



# Operation Hub 1.7

Windows Documentation



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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: 1.7**

#### **Table 1. Enhancements and New Features**

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

Description	Tracking IDs
<p>This release of Operations Hub contains the following features:</p> <ul style="list-style-type: none"><li>• UAA Group based access to Queries, Pages, and End Apps</li><li>• Improved End App and Page Load Performance</li><li>• Relational Database Support: Support for Stored Procedures from Microsoft SQL Server</li><li>• Critical Security Fixes</li><li>• Support for 300 concurrent users, with a hardware configuration of 32G and an 8-core CPU</li></ul>	<ul style="list-style-type: none"><li>• F52254, F52256, F52258</li><li>• F52236</li><li>• F52261</li><li>• F49212, F49213, F49214, F50728, F52862</li><li>• F32385</li></ul>

#### **Table 2. Known Issues and Limitations**

*The following known issues and limitations exist.*

Description	Tracking ID
<p>When you save a favorite in a trend chart, if you include a special character in the name, the error message that appears does not specify the issue.</p>	DE123967
<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 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

Description	Tracking ID
<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>	<ul style="list-style-type: none"> <li>• DE123040</li> <li>• DE116737</li> </ul>
<p>Some widgets, such as a table, do not work as expected when used with a REST query. In particular, features which require additional queries to fetch more data (such as pagination), as well as features limiting data (such as row limits) may not work.</p>	DE118883
<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>Operations Hub uses Kafka, which generates a large number of logs in the following location: <code>C:\tmp\kafka-logs\</code>. To avoid consuming too much space for these logs, we recommend that you periodically delete the logs, especially if the system has low disk space.</p>	N/A
<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>If you install Historian 7.x after installing Operations Hub on the same machine, sometimes, the Operations Hub login page does not appear. This is due to a conflict between the ports used by the two applications. To avoid this issue, perform one of the following workarounds:</p> <ul style="list-style-type: none"> <li>• Stop the Historian Tomcat instance, restart the IQP Tomcat instance, and then start the Historian Tomcat instance.</li> <li>• While installing Operations Hub, provide a different port number for the IQP HTTP port so that it does not conflict with the port used by Historian.</li> </ul>	DE122500
<p>While it is not recommended to install Historian and Operations Hub on the same computer, if you must install them together the order of install matters. Install Historian 8.x first, and then Operations Hub second.</p> <p>When installing the Historian Web Client, use the fully qualified domain name (FQDN) and the local machine name (separated by commas). Without the computer name as part of the generated certificate, the UAA Provisioner will fail when it attempts to add information to the UAA, and you cannot directly modify the certificate after it is added.</p>	DE124584
<p>Live preview for Mobile and Tablet devices opens at the bottom of the page after an object is deleted. Even though Live Preview should not open in the first place, it is cut off and there is also no way to close it. As a workaround, refresh the page.</p>	DE121922
<p>Image names should not contain spaces or non-English characters. If they do, an import or export of an app bundle will fail.</p>	DE131122
<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 Historian 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>	DE130896

Description	Tracking ID
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.	DE134904
When using Safari 13 on iOS 13+ annotations do not seem to work. The workaround is to use the Chrome browser on the iPad.	DE136597
When not connected to the Internet, there are a couple of icons (the certificate lock icon and view password icon) in the UAA/LDAP tool which may not display. These icons require an Internet to display.	N/A



**Table 3. Fixed Defects**

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

Description	Tracking ID
A Google Maps display issue caused issues with viewing locations in the map widget. There were also issues working within the layout or style provided. This issue was resolved in version 1.7.	N/A
When you imported an app, the update process replaced the old app with a new one - which meant any users from the old app would need to be re-added to the new app. Users were not imported as part of the operation. This issue was resolved in version 1.7.	DE132173
When importing and exporting apps, information from app user assignments was not included. One side effect of this issue was that when you imported a new version of an existing app, the old app was replaced with the new app, and no users were assigned to the app. Previous user assignments were lost, and had to be added again after the import. This issue was resolved in version 1.7.	N/A
Sometimes a race condition would occur when you installed Operations Hub. Because of this, you were not be able to log in; the log in page was blank. To resolve this issue, you needed to restart the IQP Tomcat Webserver service. This issue was resolved in version 1.7.	DE131187
UAA/ LDAP Tool: Ability to skip SSL verification and allow search depth. This issue was resolved in version 1.7.	US413742

**Table 4. Compatibility Matrix**

*The following products are compatible with Operations Hub.*

Product	Required Version
Historian	<ul style="list-style-type: none"> <li>• Historian 7.0 with the latest SP</li> <li>• Historian 7.1 with the latest SP</li> <li>• Historian 7.2 with the latest SIM</li> <li>• Historian 8.0</li> <li>• Historian 8.1</li> </ul> <p> <b>Note:</b> While it is not recommended to install Historian and Operations Hub on the same computer, if you must install them together the order of install matters for Historian 8.x. Install Historian 8.x prior to Operations Hub.</p> <p> <b>Note:</b> Historian REST APIs are required for REST integration between Operations Hub and Historian 8.x and above. Historian REST APIs are installed automatically when you install Historian web-based clients.</p>
Plant Applications	<ul style="list-style-type: none"> <li>• Version 8.0, SIM3, for Integrated Process Apps</li> <li>• Version 8.1</li> </ul>
Proficy Workflow	Version 2.6, SP1
User Authentication and Authorization (UAA) service	Version 4.30.0 or later



# Chapter 2. Getting Started in Windows

## *Installing Operations Hub on Windows*

### *System Requirements*

When you install Operations Hub, all the required components are automatically installed. This topic provides the requirements for hardware components, browsers, and operating systems.

### **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 32G and an 8-core CPU.

### **Supported Operating Systems**

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

- Microsoft Windows Server 2016
- Microsoft Windows Server 2019

### **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

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 device are supported for client access (end-app support only):

- iOS 12.0 or later
- Android 9.0 or later

 **Note:** We recommend using a device with medium to high resolution and landscape mode.

## Compatibility Matrix

*The following products are compatible with Operations Hub.*

Product	Required Version
Historian	<ul style="list-style-type: none"> <li>• Historian 7.0 with the latest SP</li> <li>• Historian 7.1 with the latest SP</li> <li>• Historian 7.2 with the latest SIM</li> <li>• Historian 8.0</li> <li>• Historian 8.1</li> </ul> <p> <b>Note:</b> While it is not recommended to install Historian and Operations Hub on the same computer, if you must install them together the order of install matters for Historian 8.x. Install Historian 8.x prior to Operations Hub.</p> <p> <b>Note:</b> Historian REST APIs are required for REST integration between Operations Hub and Historian 8.x and above. Historian REST APIs are installed automatically when you install Historian web-based clients.</p>
Plant Applications	<ul style="list-style-type: none"> <li>• Version 8.0, SIM3, for Integrated Process Apps</li> <li>• Version 8.1</li> </ul>

Product	Required Version
Workflow Task Client	Version 2.6, SP1
User Authentication and Authorization (UAA) service	Version 4.30.0 or later

## *Licenses for Operations Hubs*

When you purchase Operations Hub, you can purchase the Operations Hub Add on for Historian or the Analysis Tier. This topic describes the differences between these licenses.

### **Functionality Comparison**


Functionality	Operations Hub Add on for Historian	Analysis Tier
Ability to create, edit, and delete data sources	Yes	Yes
Ability to create, edit, and delete entities	Yes	Yes
Ability to create, edit, and delete queries	Yes	Yes
Ability to assign permissions for events	Yes	Yes
Ability to view Out of the box Analysis App	Yes	Yes
Ability to create, edit, and delete apps	No	Yes
Ability to assign permissions for apps	Yes	Yes
Ability to assign permissions for app pages	Yes	Yes
Ability to create, edit, and delete users	Yes	Yes
Ability to change your own password	Yes	Yes
Ability to create, edit, and delete roles	Yes	Yes
Ability to map existing UAA groups	Yes	Yes
Ability to map Existing LDAP groups	Yes	Yes

## *Install Operations Hub*

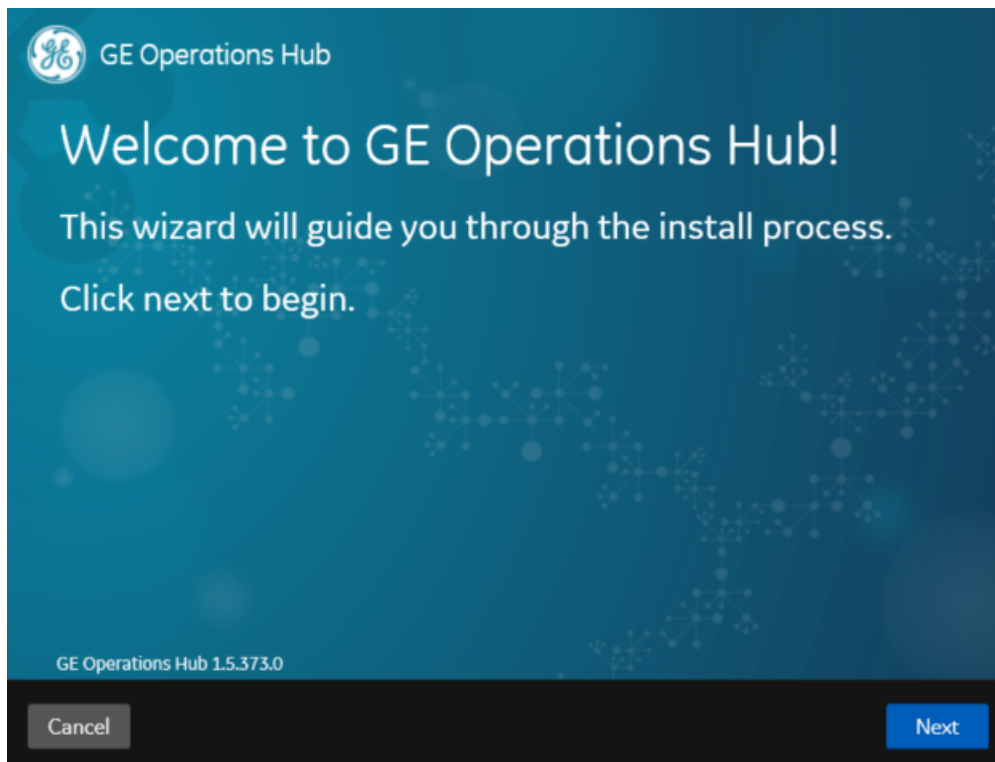
- Ensure that the machine on which you want to install Operations Hub meets the [System Requirements \(page 13\)](#).

- Use a machine that does not host any applications that are bundled with Operations Hub.
- Run a Windows update (including security updates).
- Use a host name that contains up to 24 characters and any of the following characters:
  - Alphabetic characters
  - Numeric characters
  - Minus
  - Period
- Ensure that you have administrative privileges to the machine on which you want to install Operations Hub.

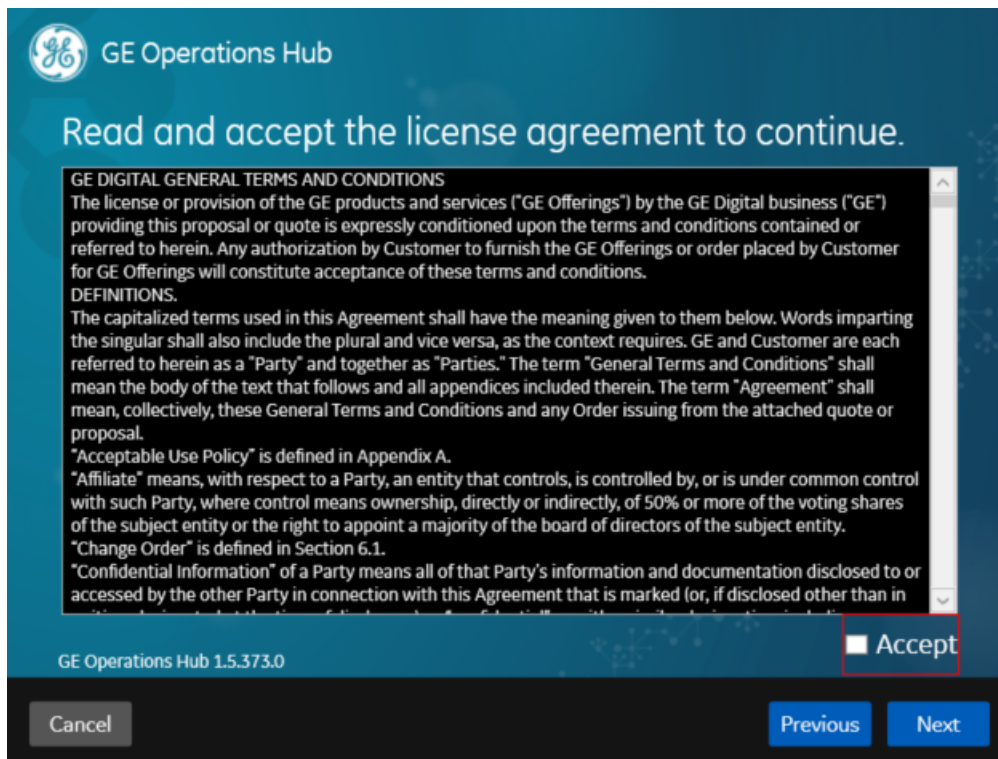
This topic describes how to perform step-by-step installation of Operations Hub. You can also [install Operations Hub automatically \(page 28\)](#).

 **Note:** This topic describes how to install Operations Hub stand-alone (by downloading the installer from Salesforce). If, however, you want to use only the Historian analysis application in Operations Hub, you can choose to install just the Operations Hub add-on for Historian. If you do so, you will not be able to create, modify, or delete any applications or components of applications in Operations Hub.

1. Run the Operations Hub installation DVD, and then select **Install GE Operations Hub 1.7**. The **Welcome to GE Operations Hub** page appears.

