	BadInvalidSelfReference	The server does not allow this type of self reference on this node.
0x80680000	2154299392	BadReferenceLocalOnly	The reference type is not valid for a reference to a remote server.
0x80690000	2154364928	BadNoDeleteRights	The server will not allow the node to be deleted.
0x40BC0000	1086062592	UncertainReferenceNotDeleted	The server was not able to delete all target references.
0x806A0000	2154430464	BadServerIndexInvalid	The server index is not valid.
0x806B0000	2154496000	BadViewIdUnknown	The view id does not refer to a valid view node.
0x80C90000	2160656384	BadViewTimestampInvalid	The view timestamp is not available or not supported.
0x80CA0000	2160721920	BadViewParameterMismatch	The view parameters are not consistent with each other.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x80CB0000	2160787456	BadViewVersionInvalid	The view version is not available or not supported.
0x40C00000	1086324736	UncertainNotAllNodesAvailable	The list of references may not be complete because the underlying system is not available.
0x00BA0000	12189696	GoodResultsMayBelIncomplete	The server should have followed a reference to a node in a remote server but did not. The result set may be incomplete.
0x80C80000	2160590848	BadNotTypeDefinition	The provided Nodeid was not a type definition nodeid.
0x406C0000	1080819712	UncertainReferenceOutOfServer	One of the references to follow in the relative path references to a node in the address space in another server.
0x806D0000	2154627072	BadTooManyMatches	The requested operation has too many matches to return.
0x806E0000	2154692608	BadQueryTooComplex	The requested operation requires too many resources in the server.
0x806F0000	2154758144	BadNoMatch	The requested operation has no match to return.
0x80700000	2154823680	BadMaxAgeInvalid	The max age parameter is invalid.
0x80E60000	2162556928	BadSecurityModelInsufficient	The operation is not permitted over the current secure channel.
0x80710000	2154889216	BadHistoryOperationInvalid	The history details parameter is not valid.
0x80720000	2154954752	BadHistoryOperationUnsupported	The server does not support the requested operation.
0x80BD0000	2159869952	BadInvalidTimestampArgument	The defined timestamp to return was invalid.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x80730000	2155020288	BadWriteNotSupported	The server does not support writing the combination of value, status and timestamps provided.
0x80740000	2155085824	BadTypeMismatch	The value supplied for the attribute is not of the same type as the attribute's value.
0x80750000	2155151360	BadMethodInvalid	The method id does not refer to a method for the specified object.
0x80760000	2155216896	BadArgumentsMissing	The client did not specify all of the input arguments for the method.
0x81110000	2165374976	BadNotExecutable	The executable attribute does not allow the execution of the method.
0x80770000	2155282432	BadTooManySubscriptions	The server has reached its maximum number of subscriptions.
0x80780000	2155347968	BadTooManyPublishRequests	The server has reached the maximum number of queued publish requests.
0x80790000	2155413504	BadNoSubscription	There is no subscription available for this session.
0x807A0000	2155479040	BadSequenceNumberUnknown	The sequence number is unknown to the server.
0x807B0000	2155544576	BadMessageNotAvailable	The requested notification message is no longer available.
0x807C0000	2155610112	BadInsufficientClientProfile	The client of the current session does not support one or more Profiles that are necessary for the subscription.
0x80BF0000	2160001024	BadStateNotActive	The sub-state machine is not currently active.
0x81150000	2165637120	BadAlreadyExists	An equivalent rule already exists.