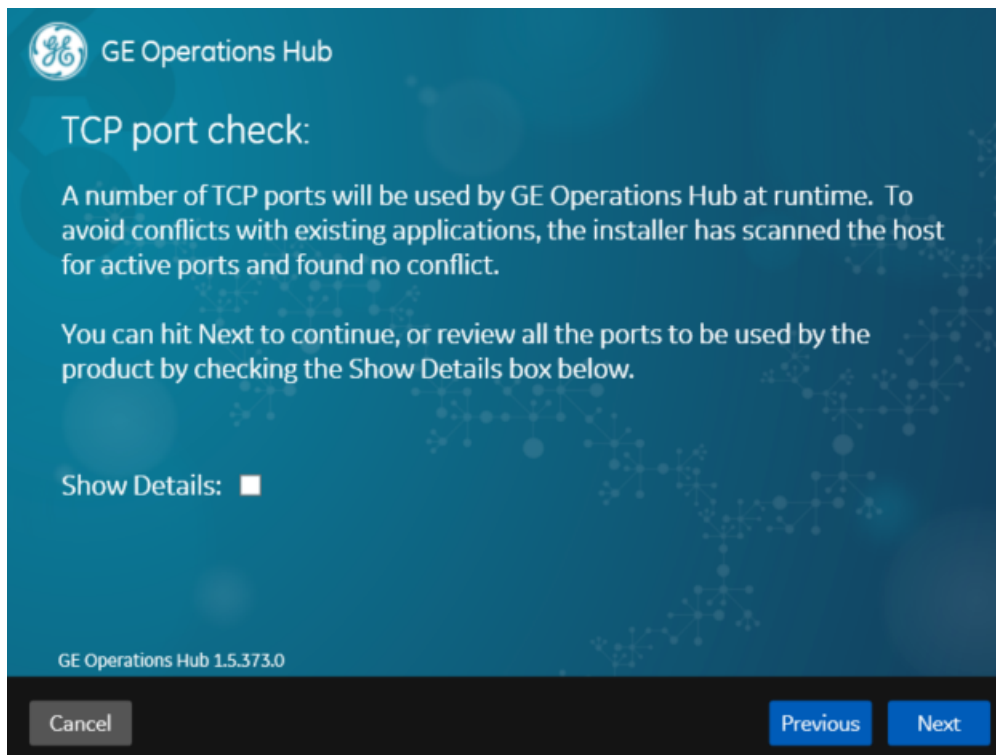


2. Select **Next**. The **Read and accept the license agreement to continue** page appears.



3. Select the **Accept** check box, and then select **Next**.

The **TCP port check** page appears, specifying whether the ports chosen for Operations Hub are available.



4. If you want to review or change the ports that will be used by Operations Hub, select the **Show Details** check box.  
The **TCP port assignments** page appears, providing a list of ports that will be used by the various components in Operations Hub.

GE Operations Hub

TCP port assignments:

Public https port :	443	IQP database port :	5432
UAA http port :	9480	IQP Hazelcast port 1 :	5901
UAA database port :	9432	IQP Hazelcast port 2 :	5902
MQTT External port :	1883	IQP Hazelcast port 3 :	5903
MQTT Internal port :	1884	IQP Endapp port :	3000
Zookeeper port :	2181	IQP Endapp internal port :	8223
Kafka port :	9092	WebHMI http port :	9482
Kafka JMX port :	9999	WebHMI database port :	9434
Redis port :	6379	Data distributor port :	9002
IQP http port :	8080		

Review and if there is any conflict (indicated by a warning sign), make sure you stop or uninstall the other programs that cause conflict.

GE Operations Hub 1.5.373.0

Cancel Previous Next

5. If needed, modify the port numbers, and then select **Next**.

The **Host Names** page appears. By default, the **All Host Names** box contains a value, and the **Primary Host Name** box is disabled and populated with the first value in the **All Host Names** box.

**GE Operations Hub**

## Host Names

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.

All Host Names:

Primary Host Name:

Notes:

- 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.
- Environment variables enclosed in percentage signs are allowed and must be evaluated to valid names.
- Entries are used to generate a server certificate and to configure UAA. If additional UAA zones (and hence subdomains) are to be created, use wildcard entries instead of listing subdomains individually.

GE Operations Hub 1.5.373.0

Cancel Previous Next

6. In the **All Host Names** box, enter any of the following details of the machine for which you want to access Operations Hub following the install:

- Fully qualified domain name
- host name
- IP address

 **Note:**

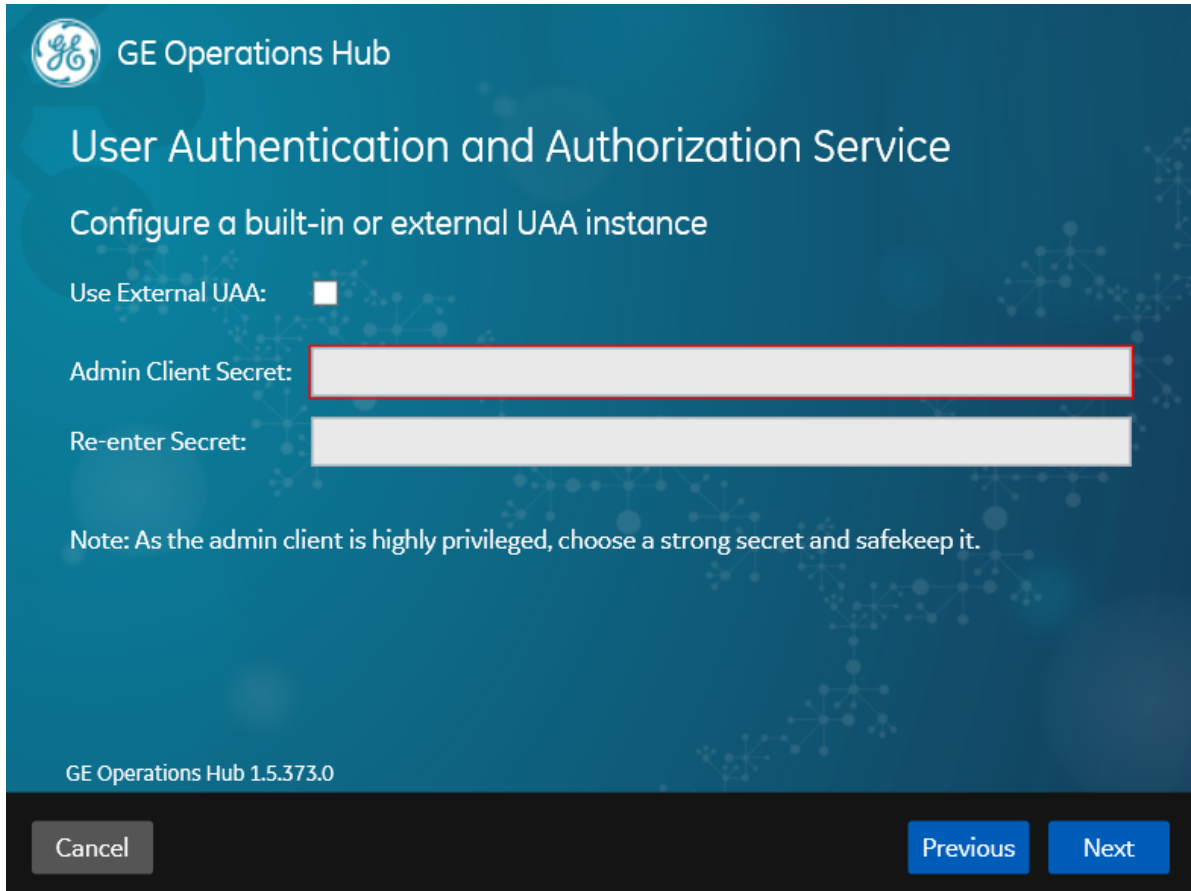
- If you want to provide more than one of the aforementioned values, use a comma to separate them.
- If you want to use Operations Hub on an iPad, the first value in this box must be the IP address.
- If you want to add the Fully Qualified Domain Name (FQDN) after completion of the install, the safest way to apply the FQDN is to uninstall without purge, and then reinstall with the FQDN in the Host Names screen.

The **Primary Host Name** box is updated with the first value in the **All Host Names** box.

7. Select **Next**.

The **User Authentication and Authorization Service** page appears.





The screenshot shows the 'User Authentication and Authorization Service' configuration window in GE Operations Hub. The window has a dark blue background with the GE logo and 'GE Operations Hub' text at the top left. The main title is 'User Authentication and Authorization Service' and the subtitle is 'Configure a built-in or external UAA instance'. There is a checkbox for 'Use External UAA:' which is currently unchecked. Below this are two text input fields: 'Admin Client Secret:' and 'Re-enter Secret:'. A red rectangular box highlights the 'Admin Client Secret' field. At the bottom of the main content area, there is a note: 'Note: As the admin client is highly privileged, choose a strong secret and safekeep it.' The version 'GE Operations Hub 1.5.373.0' is displayed at the bottom left. At the bottom of the window, there are three buttons: 'Cancel' (grey), 'Previous' (blue), and 'Next' (blue).

8. If you want to use the User Authentication and Authorization (UAA) service that is integrated with Operations Hub, enter a password in the **Admin Client Secret** and **Re-enter Secret** boxes. Otherwise, skip to the next step.
9. If you want to use an external UAA service, select the **Use External UAA** check box. When this check box is selected, the following information appears in the install screen.

**GE Operations Hub**

## User Authentication and Authorization Service

Configure a built-in or external UAA instance

Use External UAA:

UAA Base URL:

Admin Client Id:


Admin Client Secret:

UAA certificate file:

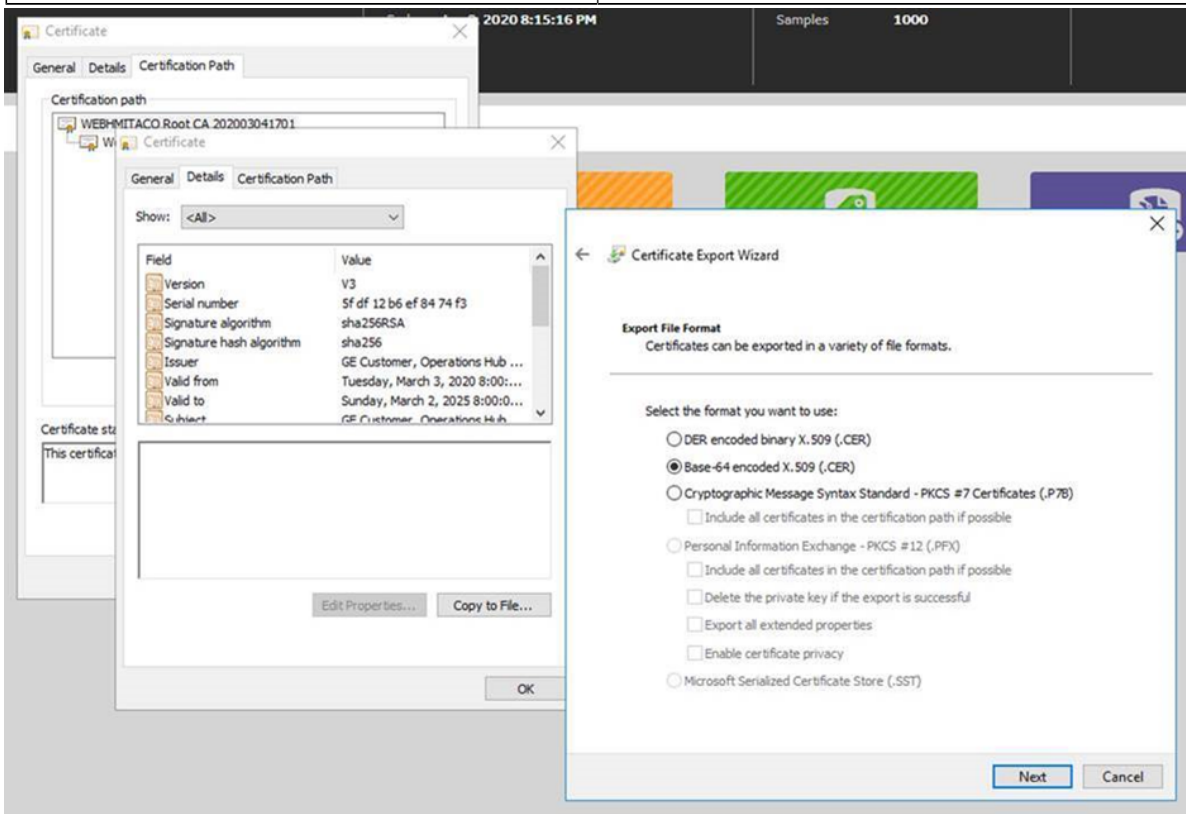
Note: Administrator of the UAA service should provide you the information above. In addition, if you specify a certificate file for it, view and confirm before proceeding.

GE Operations Hub 1.7.651.0

10. For external UAA, provide values as specified in the following table.

Item	Description
<b>UAA Base URL</b>	Enter the URL of the UAA service.   <b>Note:</b> <ul style="list-style-type: none"> <li>• If referencing Historian 7.x UAA, then use a URL similar to this: https://Historian7x:8443; if referencing Historian 8.x then use a URL of https://Historian8x (no port number).</li> <li>• Historian 7.x requires a different port than Historian 8.x. For Historian 7.x, the default port to connect to UAA is 8443. For Historian 8.x, the default port to connect to UAA is 443.</li> <li>• If the ports were customized, then use the selected port.</li> </ul>
<b>Admin Client Id</b>	Enter the ID of the administrator account of the UAA client.
<b>Admin Client Secret</b>	Enter the password of the administrator account.

Item	Description
<p><b>UAA certificate file</b></p>	<p>Enter the path to the certificate file used by the UAA service.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• If provided, the certificate file must be a .pem file for the root issuer (not the UAA server certificate).</li> <li>• Export the root certificate from Historian and save using the Base 64 option (as shown in the following figure). Then, rename the exported .cer file to .pem so you can use to it here in Operations Hub.</li> <li>• After completion of install, this certificate should also be imported into Trusted Root Certification Authorities certificate store on client machines, to suppress warnings given by browsers such as Chrome.</li> </ul>



The **Test** button allows you to test the connection to the External UAA instance based on the information provided in the dialog box. Some of the possible messages encountered that a user may need to correct when the Test button is exercised are summarized in the table below:

Issue	Warning	Resolution
Invalid credentials	401 Unauthorized.	Check the admin client id and admin client secret provided to the External UAA URL.
No certificate	The test will pass, but the user is requested to provide the UAA root issuer's certificate.	Provide the UAA root issuer certificate file in the install.
Invalid certificate	Test succeeds but the certificate is not used- error reported if bad certificate used.	Provide the correct UAA root issuer certificate file in the install.
Incorrect case sensitivity in URL or host name has a mismatch	Test succeeds but changes are required due: <ul style="list-style-type: none"> <li>• External UAA server name resolution.</li> <li>• Actual mismatch with the "UAA base URL" and the issuer Uri in the "uaa.yml file.</li> </ul>	Make sure the issuer Uri in the uaa.yml file and the UAA Base URL match exactly.
Error connecting to External UAA	External UAA server name resolution issue.	Check to make sure the External UAA is running. Check to make sure the issuer Uri in the uaa.yml file and the UAA Base URL match.
Error negotiating TLS connection	The issuer Uri in the uaa.yml has just the host name while the user provides an FQDN in the UAA base URL.	This error happens either while testing the user entered UAA Base URL or when testing the issuer Uri. The error message will indicate what issue is. The root cause is due to either the name in the UAA base url or the issuer URI name under testing can not be authenticated by the certificate provided.  Again, make sure the issuer Uri in the uaa.yml file and the UAA Base URL match exactly.

 **Note:**

- To locate the uaa.yml file on the Historian machine, go to the following folder: C:\ProgramData\GE\Operations Hub\uaa-config\uaa.yml. Find the issuer: uri: https://Hist80vm/uaa.
- The install is not blocked from proceeding without the corrections from the previous table. However, there will be some runtime errors which may require an administrator to reconfigure. See the following Historian 8.x and Historian 7.x scenarios.

**For Historian 8.x:** If the UAA URL in the Operations Hub install does NOT match the Historian 8.x UAA URL, then you will receive an "Issue not trusted" error when attempting to import a model. Examples of UAA URLs used during the Operations Hub install may be a URL with a Fully Qualified Domain Name (FQDN) or one that includes a Port Number such as: <https://z840his2019:443/uaa>. If there is a mismatch, change Historian UAA's uaa.yml file so the issuer uri matches what's in the certificate. If Historian 8.x is installed with a Fully Qualified Domain Name (FQDN), then utilize the FQDN when specifying the external UAA URL. For example: <http://HistFQDN/uaa>.

If Historian 8.x is installed with a host name like "Historian8," then utilize the host name when specifying the external UAA URL. For example: <http://Historian8/uaa>

Basically, the issuer Uri in the uaa.yml file and the UAA Base URL must match exactly. This will ensure the Operations Hub Administrator user is able to login successfully.

**For Historian 7.x:** If the UAA URL in the Operations Hub install does NOT match the Historian 7.x UAA URL, then you will receive an "Issue not trusted" error when attempting to import a model. To resolve this:

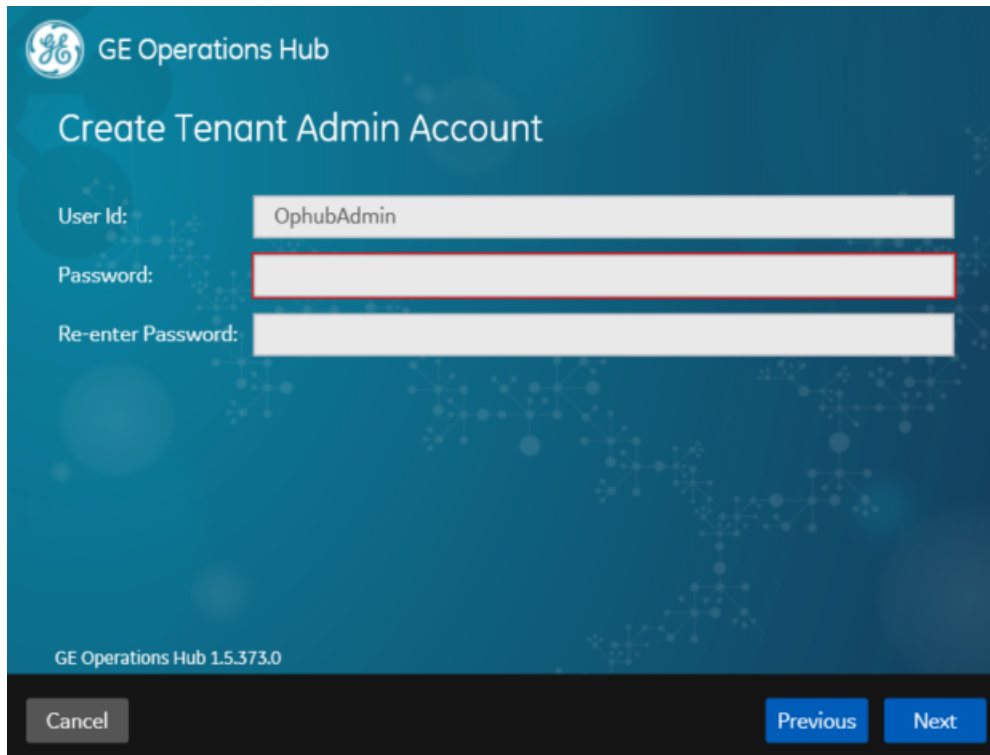
- a. Get the external UAA URL that you entered during install. For example, it might be something like: <https://historian7:8443/uaa>.
- b. Go to the Historian machine.
- c. Locate the uaa.yml file at this location: C:\Program Files\GE Digital\UAA\uaa.yml.
- d. At the end of the file, add the following lines:

```
issuer:
uri: https://historian7:8443/uaa
```

If Historian 7.x has been installed with a host name like "historian7," then it is recommended to use the external UAA URL of <https://historian7:8443/uaa> during the Operations Hub install. In this case, the Operations Hub Admin user is created correctly, and it will avoid "invalid redirect URL" error.

## 11. Select **Next**.

The **Create Tenant Admin Account** page appears.



12. Provide values as specified in the following table, and then select **Next**.

Item	Description
<b>User Id</b>	Enter the user ID of the administrator account for Operations Hub. When you provide the tenant user ID, the following conditions apply: <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 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 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 Hub, the user account, along with the groups and privileges assigned to the user, still exists in the UAA instance.</li> </ul>
<b>Password</b>	Enter a password for the administrator account.
<b>Re-enter Password</b>	Re-enter the password for the administrator account.

The **Customize Log Files and Postgres Data Locations** page appears.

GE Operations Hub

## Customize Log Files and Postgres Data Locations

Log Files Base Folder:

Base Folder for Databases:

Advanced option:  Customize database locations individually for subsystems

Note: leave database folder entries blank if no customization is needed.

GE Operations Hub 1.5.373.0

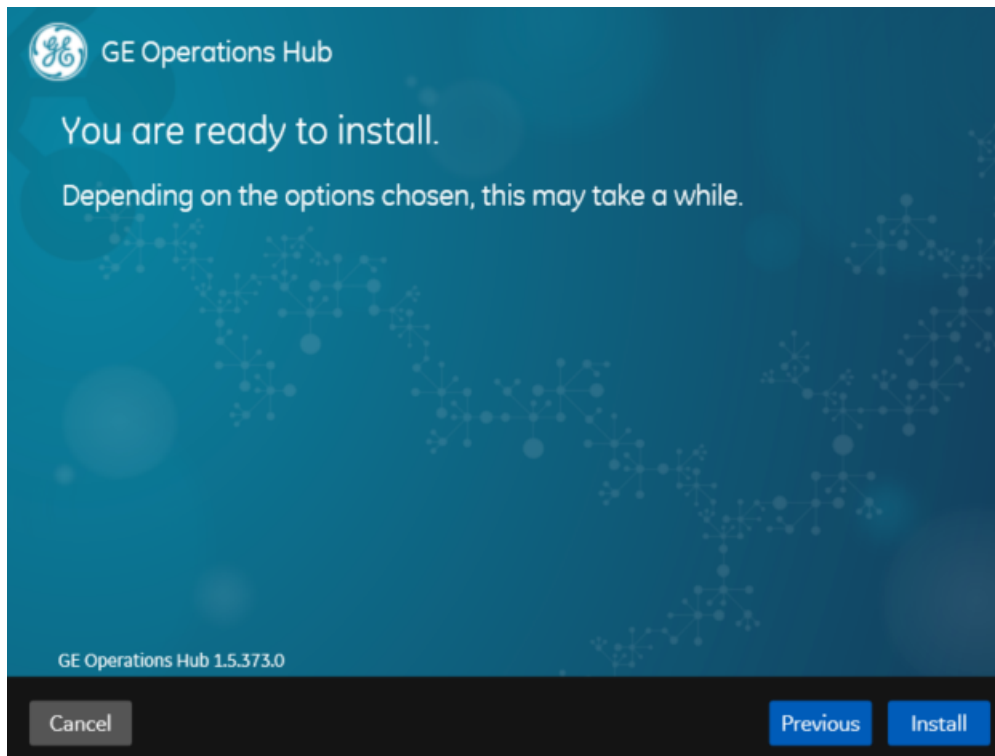
Cancel Previous Next

13. Provide values as specified in the following table, and then select **Next**.

Item	Description
<b>Log Files Base Folder</b>	Enter the path to the log files generated by Operations Hub. By default, the value in this box is <b>%ProgramData%\OphubLogs</b> .
<b>Base Folder for Databases</b>	Enter the path to the base folder for the UAA, Operations Hub, and WebHMI databases. If you want to use the default folder, leave this box blank. Otherwise, enter the path to the folder that you want to use.
<b>Customize database locations individually for subsystems</b>	Select this check box if you want to use different folders for each database.
<b>UAA Database Folder</b>	This box appears only if you have selected the <b>Customize database locations individually for subsystems</b> check box. Enter the database folder that you want to use for UAA. If you want to use the default folder, leave this box blank.
<b>IQP Database Folder</b>	This box appears only if you have selected the <b>Customize database locations individually for subsystems</b> check box. Enter the database folder that you want to use for Operations Hub. If you want to use the default folder, leave this box blank.

Item	Description
<b>WebHMI Database Folder</b>	This box appears only if you have selected the <b>Customize database locations individually for subsystems</b> check box. Enter the database folder that you want to use for WebHMI. If you want to use the default folder, leave this box blank.

The **You are ready to install** page appears.



#### 14. Select **Install**.

After the installation is complete, a message appears, specifying that the installation is complete. A link to the log folder appears. All the services used by Operations Hub are started.


[Install the Certificate on your Clients \(page 29\)](#) (on each client that you will use to access Operations Hub ), and then [log in to Operations Hub \(page 32\)](#).

### *Install Operations Hub Automatically*

This topic describes how to install Operations Hub automatically. You can also [install Operations Hub manually \(page 15\)](#).

1. In the Operations Hub installation folder, open the `windows.env` file in a text editor.



 **Note:** We recommend that you back up the original `windows.env` file.

2. As needed, provide values for the parameters, and save the file.
3. Open Command Prompt, and run the following command: `<Operations Hub installation folder>\OpHub-Windows-Installer>ophub_bundle <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.
  - `-norestart`: Use this value if you do not want services to be restarted during the installation.
  - `-promptrestart`: Use this value if you want a message to appear, asking whether services must be restarted.

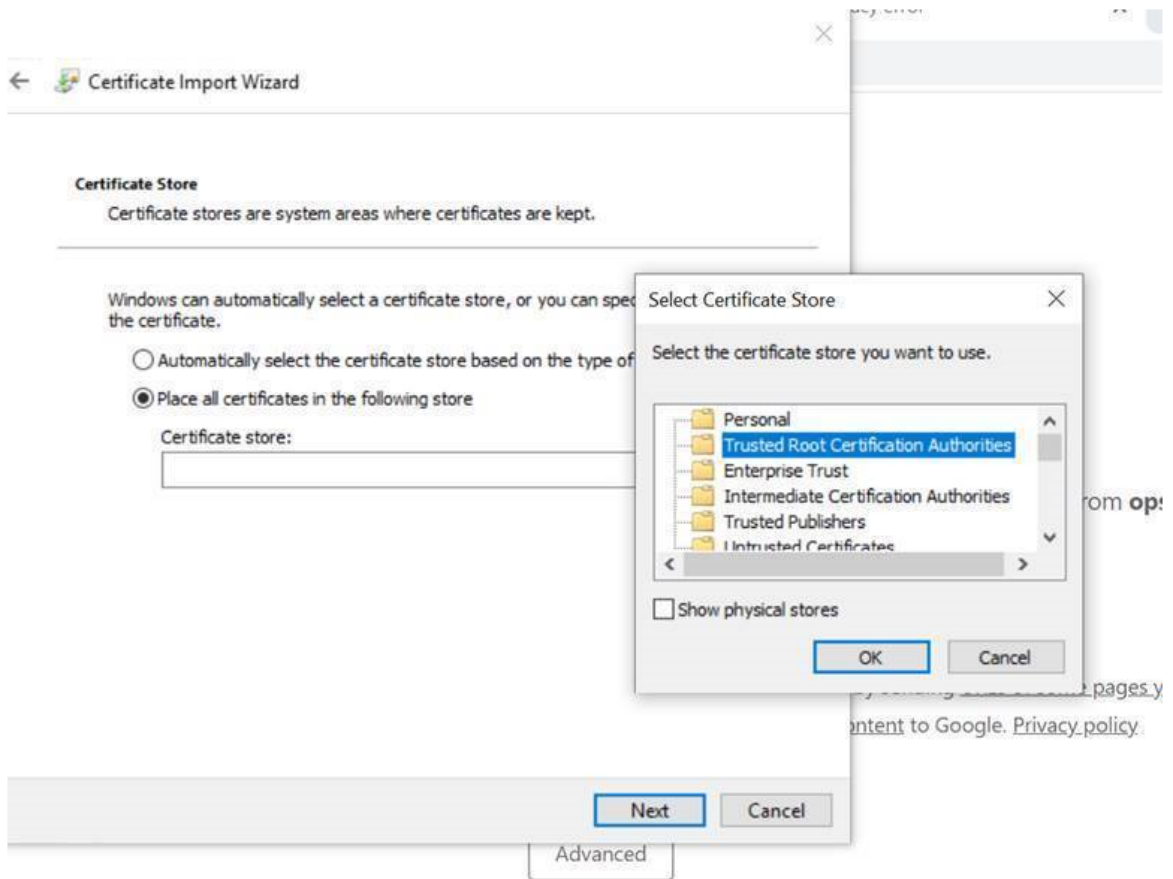
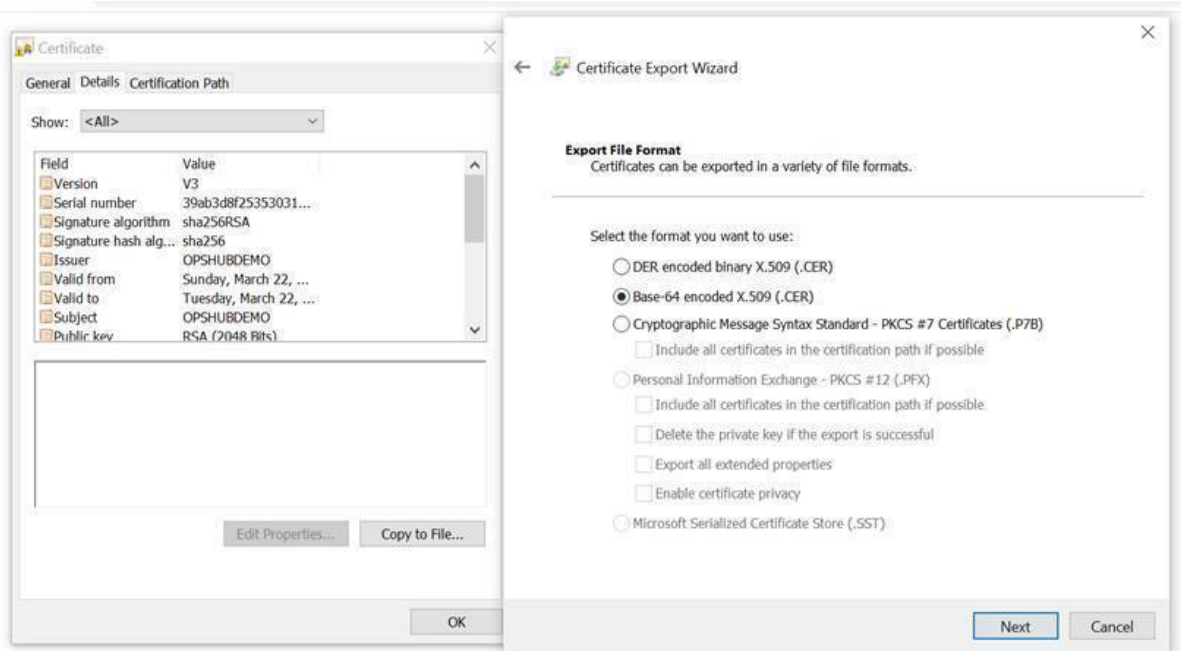
Operations Hub is installed.