<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x807D0000	2155675648	BadTcpServerTooBusy	The server cannot process the request because it is too busy.
0x807E0000	2155741184	BadTcpMessageTypeInvalid	The type of the message specified in the header invalid.
0x807F0000	2155806720	BadTcpSecureChannelUnknown	The SecureChannelId and/or TokenId are not currently in use.
0x80800000	2155872256	BadTcpMessageTooLarge	The size of the message specified in the header is too large.
0x80810000	2155937792	BadTcpNotEnoughResources	There are not enough resources to process the request.
0x80820000	2156003328	BadTcpInternalError	An internal error occurred.
0x80830000	2156068864	BadTcpEndpointUrlInvalid	The server does not recognize the QueryString specified.
0x80840000	2156134400	BadRequestInterrupted	The request could not be sent because of a network interruption.
0x80850000	2156199936	BadRequestTimeout	Timeout occurred while processing the request.
0x80860000	2156265472	BadSecureChannelClosed	The secure channel has been closed.
0x80870000	2156331008	BadSecureChannelTokenUnknown	The token has expired or is not recognized.
0x80880000	2156396544	BadSequenceNumberInvalid	The sequence number is not valid.
0x808BE0000	2159935488	BadProtocolVersionUnsupported	The applications do not have compatible protocol versions.
0x80890000	2156462080	BadConfigurationError	There is a problem with the configuration that affects the usefulness of the value.
0x808A0000	2156527616	BadNotConnected	The variable should receive its value from another variable, but has never been configured to do so.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x808B0000	2156593152	BadDeviceFailure	There has been a failure in the device/data source that generates the value that has affected the value.
0x808C0000	2156658688	BadSensorFailure	There has been a failure in the sensor from which the value is derived by the device/data source.
0x808D0000	2156724224	BadOutOfService	The source of the data is not operational.
0x808E0000	2156789760	BadDeadbandFilterInvalid	The deadband filter is not valid.
0x408F0000	1083113472	UncertainNoCommunication-LastUsableValue	Communication to the data source has failed. The variable value is the last value that had a good quality.
0x40900000	1083179008	UncertainLastUsableValue	Whatever was updating this value has stopped doing so.
0x40910000	1083244544	UncertainSubstituteValue	The value is an operational value that was manually overwritten.
0x40920000	1083310080	UncertainInitialValue	The value is an initial value for a variable that normally receives its value from another variable.
0x40930000	1083375616	UncertainSensorNotAccurate	The value is at one of the sensor limits.
0x40940000	1083441152	UncertainEngineeringUnitsExceeded	The value is outside of the range of values defined for this parameter.
0x40950000	1083506688	UncertainSubNormal	The value is derived from multiple sources and has less than the required number of Good sources.
0x00960000	9830400	GoodLocalOverride	The value has been overridden.
0x80970000	2157379584	BadRefreshInProgress	This Condition refresh failed, a Condition refresh operation is already in progress.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x80980000	2157445120	BadConditionAlreadyDisabled	This condition has already been disabled.
0x80CC0000	2160852992	BadConditionAlreadyEnabled	This condition has already been enabled.
0x80990000	2157510656	BadConditionDisabled	Property not available, this condition is disabled.
0x809A0000	2157576192	BadEventIdUnknown	The specified event id is not recognized.
0x80BB0000	2159738880	BadEventNotAcknowledgeable	The event cannot be acknowledged.
0x80CD0000	2160918528	BadDialogNotActive	The dialog condition is not active.
0x80CE0000	2160984064	BadDialogResponseInvalid	The response is not valid for the dialog.
0x80CF0000	2161049600	BadConditionBranchAlready-Acked	The condition branch has already been acknowledged.
0x80D00000	2161115136	BadConditionBranchAlready-Confirmed	The condition branch has already been confirmed.
0x80D10000	2161180672	BadConditionAlreadyShelved	The condition has already been shelved.
0x80D20000	2161246208	BadConditionNotShelved	The condition is not currently shelved.
0x80D30000	2161311744	BadShelvingTimeOutOfRange	The shelving time not within an acceptable range.
0x809B0000	2157641728	BadNoData	No data exists for the requested time range or event filter.
0x80D70000	2161573888	BadBoundNotFound	No data found to provide upper or lower bound value.
0x80D80000	2161639424	BadBoundNotSupported	The server cannot retrieve a bound for the variable.
0x809D0000	2157772800	BadDataLost	Data is missing due to collection started/stopped/lost.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x809E0000	2157838336	BadDataUnavailable	Expected data is unavailable for the requested time range due to an unmounted volume, an off-line archive or tape, or similar reason for temporary unavailability.
0x809F0000	2157903872	BadEntryExists	The data or event was not successfully inserted because a matching entry exists.
0x80A00000	2157969408	BadNoEntryExists	The data or event was not successfully updated because no matching entry exists.
0x80A10000	2158034944	BadTimestampNotSupported	The client requested history using a timestamp format the server does not support (i.e requested Server-Timestamp when server only supports SourceTimestamp).
0x00A20000	10616832	GoodEntryInserted	The data or event was successfully inserted into the historical database.
0x00A30000	10682368	GoodEntryReplaced	The data or event field was successfully replaced in the historical database.
0x40A40000	1084489728	UncertainDataSubNormal	The value is derived from multiple values and has less than the required number of Good values.
0x00A50000	10813440	GoodNoData	No data exists for the requested time range or event filter.
0x00A60000	10878976	GoodMoreData	The data or event field was successfully replaced in the historical database.
0x80D40000	2161377280	BadAggregateListMismatch	The requested number of Aggregates does not match the requested number of NodeIds.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x80D50000	2161442816	BadAggregateNotSupported	The requested Aggregate is not support by the server.
0x80D60000	2161508352	BadAggregateInvalidInputs	The aggregate value could not be derived due to invalid data inputs.
0x80DA0000	2161770496	BadAggregateConfigurationRejected	The aggregate configuration is not valid for specified node.
0x00D90000	14221312	GoodDataIgnored	The request specifies fields which are not valid for the EventType or cannot be saved by the historian.
0x80E40000	2162425856	BadRequestNotAllowed	The request was rejected by the server because it did not meet the criteria set by the server.
0x81130000	2165506048	BadRequestNotComplete	The request has not been processed by the server yet.
0x00DC0000	14417920	GoodEdited	The value does not come from the real source and has been edited by the server.
0x00DD0000	14483456	GoodPostActionFailed	There was an error in execution of these post-actions.
0x40DE0000	1088290816	UncertainDominantValue-Changed	The related EngineeringUnit has been changed but the Variable Value is still provided based on the previous unit.
0x00E00000	14680064	GoodDependentValueChanged	A dependent value has been changed but the change has not been applied to the device.
0x80E10000	2162229248	BadDominantValueChanged	The related EngineeringUnit has been changed but this change has not been applied to the device. The Variable Value is still dependent on the previous unit but its status is currently Bad.

<b>Code</b>	<b>Integer</b>	<b>String</b>	<b>Description</b>
0x40E20000	1088552960	UncertainDependentValue-Changed	A dependent value has been changed but the change has not been applied to the device. The quality of the dominant variable is uncertain.
0x80E30000	2162360320	BadDependentValueChanged	A dependent value has been changed but the change has not been applied to the device. The quality of the dominant variable is Bad.
0x00A70000	10944512	GoodCommunicationEvent	The communication layer has raised an event.
0x00A80000	11010048	GoodShutdownEvent	The system is shutting down.
0x00A90000	11075584	GoodCallAgain	The operation is not finished and needs to be called again.
0x00AA0000	11141120	GoodNonCriticalTimeout	A non-critical timeout occurred.
0x80AB0000	2158690304	BadInvalidArgument	One or more arguments are invalid.
0x80AC0000	2158755840	BadConnectionRejected	Could not establish a network connection to remote server.
0x80AD0000	2158821376	BadDisconnect	The server has disconnected from the client.
0x80AE0000	2158886912	BadConnectionClosed	The network connection has been closed.
0x80AF0000	2158952448	BadInvalidState	The operation cannot be completed because the object is closed, uninitialized or in some other invalid state.
0x80B00000	2159017984	BadEndOfStream	Cannot move beyond end of the stream.
0x80B10000	2159083520	BadNoDataAvailable	No data is currently available for reading from a non-blocking stream.

Code	Integer	String	Description
0x80B20000	2159149056	BadWaitingForResponse	The asynchronous operation is waiting for a response.
0x80B30000	2159214592	BadOperationAbandoned	The asynchronous operation was abandoned by the caller.
0x80B40000	2159280128	BadExpectedStreamToBlock	The stream did not return all data requested (possibly because it is a non-blocking stream).
0x80B50000	2159345664	BadWouldBlock	Non blocking behaviour is required and the operation would block.
0x80B60000	2159411200	BadSyntaxError	A value had an invalid syntax.
0x80B70000	2159476736	BadMaxConnectionsReached	The operation could not be finished because all available connections are in use.

## Error Messages

A list of connection errors, their cause, and action to be taken.

These are some of the errors you may encounter when testing a data source connection:



### Note:

- Make sure your Operations Hub logged in user matches with the user configured in the CIMPLICITY project or iFIX node.
- For inline writes to an iFIX or CIMPLICITY mimic with direct tag bindings, make sure that your data source matches with that of the CIMPLICITY project or iFIX node name.

Error Message	Description
Test Connection Failed - Server not reachable.	<p><b>Cause:</b> The hostname or the IP address of the server is incorrect.</p> <p><b>Action:</b> Enter the correct hostname or the IP address.</p>

Error Message	Description
Test Connection Failed - Security mode or policy not supported.	<p><b>Cause:</b> The selected security policy is not supported by the server.</p> <p><b>Action:</b> Select a security policy supported by the server.</p>
Test Connection Failed - Authentication Failed.	<p><b>Cause:</b> The user name or password to login to the sever is incorrect.</p> <p><b>Action:</b> Enter the correct user name or password.</p>
Test Connection Failed - Server not trusted.	<p><b>Cause:</b> The server certificate is not trusted by the Operations Hub client.</p> <p><b>Action:</b> To trust, access the untrusted server certificate, then select <b>Trust</b>. The server certificate gets copied to the Operations Hub trusted folder.</p>
Test Connection Failed - Server doesn't trust this client.	<p><b>Cause:</b> Operations Hub client certificate is not trusted by the server.</p> <p><b>Action:</b> Log in to the server, and add the Operations Hub client certificate to their trusted list.</p>
Test Connection Failed - Certificate Uri is Invalid.	<p><b>Cause:</b> If upgrading from Operations Hub 2.0 to 2.1, you need to revert the changes made to the <code>ServerConfig.xml</code> file.</p> <p><b>Action:</b> Follow these steps:</p> <ol style="list-style-type: none"> <li>1. Go to <code>C:\Program Files\GE\Operations hub\BrowseService</code>.</li> <li>2. Open <code>ServerConfig.xml</code> and search for: <pre style="background-color: #f0f0f0; padding: 5px;"> &lt;ServerUri&gt;urn:&lt;machine name in capital letters&gt;:proficy:webhml:dataservices&lt;/ServerUri&gt;</pre> </li> </ol> <p>Replace <code>&lt;machine name in capital letters&gt;</code> with <code>[Node-Name]</code>.</p> <ol style="list-style-type: none"> <li>3. Save and close the XML file.</li> </ol>



Error Message	Description
	<p>4. Go to Operations Hub trusted store <code>C:\ProgramData\GE\Operations Hub\pki\trusted\certs</code> and delete the existing certificate.</p> <p>5. Visit your data sources and trust them all over again to reissue the certificate.</p>
Test Connection Failed - Connection limit on OPC UA server exceeded.	<p><b>Cause:</b> You have exceeded the license limitation of clients on this server.</p> <p><b>Action:</b> Get a license issued for this client.</p>
Test Connection Failed to connect the opcua endpoint.	<p><b>Cause:</b> The endpoint url could be incorrect.</p> <p><b>Action:</b> Enter the correct endpoint URL in this format: <code>opc.tcp://hostname:port</code>.</p>
Test Connection Failed - Fields are not filled properly.	<p><b>Cause:</b> The information to establish a connection is either missing, or invalid.</p> <p><b>Action:</b> Enter the correct information.</p>

## Configure Logs to Troubleshoot Licensing Issue

With Operations Hub licensing enforcement, you may be asked to purchase a license even when you have a valid license activated on your license client.

In the event of a licensing issue, follow these steps to enable logging and reveal potential problems before contacting GE Support.

1. Open the `logback.xml` file located in each of the following locations, and create a backup of each file before making any modifications:

- `<Directory where Operations Hub is installed>\iqp-tomcat\webapps<site>\WEB-INF\classes\logback.xml`
- `<Directory where Operations Hub is installed>\iqp-tomcat\webapps<app>\WEB-INF\classes\logback.xml`
- `<Directory where Operations Hub is installed>\iqp-tomcat\webapps<eventengine>\WEB-INF\classes\logback.xml`

2. Find the following line of code and change `"ERROR"` to `"DEBUG"`.

```
<logger name="com.iqp" level="ERROR"/>
```

If the line does not exist, then add a line with "DEBUG" level within the `configuration` tag as shown below:

```
<root level="INFO">
  <appender-ref ref="FILE"/>
</root>
<logger name="com.iqp" level="DEBUG"/>
</configuration>
```

3. Save and close each `logback.xml` file.
4. Restart **GE Operations Hub IQP Tomcat Web Server** service.
5. Replicate the licensing error to log messages in the `app.log/site.log` or `eventengine.log` files located here:

```
C:\ProgramData\OphubLogs\iqp-tomcat
```

6. Look for log entries similar to the following:

```
"2021-3-2 13:24:11 - Project65.isLicenseVersionValid() : lc_license_ophub = 20
2021-03-02 14:37:41,720 [pool-6-thread-1] DEBUG com.iqp.common.utils.other.Lc -
LicenseClient.getLicenseValue(): isLicenseDateValid() = 1 isLicenseVersionValid() = 1 isLicenseVersionValid()
= 4"
```



#### Tip:

Look for keywords such as *Project65*, *LicenseClient*, and *LicenseService* to investigate licensing related issues.

7. Provide the log file details to the Support team.

## Configuration of Logging for Services

You can find log configuration for every service at the following location.

- **WebHMI Services:** `<Directory where Operations Hub is installed>\webhmi-tomcat\webapps\<Service>\WEB-INF\classes\logback.xml`
- **IQP Apps:** `<<Directory where Operations Hub is installed>\iqp-tomcat\webapps\<site/app/eventengine>\WEB-INF\classes\ logback.xml`

## Important Configurations

**MaxHistory:** <https://logback.qos.ch/manual/appenders.html#tbrpMaxHistory>. For more information, refer to <https://logback.qos.ch/manual/appenders.html#SizeAndTimeBasedRollingPolicy>.