[Log in to Operations Hub \(page 32\)](#).

## *Install the Certificate on your Clients*

This topic describes how to 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.



## Post-Installation Tasks

### Setting Up Operations Hub

#### Configure MQTT Broker Settings

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

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	Description
<b>Cloud url</b>	Enter the IP address or the URL of the MQTT broker that you want to use.
<b>Pull interval</b>	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.
<b>Use password</b>	Specify if the MQTT broker requires a user name and password to connect. By default, the value in this field is false.
<b>Password</b>	If you have selected true in the Use Password field, enter the password in this field.
<b>User</b>	If you have selected true in the Use password field, enter the user name in this field.
<b>Qos</b>	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>
<b>Port</b>	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

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. At the Ubuntu server command prompt, enter `cd <path to the installation folder>` to change to the installation directory.
3. Enter `sudo nano endapp/config/config.js` to access the configuration file.
4. In the command line `gmapKey: '[GMAPSAPIKEY]'`, replace `[GMAPSAPIKEY]` with the API key generated in step 1.
5. Save and close the file.
6. Enter `sudo docker-compose restart endapp` to restart the endapp container.  
The Google Map widget is now available for use in the application. Asset locations are now displayed on a map.

## Log in to Operations Hub

Create a tenant ([page](#) ).

Only a single user can log in to Operations Hub at a time. Therefore, if you want to log in as a different user, you must first log out of all the Operations Hub sessions (including the Site Admin console and applications created using Operations Hub).

1. In a web browser, enter `https://<site name>.<domain name>.com/iqp/#/`. Alternatively, you can use the shortcut provided on the desktop after installation.
2. Log in with the credentials you specified when you created a tenant.
3. 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 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	🔒 ↗️ ⚙️

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 convertor tool to access the Site Admin console, which is used to configure an MQTT server or an email server.

 **Note:**

- Log out and close all the browser windows before you run the convertor tool.
- Make a note of the credentials of the Site Admin console. If, however, you have not made a note of the credentials when running the convertor tool, reinstall the tool and note down the credentials.
- Even if you change the password of the Site Admin console a second time, when you run the convertor tool, the login page contains the old password. Therefore, you must replace the value in the password field with the new one.
- The Site Admin console is used to configure MQTT settings or an email server. Do not use the Site Admin 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:

1. Access the `uaa.yml` file. By default, this file is located in the following folder: `C:\Program Files\GE Digital\UAA`
2. 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.
3. Restart the Historian Embedded Tomcat Container service.

- 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.

## Mapping UAA Groups

### About User Groups

A user group is created for a specific type of users who will likely perform the same type of activities.

Typically, the following types of users use 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.

A user can belong to more than one user type. For example, a user can be both a developer and an application user.

You can add users in Operations Hub in any of the following ways:

- **Using Operations Hub:** You can create developers and application users by accessing the **MANAGE** section of Operations Hub. For instructions, refer to the Users section of the User Guide.
- **Mapping existing user groups:** If you have user groups in an existing User Authentication and Authentication (UAA) instance or Lightweight Directory Access Protocol (LDAP) service, you can map these groups with an Operations Hub UAA group. The users of these groups can then use Operations Hub.

**!** **Important:** Exercise caution in modifying the membership of a user because it is possible for a user to remove their privileges to access Operations Hub, including the user management section, thus preventing themselves from accessing Operations Hub.

## About User Authentication and Authorization (UAA)

In Operations Hub, user authentication is handled using User Account and Authentication (UAA). UAA provides identity-based security for applications and APIs. It supports open standards for authentication and authorization, including OAuth2.

When a user is created, modified, or deleted in Operations Hub, the associated user account is being created, modified, or deleted in the UAA instance, respectively.

**📄 Note:** This is done in the backend automatically. Therefore, most users will not need knowledge on UAA to perform basic user management, except when additional configuration is required.

To use UAA, you can choose among the following options:

- **Creating a new instance of UAA:** Use this option if you are not currently using a UAA instance. Typically, this option is used if Operations Hub is used stand-alone without integrating with another product.
- **Using an existing UAA:** Use this option if you are currently using UAA that contains users and groups. The users in the existing UAA instance can then use Operations Hub. You can then manage these users in Operations Hub. To use an existing instance of UAA, you must provide the details while installing Operations Hub.

**📄 Note:** Operations Hub supports UAA version 4.30.0 or later.

Regardless of whether you use a new or an existing instance of UAA, you can use an external identity provider, such as a Lightweight Directory Access Protocol (LDAP) service, to fetch the users and groups. You can then view these users and assign applications to them using Operations Hub. You cannot, however, modify these users using Operations Hub.

## Map Existing UAA Groups With Operations Hub UAA

If you want users from an existing instance of UAA to use Operations Hub, you must map the corresponding UAA groups with an Operations Hub UAA group, which is created during Operations Hub installation.

1. Double-click



**i Tip:** By default, this icon appears on the desktop after you install Operations Hub.

The **UAA/LDAP Connectivity Tool** page appears.

2. Select the **Map Existing UAA Groups** check box.
3. In the **UAA Connection** section, provide values as specified in the following table.

**!** **Important:** The values that you provide in this step must match the values that you provided in the **User Authentication and Authorization Service** page while installing Operations Hub. These values are required to connect to the Operations Hub UAA. Operations Hub works only with a single instance of UAA, which is specified during Operations Hub installation. After installation, you cannot change the instance of UAA that Operations Hub will use.

Box	Description
<b>URL</b>	Enter the authorization server URL of the Operations Hub UAA that you specified in the <b>UAA Base URL</b> box during installation (for example, https://localhost).  If referencing Historian 7.x UAA, then use a url of https://Historian7x:8443; if referencing Historian 8.x then use a URL of https://Historian8x (no port number). The port numbers reflect the default port numbers for Historian. If ports were customized, then use the selected port.
<b>Client ID</b>	Enter the client ID of the Operations Hub UAA server that you specified in the <b>Admin Client ID</b> box during installation.
<b>Client Secret</b>	Enter the client secret configured for the OAuth client that you specified in the <b>Admin Client Secret</b> box during installation.

#### 1 UAA Connection



URL \*

https://operationshub:8443

Client ID \*

admin

Client Secret \*

admin123


Test

Continue

4. Select **Test**.  
If connection to the UAA server is established, a message appears, confirming the same.
5. Select **Continue**.  
In the **UAA Mapping** section, the drop-down list box contains a list of groups in Operations Hub UAA. In the **Filter** box, a list of groups in the existing UAA instance appear.



6. In the drop-down list box, select the Operations Hub UAA group to which you want to map the existing UAA groups.
7. In the **Filter** box, select the check boxes corresponding to the existing UAA groups that you want to map.

 **Note:** If a group is already mapped to the Operations Hub UAA group that you have selected, the check box is already selected.

8. Select **Map Members**.

A message appears, confirming that the Operations Hub UAA group is mapped to the existing UAA groups that you have selected.

9. Repeat steps 6 through 8 for all the Operations Hub UAA groups that you want to map.


The existing UAA groups are mapped with the Operations Hub UAA groups.

## Map LDAP Groups With Operations Hub UAA

If you want LDAP users to use Operations Hub, you must map the corresponding UAA groups with an Operations Hub UAA group, which is created using Operations Hub installation.




1. Double-click

 **Tip:** By default, this icon appears on the desktop after you install Operations Hub.

The **UAA/LDAP Connectivity Tool** page appears.

2. Select the **Map Existing LDAP Groups** check box.
3. In the **UAA Connection** section, provide values as specified in the following table.

 **Important:** The values that you provide in this step must match the values that you provided in the **User Authentication and Authorization Service** page while installing Operations Hub. These values are required to connect to the Operations Hub UAA. Operations Hub works only with a single instance of UAA, which is specified during Operations Hub installation. After installation, you cannot change the instance of UAA that Operations Hub will use.

<b>Box</b>	<b>Description</b>
<b>URL</b>	Enter the authorization server URL of the Operations Hub UAA that you specified in the <b>UAA Base URL</b> box during installation (for example, <a href="https://localhost">https://localhost</a> ).  If referencing Historian 7.x UAA, then use a url of <a href="https://Historian7x:8443">https://Historian7x:8443</a> ; if referencing Historian 8.x then use a URL of <a href="https://Historian8x">https://Historian8x</a> (no port number). The port numbers reflect the default port numbers for Historian. If ports were customized, then use the selected port.
<b>Client ID</b>	Enter the client ID of the Operations Hub UAA server that you specified in the <b>Admin Client ID</b> box during installation.
<b>Client Secret</b>	Enter the client secret configured for the OAuth client that you specified in the <b>Admin Client Secret</b> box during installation.

4. Select **Test**.

If connection to the UAA server is established, a message appears, confirming the same.

5. In the **LDAP Connection** section, provide values as specified in the following table.

<b>Item</b>	<b>Description</b>
<b>URL</b>	Enter the base URL of the LDAP server (for example, <a href="https://localhost">https://localhost</a> ).
<b>Bind User DN</b>	Enter the distinguished name of the bind user (for example, <code>cn=admin,ou=Users,dc=test,dc=com</code> ).
<b>Password</b>	Enter the password for the LDAP user ID that searches the LDAP tree for user information.
<b>Skip SSL Verification (UAA restart required)</b>	Select this check box if you do not have the certificate to access the LDAP server. Messages are still encrypted, but the certificate is not verified for correctness. Do not select this option if you are not confident of the direct connection to the LDAP server; it could result in redirected traffic outside of your controlled network.
<b>User Search Filter</b>	Enter the starting point for the LDAP user search in the directory tree (for example, <code>dc=developers,dc=com</code> ).
<b>User Search Base</b>	Enter the subdirectories to include in the search (for example, <code>cn={0}</code> ).
<b>Group Search Base</b>	Enter the subdirectories to include in the search (for example, <code>member={0}</code> ).
<b>Max Group Search Depth</b>	Enter a value to define the maximum depth for searching LDAP groups. (This may impact performance for very large systems.) By default this value is 10.
<b>Group Search Filter</b>	Enter the starting point for the LDAP group search in the directory tree (for example, <code>ou=scopes,dc=developers,dc=com</code> ).

UAA/LDAP Connectivity Tool

Map Existing UAA Groups  Map Existing LDAP Groups

1 UAA Connection

2 LDAP Connection

Base url \*  
ldap://localhost:389/

bind user dn \*  
cn=admin,dc=test,dc=com

password \*

Skip SSL verification (UAA restart required)

user search base \*  
dc=test,dc=com

user search filter \*  
cn={0}

group search base \*

max group search depth \*  
10

group search filter \*

6. Select **Test**, and then select **Submit**.

If connection to the LDAP server is established, a message appears, confirming the same.

7. Select **Test** again, and then select **Continue**.

In the **LDAP Mapping** section, the drop-down list box contains a list of groups in Operations Hub UAA.

8. In the drop-down list box, select the Operations Hub UAA group to which you want to map LDAP groups. You can also search for a group in the **LDAP Groups Search Filter** box. When searching, be sure to use the standard LDAP query language for your search.

3 LDAP Mapping

UAA Group \*

LDAP Groups Search Filter  
(objectclass=\*)

Search

ldapGroups

DC=ophub,DC=internal

CN=Users,DC=ophub,DC=internal


CN=Computers,DC=ophub,DC=internal

OU=Domain Controllers,DC=ophub,DC=internal

CN=System,DC=ophub,DC=internal

Map Groups

Back Continue

 **Note:** If a group is already mapped to the Operations Hub UAA group that you have selected, the check box is already selected.

9. Select **Map Groups**.

A message appears, confirming that the LDAP groups are mapped to the Operations Hub UAA group.

10. Repeat steps 8 through 10 for all the Operations Hub UAA groups that you want to map.


The LDAP groups are mapped with the Operations Hub UAA groups.

## Remove Mapping Between UAA Groups of Operations Hub and an Existing UAA Instance

If you want to stop users from a UAA group of an existing UAA instance from using Operations Hub, you can remove the mapping between the UAA group of Operations Hub and the existing UAA instance. If you want to stop integration between the Operations Hub UAA and the existing UAA instance altogether, you must remove the mapping for all the groups of the UAA instance.



1. Double-click

 **Tip:** By default, this icon appears on the desktop after you install Operations Hub.

The **UAA/LDAP Connectivity Tool** page appears.

2. Select the **Map Existing UAA Groups** check box.

3. In the **UAA Connection** section, provide values as specified in the following table.

Box	Description
<b>URL</b>	Enter the authorization server URL of the Operations Hub UAA that you specified in the <b>UAA Base URL</b> box during installation (for example, https://localhost).  If referencing Historian 7.x UAA, then use a url of https://Historian7x:8443; if referencing Historian 8.x then use a URL of https://Historian8x (no port number). The port numbers reflect the default port numbers for Historian. If ports were customized, then use the selected port.
<b>Client ID</b>	Enter the client ID of the Operations Hub UAA server that you specified in the <b>Admin Client ID</b> box during installation.
<b>Client Secret</b>	Enter the client secret configured for the OAuth client that you specified in the <b>Admin Client Secret</b> box during installation.

4. Select **Test**, then select **Submit**, and then select **Test** again.

If connection to the UAA server is established, a message appears, confirming the same, and the **Continue** button is enabled.

5. Select **Continue**.

In the **UAA Mapping** section, the drop-down list box contains a list of groups in Operations Hub UAA. In the **Filter** box, a list of groups in the existing UAA instance appear.

6. In the drop-down list box, select the Operations Hub UAA group for which you want to remove the mapping.

In the **Filter** box, check boxes for the UAA groups that are mapped to the selected Operations Hub UAA group are selected.

7. In the **Filter** box, clear the check boxes corresponding to the UAA groups for which you want to remove the mapping.

8. Select **Map Members**.

The mapping between the UAA groups of Operations Hub UAA and the existing UAA instance is removed.

9. Repeat steps 6 through 8 for all the Operations Hub UAA groups for which you want to remove the mapping.


Mapping between the UAA Groups of Operations Hub and the existing UAA instance has been removed.

## Remove Mapping Between Operations Hub UAA Groups and LDAP Groups

If you want to stop users from an LDAP group from using Operations Hub, you can remove the mapping between the UAA group of Operations Hub and LDAP. If you want to stop integration between the Operations Hub UAA and LDAP altogether, you must remove the mapping for all the groups of the UAA instance.




1. Double-click

 **Tip:** By default, this icon appears on the desktop after you install Operations Hub.

The **UAA/LDAP Connectivity Tool** page appears.

2. Select the **Map Existing LDAP Groups** check box.

3. In the **UAA Connection** section, provide values as specified in the following table.

 **Important:** The values that you provide in this step must match the values that you provided in the **User Authentication and Authorization Service** page while installing Operations Hub. These values are required to connect to the Operations Hub UAA. Operations Hub works only with a single instance of UAA, which is specified during Operations Hub

installation. After installation, you cannot change the instance of UAA that Operations Hub will use.

<b>Box</b>	<b>Description</b>
<b>URL</b>	Enter the authorization server URL of the Operations Hub UAA that you specified in the <b>UAA Base URL</b> box during installation (for example, <a href="https://localhost">https://localhost</a> ).  If referencing Historian 7.x UAA, then use a url of <a href="https://Historian7x:8443">https://Historian7x:8443</a> ; if referencing Historian 8.x then use a URL of <a href="https://Historian8x">https://Historian8x</a> (no port number). The port numbers reflect the default port numbers for Historian. If ports were customized, then use the selected port.
<b>Client ID</b>	Enter the client ID of the Operations Hub UAA server that you specified in the <b>Admin Client ID</b> box during installation.
<b>Client Secret</b>	Enter the client secret configured for the OAuth client that you specified in the <b>Admin Client Secret</b> box during installation.

4. Select **Test**.

If connection to the UAA server is established, a message appears, confirming the same.

5. In the **LDAP Connection** section, provide values as specified in the following table.

<b>Box</b>	<b>Description</b>
<b>URL</b>	Enter the base URL of the LDAP server (for example, <a href="https://localhost">https://localhost</a> ).
<b>Bind User DN</b>	Enter the distinguished name of the bind user (for example, <a href="#">cn=admin,ou=Users,dc=test,dc=com</a> ).
<b>Password</b>	Enter the password for the LDAP user ID that searches the LDAP tree for user information.
<b>User Search Filter</b>	Enter the starting point for the LDAP user search in the directory tree (for example, <a href="#">dc=developers,dc=com</a> ).
<b>User Search Base</b>	Enter the subdirectories to include in the search (for example, <a href="#">cn={0}</a> ).
<b>Group Search Filter</b>	Enter the starting point for the LDAP group search in the directory tree (for example, <a href="#">ou=scopes,dc=developers,dc=com</a> ).
<b>Group Search Base</b>	Enter the subdirectories to include in the search (for example, <a href="#">member={0}</a> ).

6. Select **Test**, and then select **Submit**.

If connection to the LDAP server is established, a message appears, confirming the same.

7. Select **Test** again, and then select **Continue**.

In the **LDAP Mapping** section, the drop-down list box contains a list of groups in Operations Hub UAA. In the **Filter** box, a list of LDAP groups appears.

8. In the drop-down list box, select the Operations Hub UAA group whose mapping you want to remove.

In the **Filter** box, check boxes for the UAA groups that are mapped to the selected Operations Hub UAA group are selected.

9. In the **Filter** box, clear the check boxes corresponding to the LDAP groups for which you want to remove the mapping.
10. Select **Map Groups**.  
The mapping between the UAA groups of Operations Hub UAA and LDAP is removed.
11. Repeat steps 8 through 10 for all the Operations Hub UAA groups for which you want to remove the mapping.

Mapping between the UAA Groups of Operations Hub and LDAP has been removed.

## *Certificate Management*

### About the Certificate Management Tool

The Certificate Management tool allows you to manage external certificates and renew expired certificates. It 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 \(page 43\)](#).
- [Renew a local certificate \(page 45\)](#).
- [Import a server certificate or an issuer certificate \(page 44\)](#).
- [Remove a server certificate or an issuer certificate \(page 45\)](#).
- [View log messages \(page 46\)](#) 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 .

 **Tip:** By default, this icon appears on the desktop after you install 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 .

 **Tip:** By default, this icon appears on the desktop after you install 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 .

**i Tip:** By default, this icon appears on the desktop after you install 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 .

**i Tip:** By default, this icon appears on the desktop after you install 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 .

 **Tip:** By default, this icon appears on the desktop after you install 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.

## *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).

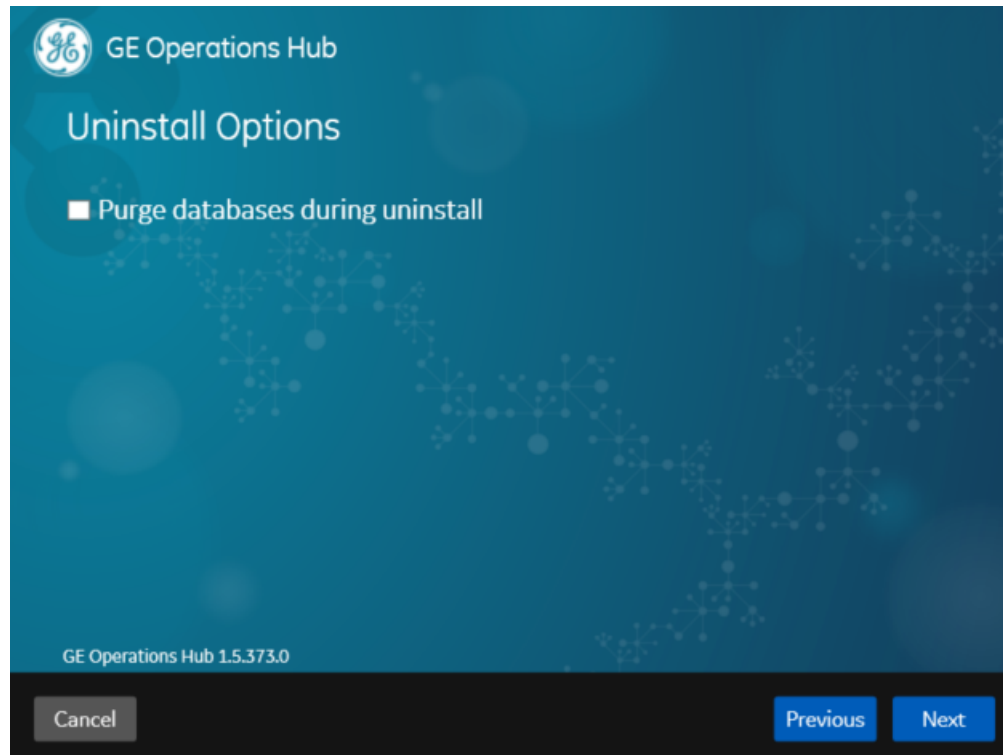
1. Create a data source to connect to the Historian server. For instructions, refer to the Data Sources section of the User Guide.
2. Set up the Historian server. For instructions, refer to the Administration section of the User Guide.
3. Access the Historian Analysis application. For instructions, refer 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.

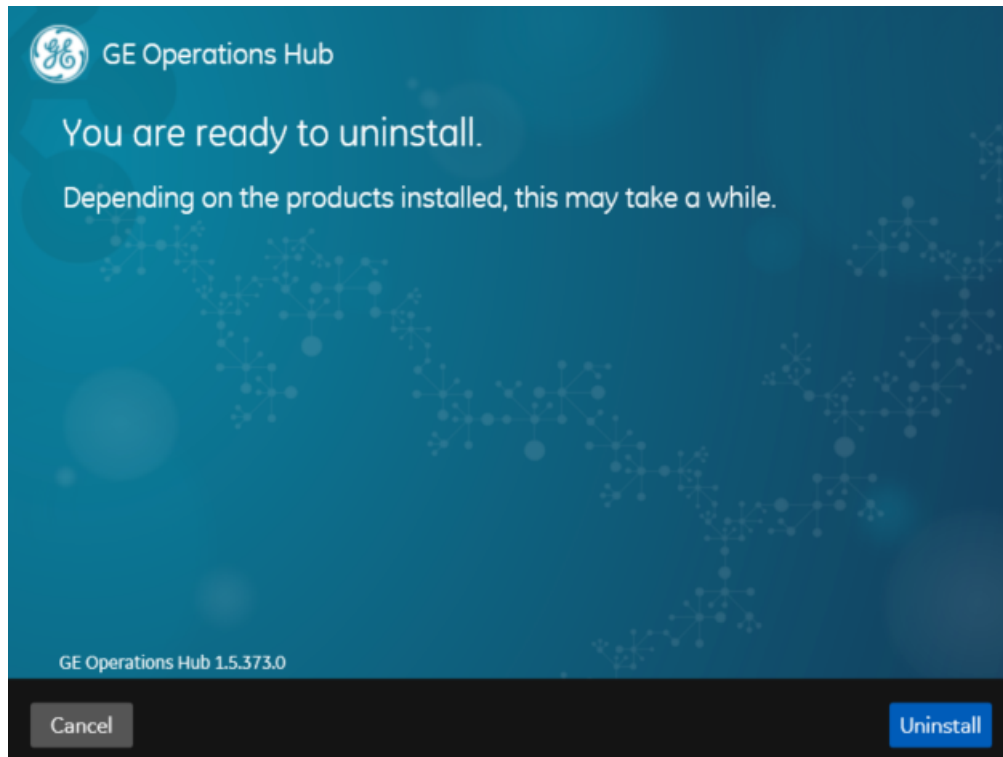
## *Uninstalling Operations Hub*

### *Uninstall Operations Hub on Windows*

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** page 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 page 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.

#### **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 \(page 50\)](#).
2. Creating a Model. See [Create a Model for Operations Hub to use with Historian \(page 52\)](#).
3. Using the Trend widget to trend model-based Historian data or trend data directly from a Historian. See [Use the Trend Widget with Operations Hub \(page 52\)](#).

4. Creating a Historian REST query. See [Create Historian REST Query for Operations Hub \(page 56\)](#).
5. Using the Query in the page designer. See [Use the Historian Query in the Operations Hub Page Designer \(page 58\)](#).

## 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).

## *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

## Configuring Historian 7.x in Operations Hub

< Local Historian

Name:

Type: Historian

Base URL:

Certificate Required  
 Ignore TLS/SSL

Certificate: Choose Certificate LocalHistorianCert.cer

Description:

System API Authentication Required  
 REST Authentication Required

---

**System Api Authentication Settings**

User Name:

Password:

Test

---

**Rest Authentication Settings**

Auth Type: OAuth

Auth Grant Type: client\_credentials

Certificate: Choose Certificate LocalHistorianCert.cer

Use DataSource Cert

Auth URL:

Auth Client Id:

Auth Client Secret:

Test

Cancel
Save
Save As New
Save And Exit

## Configuring Historian 8.x in Operations Hub

< HistorianServer

Name:

Type: Historian

Base URL:

Certificate Required  
 Ignore TLS/SSL

Description:

System API Authentication Required  
 REST Authentication Required

---

**System Api Authentication Settings**

User Name:

Password:

Test

---

**Rest Authentication Settings**

Auth Type: OAuth

Auth Grant Type: client\_credentials

Auth URL:

Auth Client Id:

Auth Client Secret:

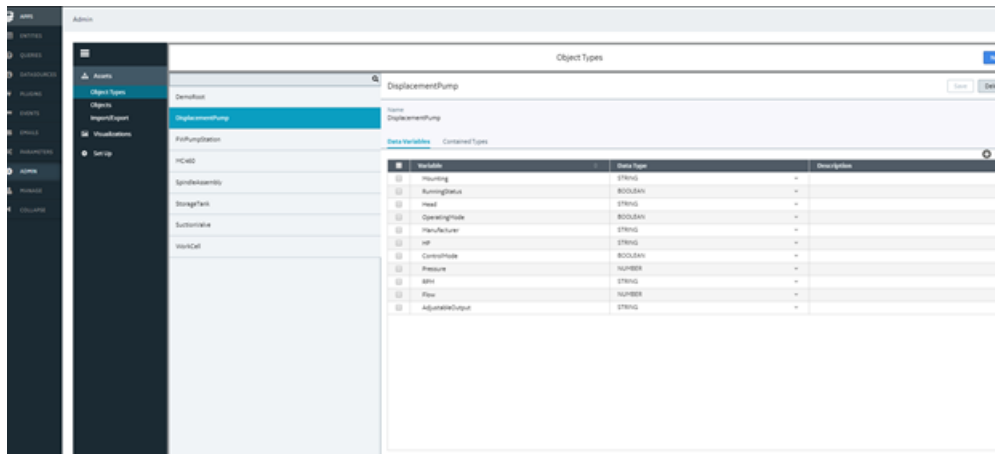
Test

Cancel
Save
Save As New
Save And Exit

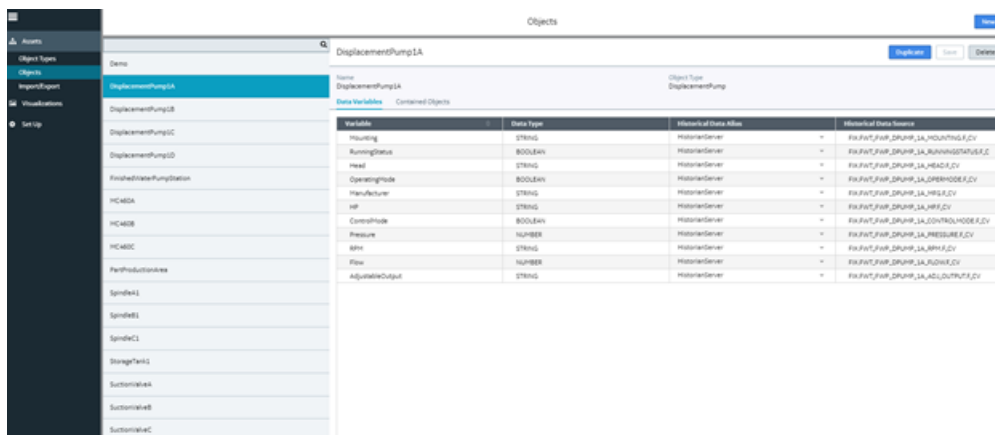
**Note:** The Auth Client ID field is case sensitive. For example, if the Historian server name is hist8Server, the user must use hist8Server.admin and not HIST8Server.admin or Hist8Server.admin, otherwise REST authentication will fail. If your rest connection fails, make sure you can login to the Historian 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



### Create an Object based on the New Type



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

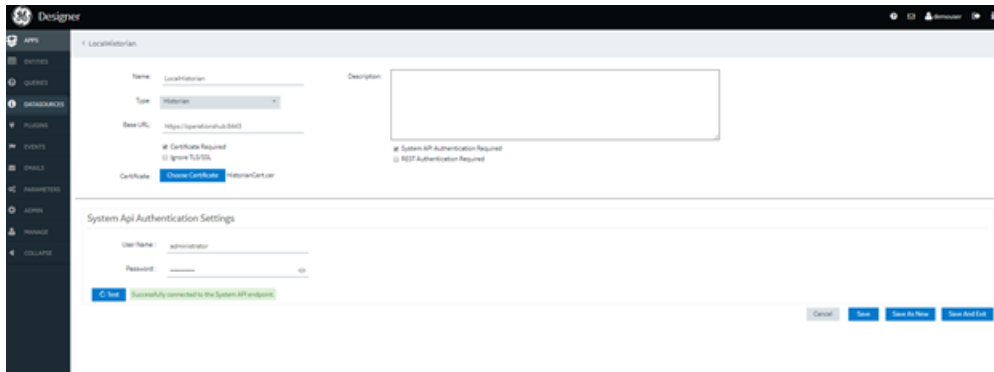
## Use the Trend Widget with Operations Hub



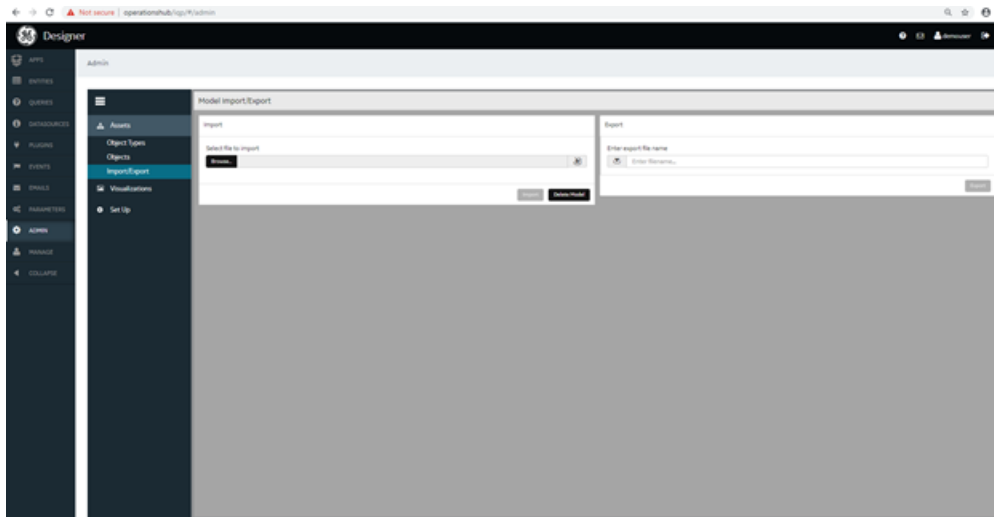
When using Operations Hub with Historian use the following guidelines to successfully get data flowing in the Trend widget.