To configure package level logging or any changes on the logging configuration that do not require restart of the tomcat container.

```
<configuration scan="true" scanPeriod="30 seconds" >
  ...
</configuration>
```

(<http://logback.qos.ch/manual/configuration.html#autoScan> scan=true) which detects runtime changes on log level without need to restart the service. But currently it is kept disabled, as it has runtime impact.

You can configure package level logger highlighted as below:

<https://logback.qos.ch/manual/configuration.html#loggerElement>

```
<configuration>

  <appender name="STDOUT" class="ch.qos.logback.core.ConsoleAppender">
    <!-- encoders are assigned the type
         ch.qos.logback.classic.encoder.PatternLayoutEncoder by default -->
    <encoder>
      <pattern>%d{HH:mm:ss.SSS} [%thread] %-5level %logger{36} - %msg%n</pattern>
    </encoder>
  </appender>

  <logger name="chapters.configuration" level="INFO"/>

  <!-- Strictly speaking, the level attribute is not necessary since -->
  <!-- the level of the root level is set to DEBUG by default.      -->
  <root level="DEBUG">
    <appender-ref ref="STDOUT" />
  </root>

</configuration>
```

```

<?xml version="1.0"?>
<configuration>

  <appender name="FILE" class="ch.qos.logback.core.rolling.RollingFileAppender">
    <append>true</append>
    <file>${logging.path:-logs}/alarmService.log</file>
    <rollingPolicy class="ch.qos.logback.core.rolling.TimeBasedRollingPolicy">
      <fileNamePattern>${logging.path:-logs}\alarmService.%d{yyyy-MM-dd}.%i.log.gz</fileNamePattern>
      <!-- Max number of Log Files
      <minIndex>1</minIndex>
      <maxIndex>20</maxIndex-->

      <!-- keep 7 days' worth of history -->
      <MaxHistory>7</MaxHistory>
      <timeBasedFileNamingAndTriggeringPolicy class="ch.qos.logback.core.rolling.SizeAndTimeBasedFNATP">
        <maxFileSize>100MB</maxFileSize>
      </timeBasedFileNamingAndTriggeringPolicy>
    </rollingPolicy>
    <encoder>
      <pattern>%d{yyyy-MM-dd HH:mm:ss.SS} %-5level --- [%thread] %-40.40logger{39} : %msg%n</pattern>
    </encoder>
  </appender>

  <!-- additivity=false ensures analytics data only goes to the analytics log -->
  <root level="INFO">
    <appender-ref ref="FILE"/>
  </root>

```

## UAA Services

<Directory where Operations Hub is installed>\uaa-tomcat\webapps\uaa\WEB-INF\classes\log4j2.properties

```

appender.rolling.policies.type = Policies
appender.rolling.policies.size.type = SizeBasedTriggeringPolicy
appender.rolling.policies.size.size=100MB
appender.rolling.strategy.type = DefaultRolloverStrategy
appender.rolling.strategy.max = 10

appender.rolling.strategy.action.type = Delete
appender.rolling.strategy.action.basepath=${sys:logging.path}
appender.rolling.strategy.action.maxDepth = 1
appender.rolling.strategy.action.condition.type = IfFileName
appender.rolling.strategy.action.condition.glob = uaa-backup-*.log.gz
appender.rolling.strategy.action.ifAny.type = IfAny
appender.rolling.strategy.action.ifAny.ifLastModified.type = IfLastModified
appender.rolling.strategy.action.ifAny.ifLastModified.age = 7d

```

## Modify Registry for TLS 1.2

This topic describes how to modify the registry setting on the Operations Hub server to allow for TLS 1.2.

The following steps serve as a workaround to troubleshoot these issues:

- [Resolving Proficy Authentication Issue During Workflow Task Client Install \(on page 874\)](#)
- [Resolving External Proficy Authentication Issue During Operations Hub Install \(on page 875\)](#)
- [Workflow Task Client is unable to connect to the Proficy Server \(on page 875\)](#)

1. Access the following registry paths and modify the `DWORD` value name `SchUseStrongCrypto` with the value data as 1.

- `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\.NETFramework\v4.0.30319`

- `HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\Microsoft\.NETFramework\v4.0.30319`

2. If the registry value does not exist, then create a new one with the same value name and value data.

**Note:**

For more information, refer to [Microsoft suggested actions](#).

## Scalable Vector Graphic (SVG) Editor Tools

Scalable Vector Graphic (SVG) is a vector image file type. The SVG images are scalable, that is, you can modify the shapes, lines, curves, and so on or, resize the SVG images without affecting the image quality.

You can edit the SVG vector graphics by importing the SVG images to editor tools such as Figma, PowerPoint, Adobe Illustrator, and others. The SVG images can be rendered over the supporting web browsers such as Google Chrome, Mozilla Firefox, and Apple Safari. When compared to the common image types (JPEG, PNG) the SVG format images can be exported to other editor tools without affecting the image quality. You can customize the SVG images as per the design specific needs and animate the images for interactive sessions. As the SVG vector format images are based on XML code language, you can edit the elements such as `<svg>`, `<rect>`, `<circle>`, and `<path>`. These elements can be modified using the CSS or JavaScript thus provides the flexibility to create vector images and publish the SVG images over the web.

### Troubleshooting SVG Issues

When you import the SVG images into Operations Hub SVG Editor tool, if the import is not successful due to the additional features provided by the third-party SVG editing tool that are incompatible, you can troubleshoot these issues using the SVG file XML coding. When you try to import the SVG files into Operation Hub, you may notice some transformation issues in your SVG file. To rectify, you can apply the following steps to troubleshoot the issues while you import SVG files using the SVG editing tools such as: Figma, PowerPoint, and Adobe Illustrator.

### Working with SVG Editor Tools

#### Figma

You can choose to import the SVG files from your computer to Figma tool using the File menu import option or, you can drag and drop the SVG file into the canvas and edit the SVG files as desired. As the

SVG files are vector format files you can edit individual elements, resize, adjust the properties using the Figma tools and different layers. You can also add new elements to the SVG file and design the shapes, lines, and edit the text, as required. The advantage of using working on Figma tool using SVGs is that you can easily collaborate with other members working on the same SVG file, share the files, and provide comments on specific elements in the file.

After you save the changes, when you try to export the SVG file, you can choose to:

- Save the file format to SVG (that is <file name>.SVG).
- Set the file size using scale factor (you will not lose the clarity or resolution using scale factor).
- Export the specific section of the file or, entire Figma file.
- Set the background color or, image to the exported SVG file (if required).
- Use custom fonts (if you want the text to be editable and animated).

To make the use of custom fonts, you must export the texts in SVG file as glyphs. A glyph is a graphical representation of a letter or, a symbol that represents as a character in a specific format. In Figma, you can convert the text to outlines and can be edited as a shape, and thus when you export text layer as an SVG file, the Figma converts each letter or symbol in the text and is indicated as glyph.



**Note:**

1. If you want the text to be editable and animated in Operations Hub, ensure not to select the *Outline* text in the settings.
2. To browse and search for a specific element in SVG image, ensure to select *Include ID attribute* in the settings.
3. Save the above settings to persist the Figma settings.

For Figma help guide, refer to <https://help.figma.com/hc/en-us/articles/360040028114-Guide-to-exports-in-Figma> for more information.

### **PowerPoint**

The PowerPoint tool is not used to create complex HMI graphics, however you have the access to SVG editor in Operations Hub that have same capabilities as that of PowerPoint to edit simple SVG graphics. You can export SVG images into PowerPoint to project SVG images in the PowerPoint presentation mode. Following examples illustrate the troubleshooting steps for various issues you may come across in the SVG files.

### **Sample SVG: PowerPoint SVG Export**

```

<svg width="1741" height="903"
  xmlns="http://www.w3.org/2000/svg"
  xmlns:xlink="http://www.w3.org/1999/xlink" xml:space="preserve" overflow="hidden">
  <defs>
    <clipPath id="clip0">
      <rect x="268" y="277" width="1741" height="903"/>
    </clipPath>
  </defs>
  <g clip-path="url(#clip0)" transform="translate(-268 -277)">
    <text font-family="Arial,Arial_MSFontService,sans-serif" font-weight="400" font-size="83" transform="matrix(1 0 0 1 317.751 383)">Left Aligned Text
    <tspan font-size="83" x="967.083" y="334">Right Aligned Text</tspan>
    <tspan font-size="83" x="456.248" y="728">Center Aligned Text</tspan>
  </text>
  </g>
</svg>

```

## Tspan

When you save the Power Point slide as an SVG file, the text elements in the saved SVG image or the slide will be exported as SVG text elements. And if the SVG text elements contains nested tspan elements then the same tspan elements will be exported into SVG file. When you try to import the PowerPoint SVG image to the SVG editor in the Operations Hub, the SVG editor tool do not support the tspan elements, but the SVG editor tool will convert each tspan elements into text elements. Thus, using the SVG editor tool in Operation Hub for an imported PowerPoint SVG image, you can format and animate each text element. Following is the example of tspan element transformation into text element.

## Transformed SVG

```

<svg width="1741" height="903"
  xmlns="http://www.w3.org/2000/svg"
  xmlns:svg="http://www.w3.org/2000/svg" xml:space="preserve">
  <defs>
    <clipPath id="clip0">
      <rect height="903" id="svg_1" width="1741" x="268" y="277"/>
    </clipPath>
  </defs>
  <g class="layer">
    <title>Layer 1</title>

```

```

<g clip-path="url(#clip0)" id="svg_2" transform="translate(-268 -277)">
  <text font-family="Arial,Arial_MSFontService,sans-serif" font-size="83" font-weight="400" id="svg_3_0"
transform="matrix(1 0 0 1 317.751 383)" x="0" y="0">Left Aligned Text</text>
  <text font-family="Arial,Arial_MSFontService,sans-serif" font-size="83" font-weight="400" id="svg_3_1"
transform="matrix(1 0 0 1 317.751 383)" x="967.08" y="334">Right Aligned Text</text>
  <text font-family="Arial,Arial_MSFontService,sans-serif" font-size="83" font-weight="400" id="svg_3_2"
transform="matrix(1 0 0 1 317.751 383)" x="456.25" y="728">Center Aligned Text</text>
</g>
</g>
</svg>

```

## Alignment

When you import the SVG PowerPoint slide into SVG editor tool of Operations Hub, you can notice that the SVG text elements settings are not imported, because the SVG text elements have different attributes and values that do not align with the PowerPoint text alignments. To troubleshoot this issue, you must manually select the alignment options in the SVG editor tool settings. Following is the example with text alignment applied.

## Transformed SVG with Text Alignment

```

<svg width="1741" height="903"
xmlns="http://www.w3.org/2000/svg"
xmlns:svg="http://www.w3.org/2000/svg" xml:space="preserve">
  <defs>
    <clipPath id="clip0">
      <rect height="903" id="svg_1" width="1741" x="0" y="0"/>
    </clipPath>
  </defs>
  <g class="layer">
    <title>Layer 1</title>
    <g clip-path="url(#clip0)" id="svg_2">
      <text font-family="Arial,Arial_MSFontService,sans-serif" font-size="83" font-weight="400" id="svg_3_0"
text-anchor="start" transform="matrix(1 0 0 1 0 0) matrix(1 0 0 1 317.751 383)" x="-268" y="-277">Left Aligned
Text</text>
      <text font-family="Arial,Arial_MSFontService,sans-serif" font-size="83" font-weight="400" id="svg_3_1"
text-anchor="end" transform="matrix(1 0 0 1 0 0) matrix(1 0 0 1 317.751 383)" x="699.08" y="57">Right Aligned
Text</text>
      <text font-family="Arial,Arial_MSFontService,sans-serif" font-size="83" font-weight="400" id="svg_3_2"
text-anchor="middle" transform="matrix(1 0 0 1 317.751 383)" x="188.25" y="451">Center Aligned Text</text>

```



```

    </g>
  </g>
</svg>

```

## Unique IDs

When you try to import multiple SVG files from PowerPoint to SVG Editor tool in Operations Hub, you will notice that the SVG elements with the same IDs from SVG files may overlap and thus create the problem while styling or scripting the SVGs. As a reason, you will not be able to transfer the SVGs between PowerPoint and SVG editor. Also, the animation and other graphic settings will be lost. You will also notice the items defined in the definition section such as clip path in the above example should be manually renamed such that each element will possess unique name (Example: element number 1, element number 2, and so on). If the SVG elements do not have unique IDs, the elements in the SVG graphic may not be generated accurately, that is, anything outside the clip path will be invisible or certain area will be clipped off from the view in the page builder and in end app. To troubleshoot this issue, you must rename the SVG element IDs with unique IDs, following is the example to rename the IDs.