## Use the Trend Widget with an Asset Model

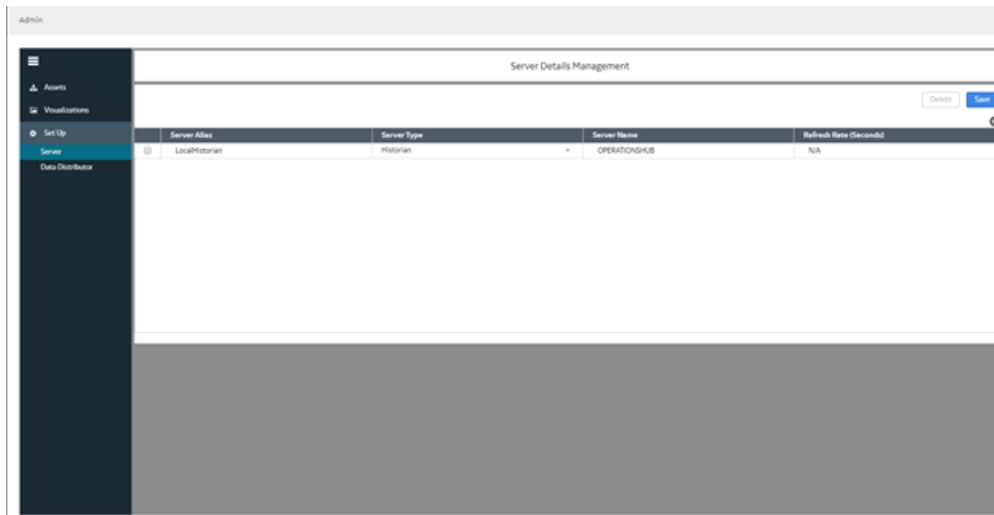
1. Create a data source to Historian via the **Data Sources** section.



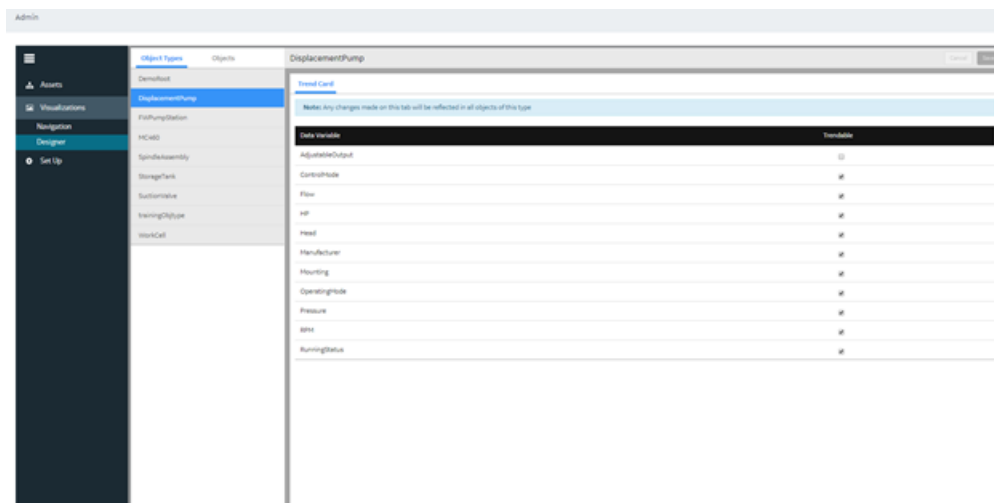
2. Make sure the test passes.
3. Import the model from the **Admin > Import/Export** option.



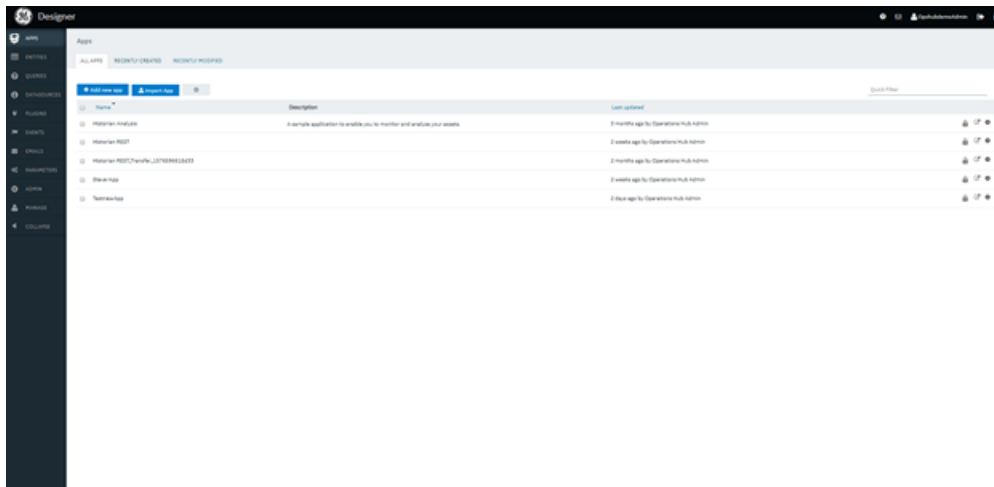
4. While in the **Admin**, make sure the Historian server is also setup via the **Setup** area.



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

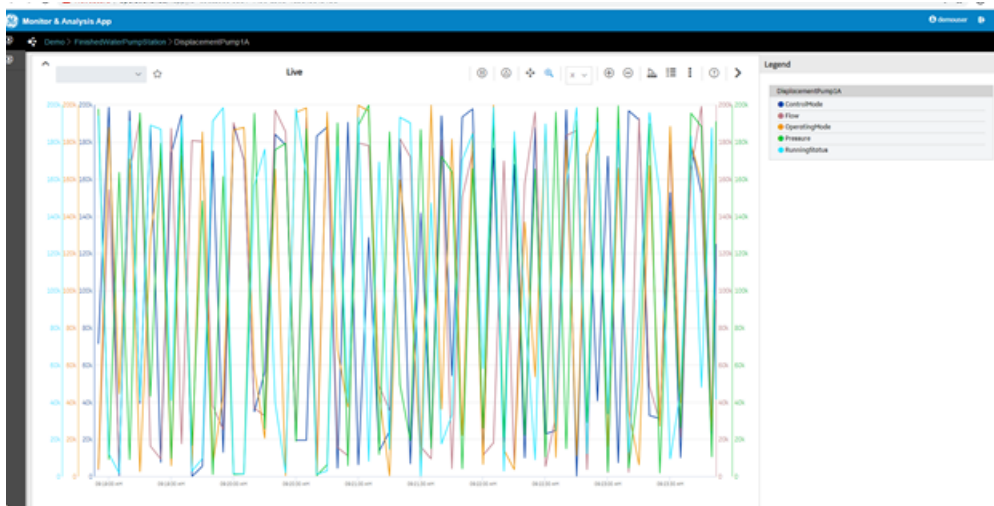


6. Switch to the **Apps** section.
7. Choose the **Historian Analysis** app.





8. Click the  button to open the app.

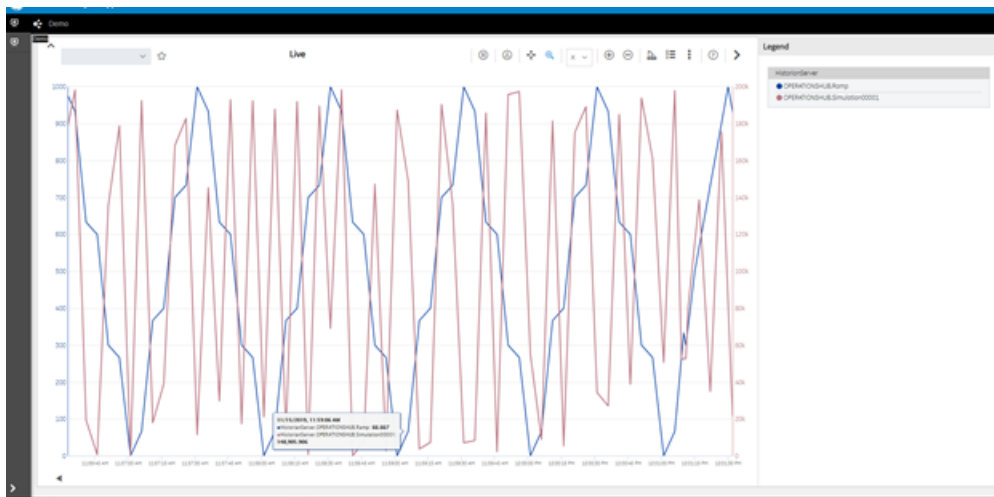
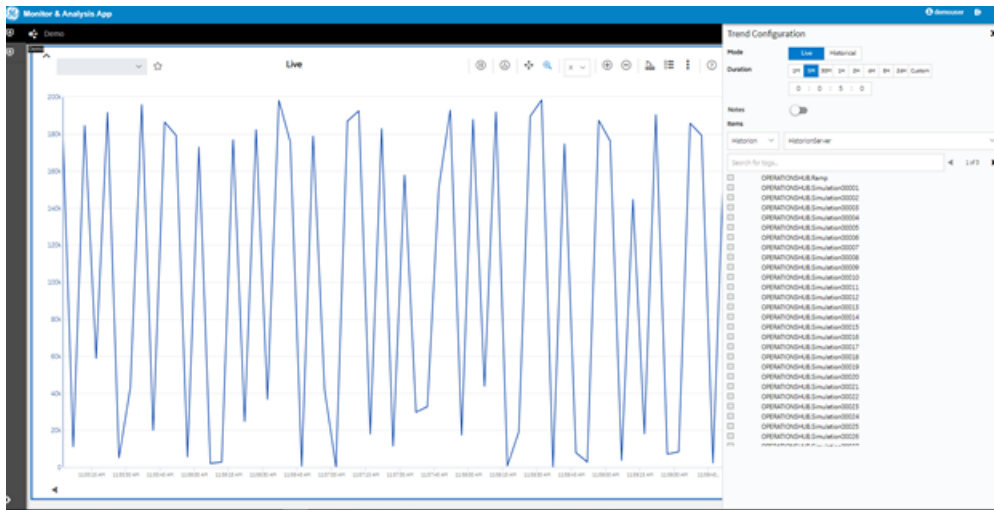
9. At run time, navigate through the model and the Trend chart will display data based on the context selected.



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. Click the  button to open the app.
7. At run time, open the Trend chart configuration via the  button, and browse the Historian to add tags to the chart for trending .



### *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 \(page 50\)](#) section.

### Rest Authentication Settings

Auth Type:	<input type="text" value="OAuth"/>	Auth URL:	<input type="text" value="https://webhmitaco/uaa/oauth/token"/>
Auth Grant Type:	<input type="text" value="client_credentials"/>	Auth Client Id:	<input type="text" value="WebHMITaco.admin"/>
Certificate:	<input type="text" value="Choose Certificate"/> Hist9Cer.cer	Auth Client Secret:	<input type="password" value="*****"/>
<input checked="" type="checkbox"/> Use DataSource Cert			

[Test](#)

2. Create a query for Current value as shown below:

### Get Current Value

Name:	<input type="text" value="Get Current Value"/>	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

[+Add Path Param](#)

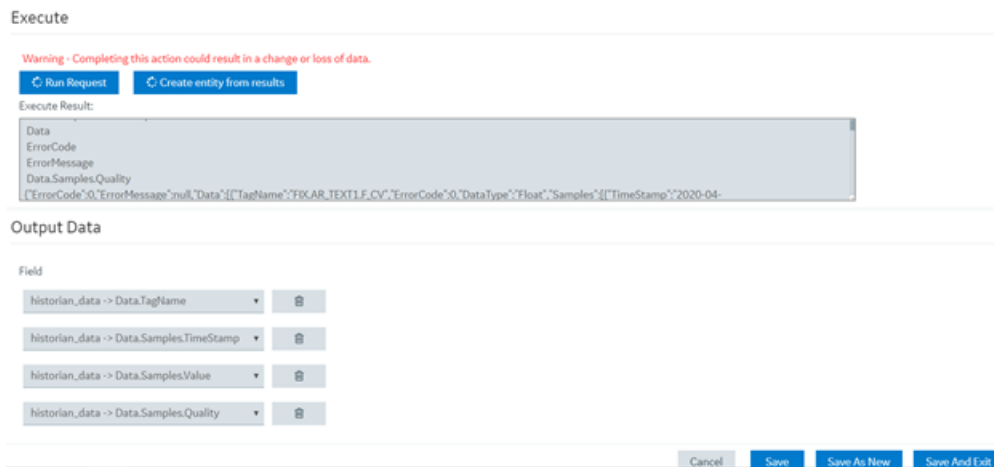
#### Query Parameters

Key	Type	Default or Test Value	
tagNames	<input type="text" value="Input Field"/>	*	<input type="button" value="X"/>