## Transformed SVG with Unique IDs

```

<svg width="1741" height="903"
  xmlns="http://www.w3.org/2000/svg"
  xmlns:svg="http://www.w3.org/2000/svg" xml:space="preserve">
  <defs>
    <clipPath id="clip0_graphic1234">
      <rect height="903" id="svg_1" width="1741" x="0" y="0"/>
    </clipPath>
  </defs>
  <g class="layer">
    <title>Layer 1</title>
    <g clip-path="url(# clip0_graphic1234)" id="svg_2">
      <text font-family="Arial,Arial_MSFontService,sans-serif" font-size="83" font-weight="400" id="svg_3_0"
text-anchor="start" transform="matrix(1 0 0 1 0 0) matrix(1 0 0 1 317.751 383)" x="-268" y="-277">Left Aligned
Text</text>
      <text font-family="Arial,Arial_MSFontService,sans-serif" font-size="83" font-weight="400" id="svg_3_1"
text-anchor="end" transform="matrix(1 0 0 1 0 0) matrix(1 0 0 1 317.751 383)" x="699.08" y="57">Right Aligned
Text</text>
      <text font-family="Arial,Arial_MSFontService,sans-serif" font-size="83" font-weight="400" id="svg_3_2"
text-anchor="middle" transform="matrix(1 0 0 1 317.751 383)" x="188.25" y="451">Center Aligned Text</text>
    </g>
  </g>
</svg>

```

```
</svg>
```

## Adobe Illustrator

### Overriding Classes

When you create SVG graphics using Adobe Illustrator and when you try to import the SVG graphics to SVG editor tool in Operations Hub, the animations may not work correctly. This is because the Adobe Illustrator uses classes to apply styles and SVG editor tool uses attributes, the classes applied by the illustrator override the attributes in SVG code when imported. As a result, the animations will not work correctly or, do not appear when viewed in a browser. To troubleshoot this issue, you must edit the SVG code to manually remove the conflicting classes and apply the styles using the attributes as indicated in the following example.

### Illustrator SVG Export

```
<?xml version="1.0" encoding="UTF-8"?>
<svg id="Layer_1" data-name="Layer 1"
  xmlns="http://www.w3.org/2000/svg" viewBox="0 0 253.76 402.25">
  <defs>
    <style>
      .cls-1 {
        fill: #a7a9ac;
      }
      .cls-2 {
        fill: #6d6e71;
      }
      .cls-3 {
        fill: #808285;
      }
    </style>
  </defs>
  <g id="Mixer">
    <rect class="cls-1" y="187.12" width="253.76" height="97.85"/>
    <polyline class="cls-1" points="0 295.04 85.88 369.23 167.01 369.23 253.27 295.04"/>
    <path class="cls-1" d="M0,178.12c21.51-10.5,63.49-27.5,118.96-27.96,60.69-.5,113.17,16.93,134.8,27.96"/>
    <rect class="cls-1" x="101.61" y="376.45" width="50.54" height="25.81"/>
  </g>
  <g id="Motor">
```

```

<rect class="cls-2" x="118.82" y="94.65" width="11.56" height="54.83"/>

<g>

  <g>

    <rect class="cls-3" x="100.54" y="83.36" width="48.39" height="11.29"/>

    <path class="cls-3" d="M98.85,13.03c1.25-1.59,10.05-12.4,25.27-13,16.82-.67,26.94,11.71,27.96,13"/>

    <rect class="cls-3" x="163.44" y="19.38" width="5.38" height="63.98"/>

    <rect class="cls-3" x="154.84" y="26.37" width="11.29" height="50.54"/>

    <rect class="cls-3" x="94.62" y="19.38" width="60.22" height="63.98"/>

  </g>

  <g>

    <rect class="cls-1" x="101.75" y="24.99" width="5.99" height="52.69"/>

    <rect class="cls-1" x="111.42" y="24.99" width="7.3" height="52.69"/>

    <rect class="cls-1" x="122.72" y="24.99" width="5.99" height="52.69"/>

    <rect class="cls-1" x="132.04" y="24.99" width="5.99" height="52.69"/>

    <rect class="cls-1" x="142.03" y="24.99" width="5.99" height="52.69"/>

  </g>

</g>

</g>

</svg>

```

## Transformed SVG

```

<svg width="253.76" height="402.25"

  xmlns="http://www.w3.org/2000/svg"

  xmlns:svg="http://www.w3.org/2000/svg" data-name="Layer 1">

  <g class="layer">

    <title>Layer 1</title>

    <g id="Mixer">

      <rect fill="#a7a9ac" height="97.85" id="svg_1" width="253.76" y="187.12"/>

      <polyline fill="#a7a9ac" id="svg_2" points="0 295.04 85.88 369.23 167.01 369.23 253.27 295.04"/>

      <path d="m0,178.12c21.51,-10.5 63.49,-27.5 118.96,-27.96c60.69,-0.5 113.17,16.93 134.8,27.96"

fill="#a7a9ac" id="svg_3"/>

      <rect fill="#a7a9ac" height="25.81" id="svg_4" width="50.54" x="101.61" y="376.45"/>

    </g>

    <g id="Motor">

      <rect fill="#6d6e71" height="54.83" id="svg_5" width="11.56" x="118.82" y="94.65"/>

      <g id="svg_6">

        <g id="svg_7">