[+Add Query Param](#)

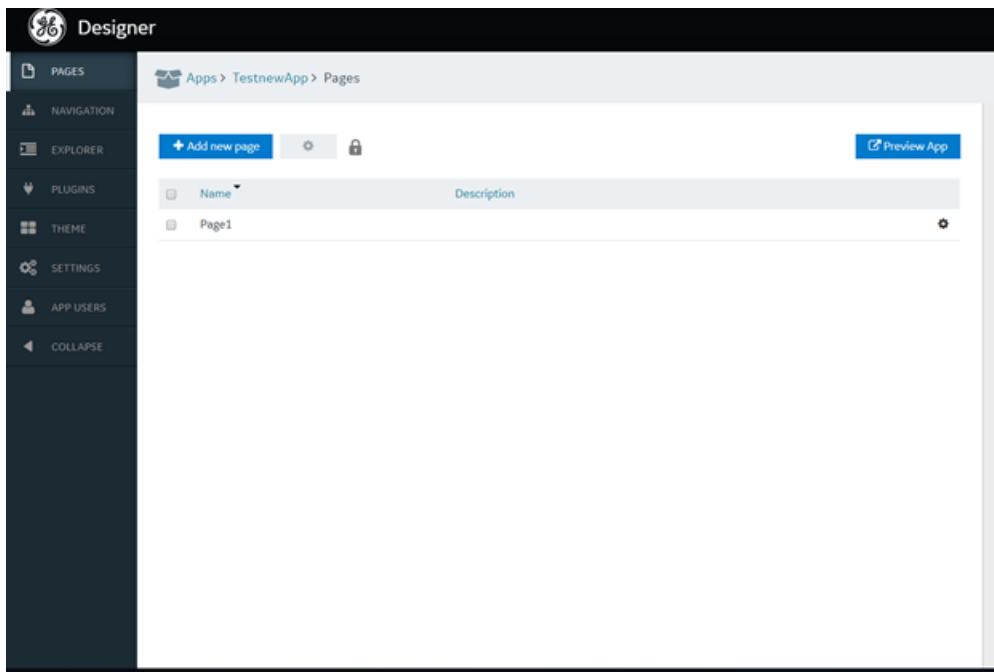
#### Header Parameters

[+Add Header Param](#)

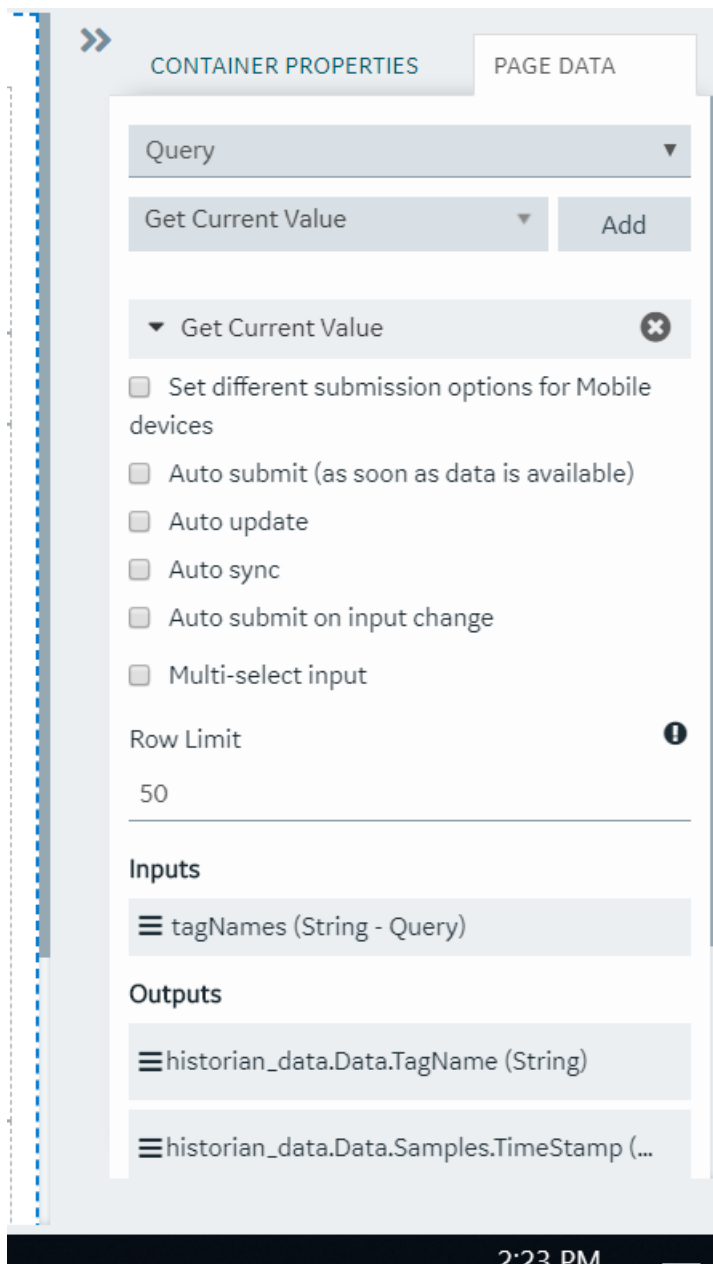


## *Use the Historian Query in the Operations Hub Page Designer*

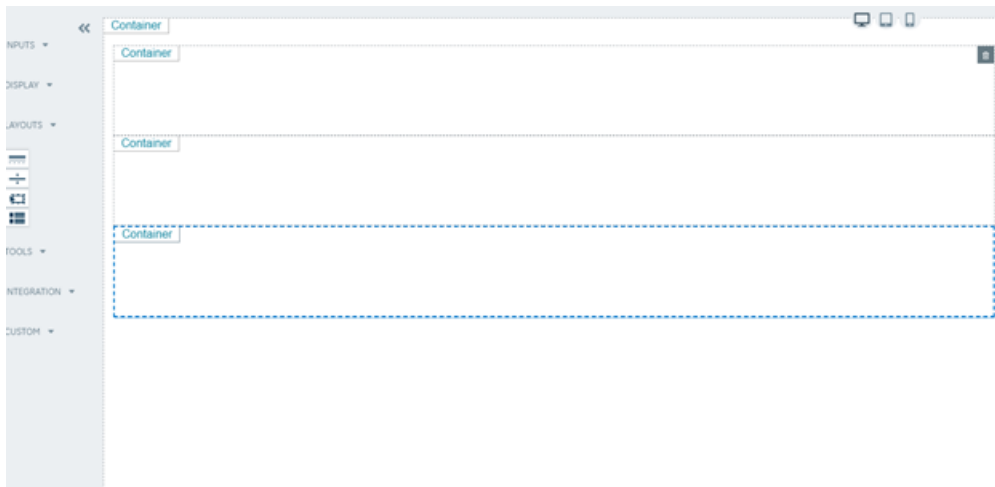
1. Go to **Apps > Pages** and then **Add a New Page** from within the App.



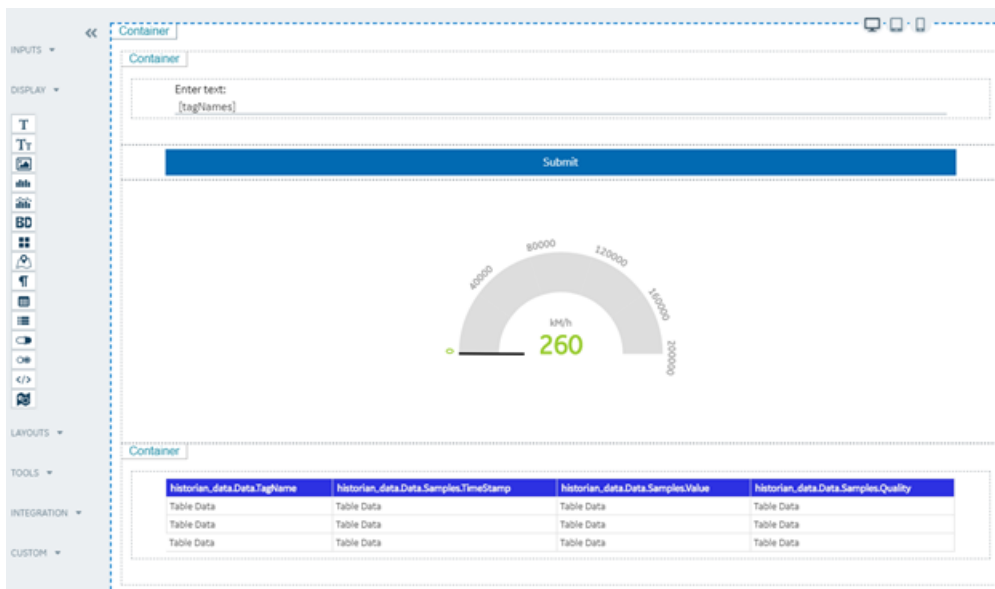
2. Within Page > Page Data, for the Query, next to **Get Current Value**, click Add to add the “Current Value Query” to Page.



3. Add widgets to the Page, by first adding three containers to the page. On Layouts, click Containers.

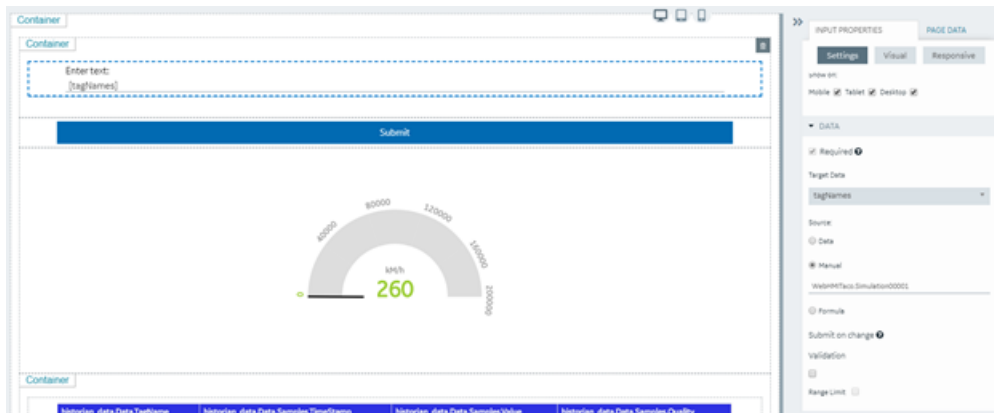


4. Add an Input > Input widget and a button into the first container, Display > Gauge into the second container, and Display > Table into the third container.

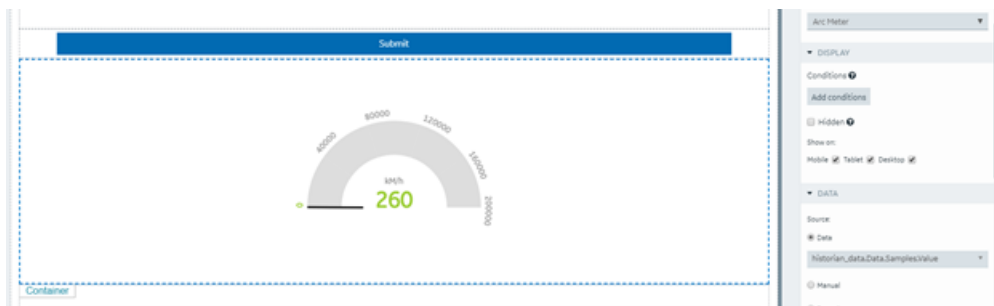


5. Now we need to bind the query parameters to each of the widgets: For the Input widget set the target data to the “GetCurrentValue” > TagNames. For the Source you can put in a manual entry of a known Historian tag name.

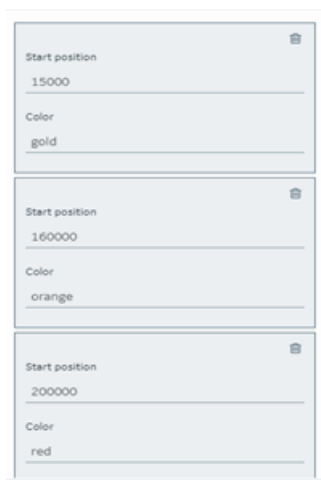




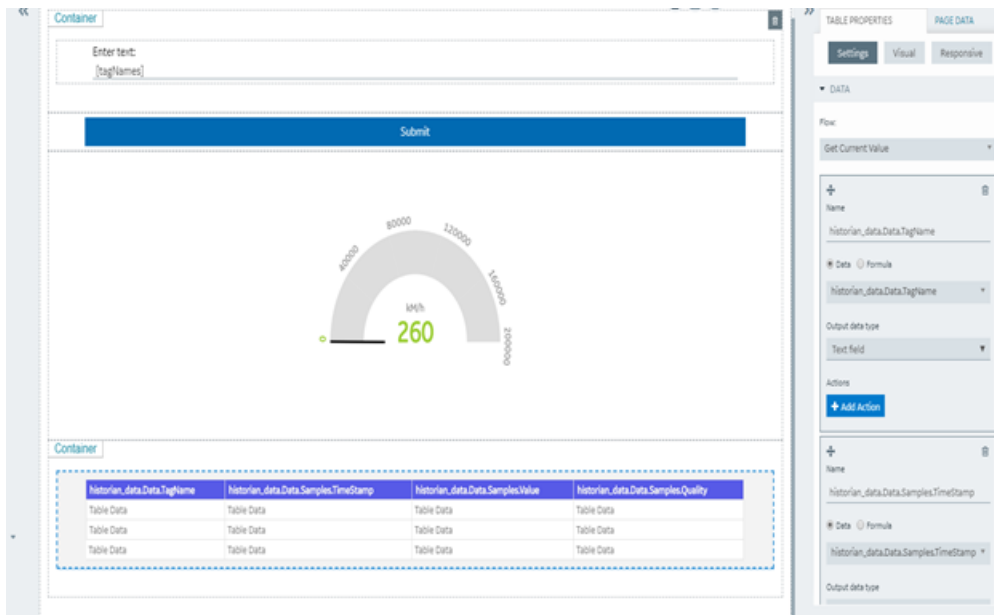
6. For the Gauge widget, set the style to “Arc Meter” and set the Data > Source > Get Current Value > historian\_data.Data.Samples.Value.



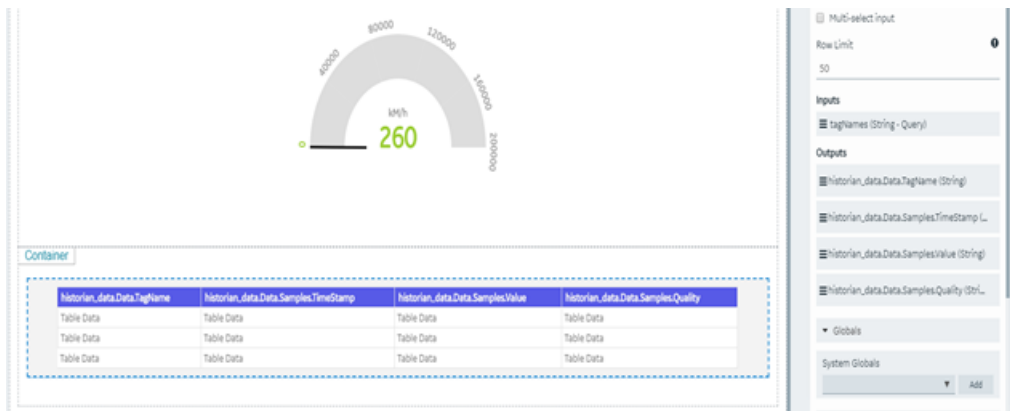
7. Set the color and start position numbers based on the data source High and Low as shown in the following figure.