```

```

<rect fill="#808285" height="11.29" id="svg_8" width="48.39" x="100.54" y="83.36"/>
<path d="m98.85,13.03c1.25,-1.59 10.05,-12.4 25.27,-13c16.82,-0.67 26.94,11.71 27.96,13"
fill="#808285" id="svg_9"/>
<rect fill="#808285" height="63.98" id="svg_10" width="5.38" x="163.44" y="19.38"/>
<rect fill="#808285" height="50.54" id="svg_11" width="11.29" x="154.84" y="26.37"/>
<rect fill="#808285" height="63.98" id="svg_12" width="60.22" x="94.62" y="19.38"/>
</g>
<g id="svg_13">
<rect fill="#a7a9ac" height="52.69" id="svg_14" width="5.99" x="101.75" y="24.99"/>
<rect fill="#a7a9ac" height="52.69" id="svg_15" width="7.3" x="111.42" y="24.99"/>
<rect fill="#a7a9ac" height="52.69" id="svg_16" width="5.99" x="122.72" y="24.99"/>
<rect fill="#a7a9ac" height="52.69" id="svg_17" width="5.99" x="132.04" y="24.99"/>
<rect fill="#a7a9ac" height="52.69" id="svg_18" width="5.99" x="142.03" y="24.99"/>
</g>
</g>
</g>
</g>
</svg>

```

## iFIX

iFIX supports exporting SVG files, and you can import the SVG files into SVG Editor tool in Operations Hub. When you import an iFIX generated SVG file into the Operations Hub SVG Editor tool, some of the elements from iFIX will not be supported (scripts, animations, data binding) or, not translated in SVG editor tool within Operations Hub.

### Issue with iFIX Tool tips

When you import the iFIX SVG file into the SVG editor tool in Operations Hub, you may notice text distortion issues due to tool tip elements in iFIX SVG file may not be compatible or supported in SVG editor tool within Operations Hub. To troubleshoot this issue, you must manually remove the tool tip elements from the original text in the SVG file.

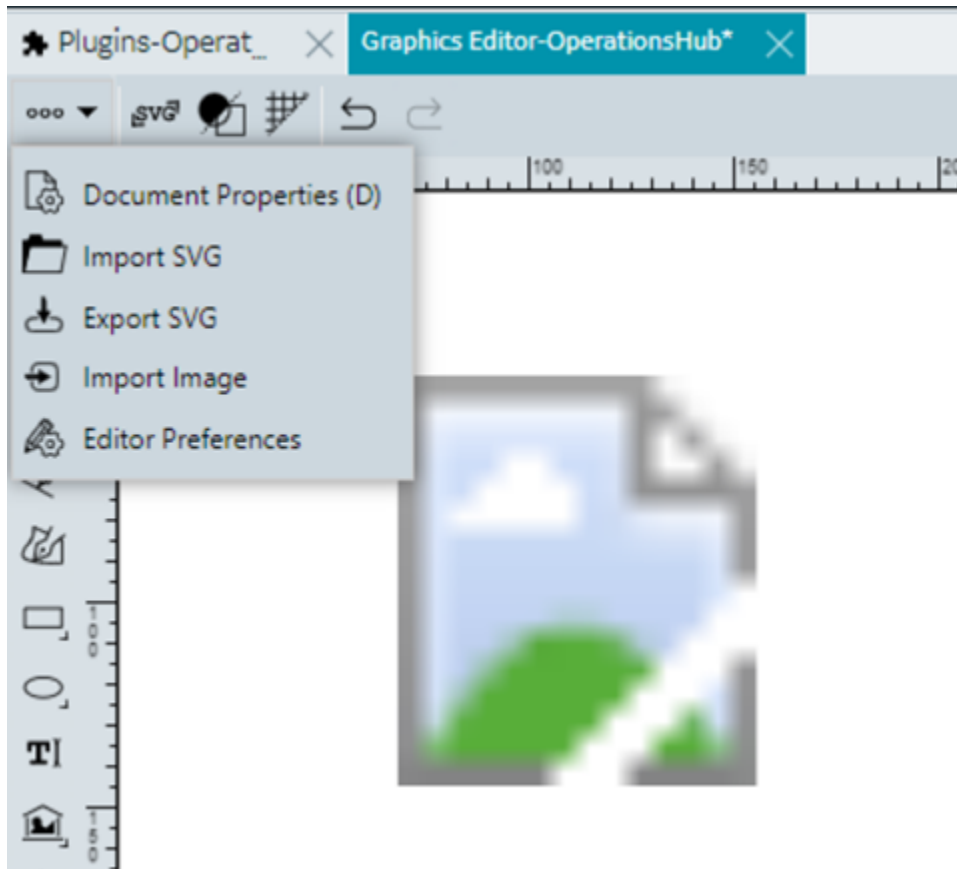
### Remove tool tips from SVG

```
<tooltipOption>TooltipDescription</tooltipOption>
```

### Issue with Referenced Images

When you import the iFIX SVG file into the SVG editor tool in Operations Hub, you may notice that the referenced images in the SVG file may not display correctly or appear with broken icon image. This is

because the referenced image file path is not accessible, or the image file path is not relative to the location of the SVG file. To troubleshoot this issue, you must import each SVG image separately using the SVG editor toolbar.



## Addressing Import Errors: Invalid Application/Page Name

With Operations Hub 2024 release, restrictions have been imposed on the use of special characters for both application and page names.

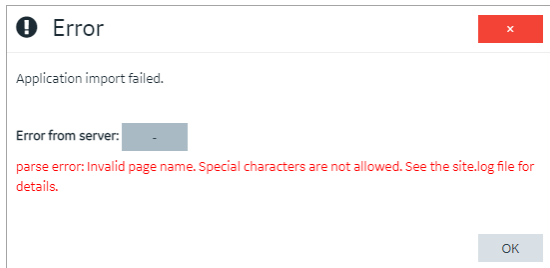
This security measure may cause issues when importing applications that were created prior to this change. Attempting to import older apps/pages with special characters `~ ^ ~ ! @ # $ % ^ & * ( ) + = | { } " ; : < > ? / , . ' [ ] \` will result in import failures as shown below. This issue also applies to imports via UI and REST API.

The import operation fails upon the very first detection of an invalid application or page name. You may also encounter other invalid names that need fixing. When an import fails, files are not modified in your existing system.

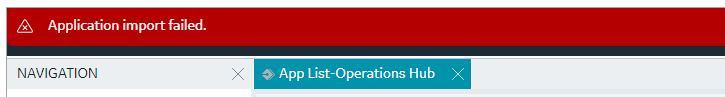
Use the following workaround to fix the issue:

1. Investigate the Log File *(on page 910)*
2. Consider any of these options:
  - (Recommended) Rename Application/Page Names Prior to Export *(on page 911)*
  - Manually Modify the Export File *(on page 911)*

Error display in Operations Hub classic version:



Error display in Operations Hub new version:



## Investigate the Log File

When you encounter import failures, follow these steps to view the log file.

1. Navigate to the `site.log` file.

The location of this file may vary based on your installation. The default location is `C:\ProgramData\OphubLogs\iqp-tomcat\site.log`.

2. If the `ProgramData` folder is hidden, make it visible in File Explorer.

In File Explorer, select **View > Hidden items**.

3. Open the `site.log` file with a text editor such as Notepad++.
4. Use the text editor's search function to look for the key terms `Invalid app name` or `Invalid page name` in the `site.log` file.
5. After finding the error messages, confirm that the timestamp of the message matches the time when the import action was performed. This information is usually located at the bottom of the log file. This error message will contain the invalid application or page name.

## (Recommended) Rename Application/Page Names Prior to Export

In case the original Operations Hub system is accessible, follow these steps to rename the application/page with special characters, export the application again, and import the modified application to the new system.

1. Log in to the original Operations Hub system where the application/page with special characters is located.
2. Navigate to the application/page that contains special characters in its name.
3. Rename the application/page to remove any special characters.
4. Ensure that other applications/pages included in this export have names that comply with the special character restriction.
5. After renaming, export the application/page from the original system.
6. Import the modified application/page into your 2024 Operations Hub system.

## Manually Modify the Export File

In case the original Operations Hub system is not accessible, follow these steps to manually modify the export `.zip` file by extracting all files to a folder, edit the `.xml` file to remove special characters from application/page names, and then compress the files back into a `.zip` file for import.

1. Open File Explorer and navigate to the exported application/page `.zip` file.
2. Extract the `.zip` file and locate the `.xml` file associated with the application/page.
3. Open the `.xml` file with a text editor such as Notepad++.
4. In the text editor, use the search function to find the exact application or page name that contains special characters.
5. Rename the application or page name in the `.xml` file to remove any special characters. Ensure to update all relevant occurrences of the application or page name in the file.

### Points to Consider:

- Pay attention to the file naming to avoid conflicts if another application/page shares the same name after rename.
- Before making any changes to the `.xml` file, take a backup of the exported application/page `.zip` file.

The `.xml` file contains data organized in a hierarchical structure. Here's an example of the path structure with bad data highlighted. Special characters like `@` and `#` are not allowed in application and page names. Consider using alphanumeric characters, underscores, or hyphens instead.

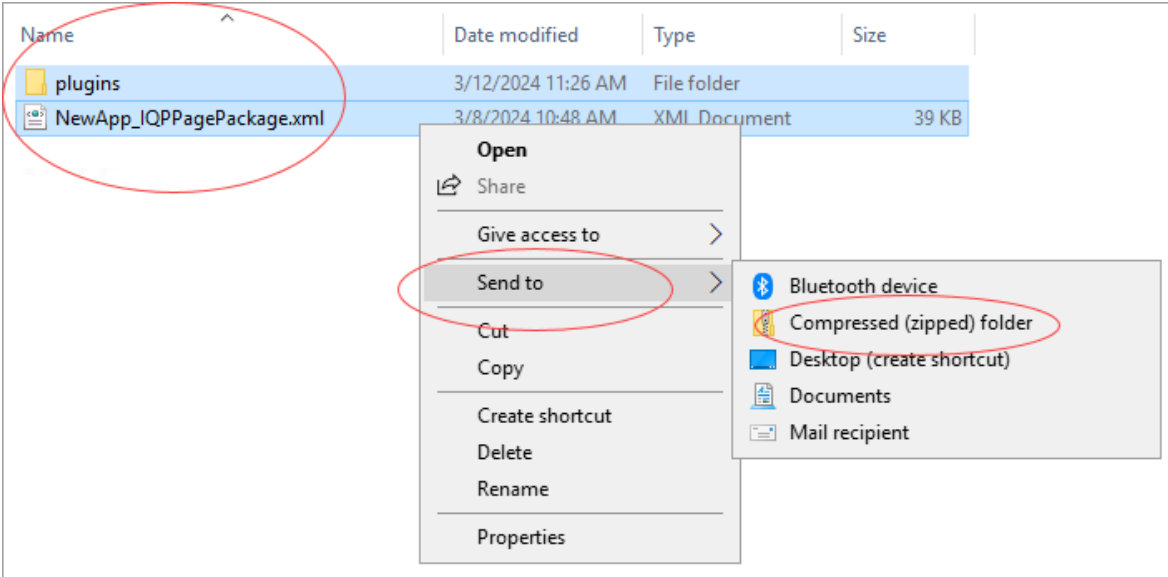
```
<Package>
  <Apps>
    <App>
      <appName>LeanManufacturing@App</appName>
      <items>
        { "displayName": "Kaizen#2024" }
      </items>
    </App>
  </Apps>
  <Pages>
    <Page>
      <pageName>Kaizen#2024</pageName>
    </Page>
    <Page>
      <pageName>Performance_Metrics</pageName>
    </Page>
  </Pages>
</Package>
```

6. After making the necessary changes, save the `.xml` file.
7. In File Explorer, compress the extracted files.

Select all the files/folders, right-click on the selection and choose **Send to > Compressed (zipped) folder**.

When creating a zip file for import into Operations Hub, ensure that you select all the files and folders inside the main folder, rather than right-clicking on the outer folder itself. This prevents the creation of a nested folder within the zip file, which can cause import failures in Operations Hub.





8. Import this newly created .zip file into your 2024 Operations Hub system.