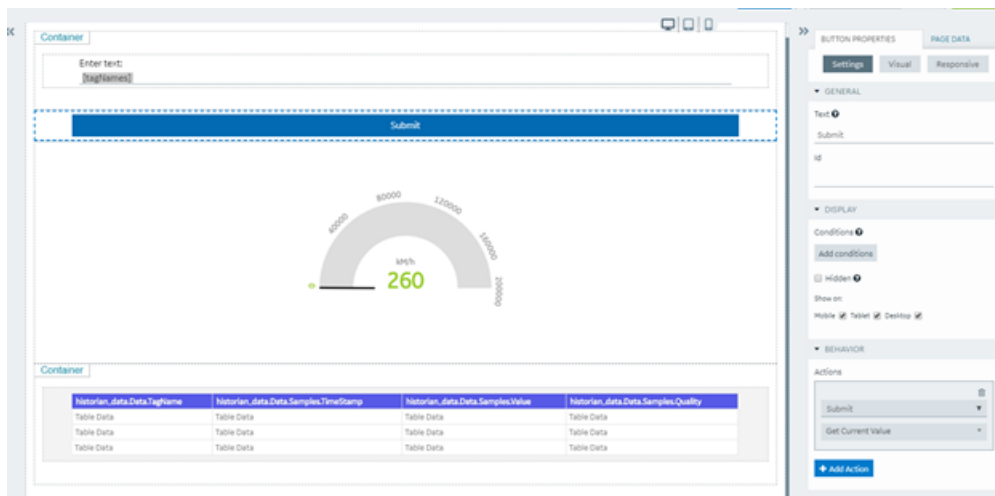
8. For the Table widget, set the Flow->Get Current Value. Now set the value for each of the fields shown below.



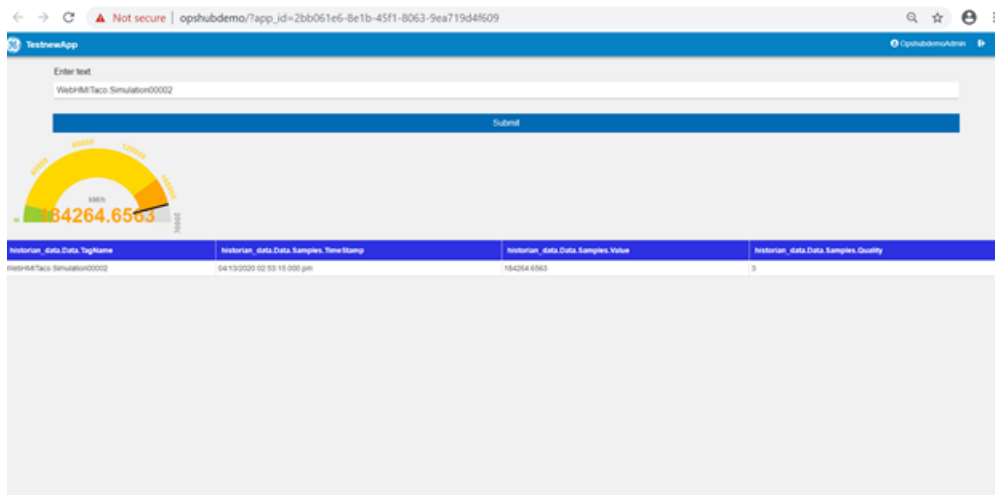
9. Alternatively, you can drag and drop the output parameters from the query onto the grid.



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, and provide the details to the external database. Refer to the [Create a Query to a Relational Database \(page 66\)](#) section.
2. 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 \(page 66\)](#) section.
3. 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 \(page 70\)](#) section.
4. View the page in the end app. For an example, see [Example of Adding Relational Database Queries to a Page \(page 74\)](#).

## *Create a SQL Data Source*

1. In 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.

Item	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: 10.181.213.211 or databaseserver01.</i>  This field only appears if you select Relational Database as the Datasource 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 Datasource Type.
<b>Database</b>	Enter the database name that you want to connect to.  This field only appears if you select Relational Database as the Datasource 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>	After the required fields are filled in, click the <b>Test</b> button.  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.  If it fails, it reads: "Failed to connect to the Database. More Details." Click the "More Details" link to view detailed reason in a popup.

3. Click the **Test** button.

The following example shows a successful SQL Database connection.

The screenshot shows the 'New DataSource' configuration window in the GE Designer application. The window is titled 'New DataSource' and has a dark sidebar on the left with navigation options: APPS, ENTITIES, QUERIES, DATASOURCES (selected), PLUGINS, EVENTS, EMAILS, PARAMETERS, ADMIN, MANAGE, and COLLAPSE. The main area contains the following configuration fields:

- Name: SQL DB
- Datasource Type: Relational Database
- Database type: Microsoft SQL Server
- Host: 10.181.213.50
- Port: 1433
- Database: master
- Certificate Required
- Description: (empty text area)

Below the main configuration is a 'SQL Authentication Settings' section with the following fields:

- User Name: sa
- Password: (masked with dots)

A 'Test' button is located below the authentication settings. A green message box indicates 'Successfully connected to the Database'. At the bottom of the window are buttons for 'Cancel', 'Save', 'Save As New', and 'Save And Exit'.

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**.


## *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 \(page 64\)](#).

1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.

Queries

+ Add new query 

« 1 » Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	  
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	  

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**

< New Query

Name: Get All Species

Description:

Type: Database

Data Source: SQL DB

Query Type: Stored Procedure

Schema: Species

Stored Procedure: GetAllSpecies

**Input Parameters**

Key	Datatype	Type	Default or Test Value
BirdName	VARCHAR	Input Field	
BirdNameOutput	VARCHAR	Input Field	
ReptileName	VARCHAR	Input Field	
ReptileNameOutput	VARCHAR	Input Field	

**Output Parameters**

Key	Datatype
BirdNameOutput	VARCHAR
ReptileNameOutput	VARCHAR

**Test**

Execute

Resultset1

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

Resultset2

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

OutputParameter

BirdNameOutput(VARCHAR)	ReptileNameOutput(VARCHAR)

**Output Data**

+ Add field + Add all fields

**Output Data**

+ Add field + Add all fields

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

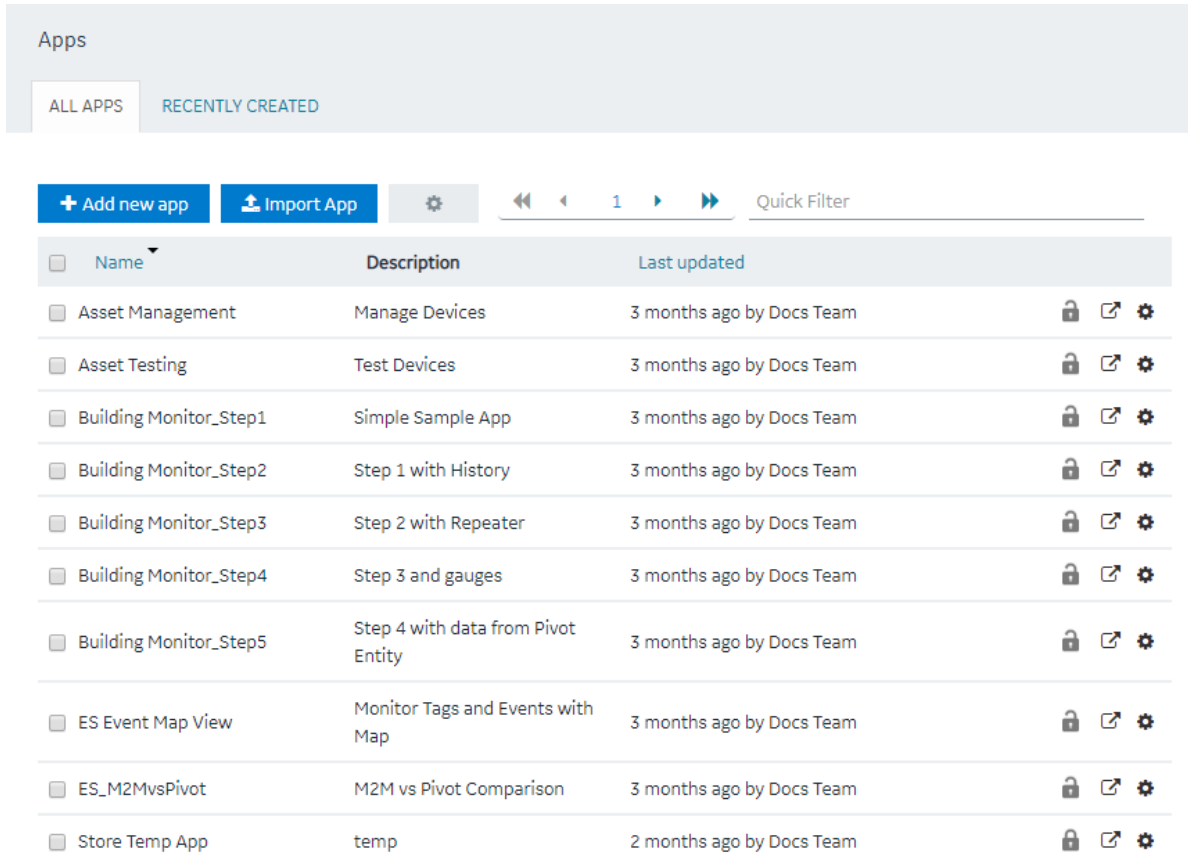
Cancel Save Save As New Save And Exit

13. Select **Save** or **Save And Exit**.  
The query is created.

## Use the Relational Database Query in the Designer

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

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



The screenshot shows the 'Apps' workspace in Operations Hub. At the top, there are two tabs: 'ALL APPS' and 'RECENTLY CREATED'. Below the tabs, there are three buttons: '+ Add new app', 'Import App', and a settings gear icon. To the right of these buttons is a pagination control showing '1' and a 'Quick Filter' input field. The main content is a table with the following columns: 'Name', 'Description', and 'Last updated'. The table contains ten rows of application data, each with a checkbox in the 'Name' column, a lock icon, an edit icon, and a settings icon in the rightmost column.

<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.

Apps > Asset Management > Pages

+ Add new page    ⚙️    🔒    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. Select **Add new page**.  
The **Create Page** window appears.

## Create Page ✕

Page name:

Page description:

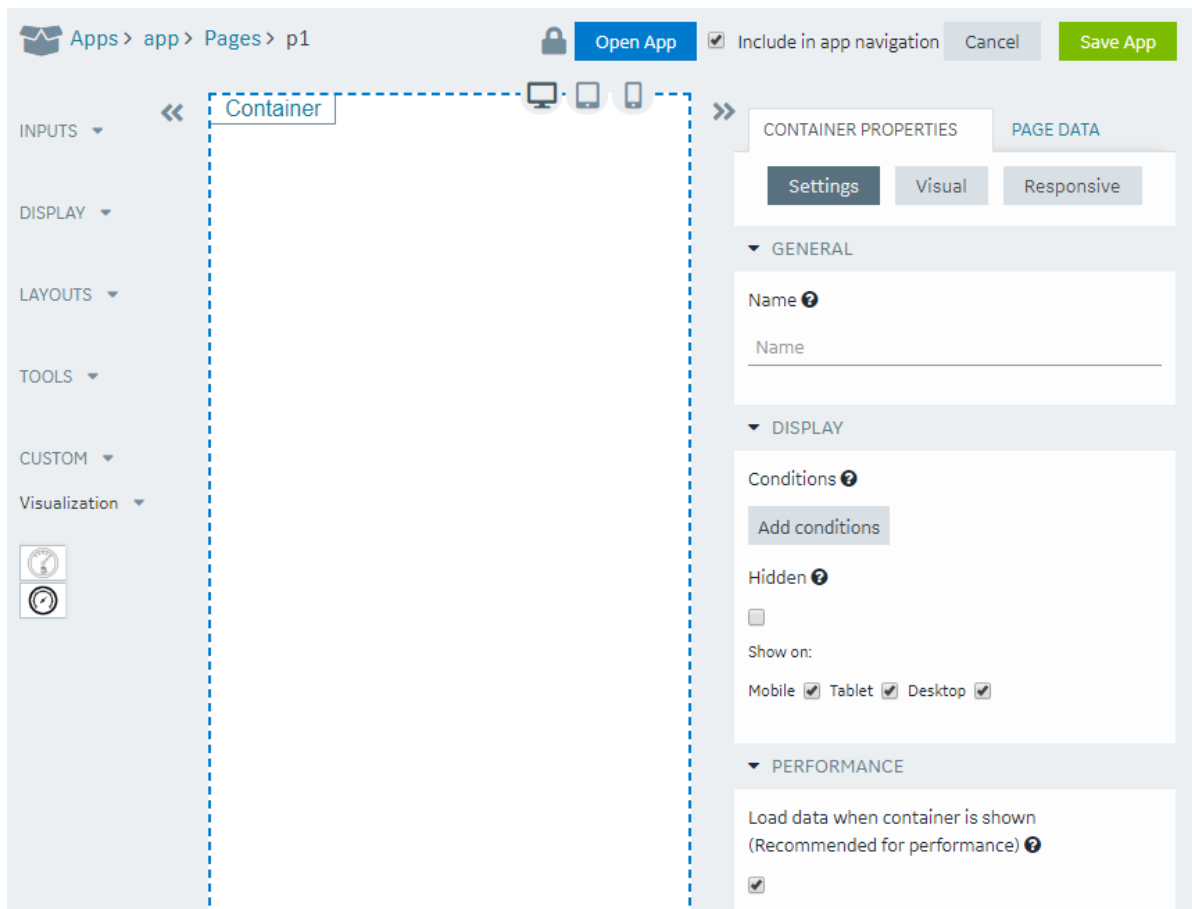
Include in app navigation:

**Create**    Cancel

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

Field	Description
<b>Page name</b>	Enter a name for the page. The name must contain at least one uppercase or lowercase letter.
<b>Page description</b>	Enter a description for the page.
<b>Include in app navigation</b>	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:

- Select the flow type as Query
- Select the Data source type as Relational Database
- Select the required data source
- Select the required Query
- Select a result set
- Click Add

The Query with sub-selected result set will be added to the page. The naming convention will be QueryName - ResultSetName.

Assigning Inputs and Outputs to components will be exactly like that of REST and Entity pages.

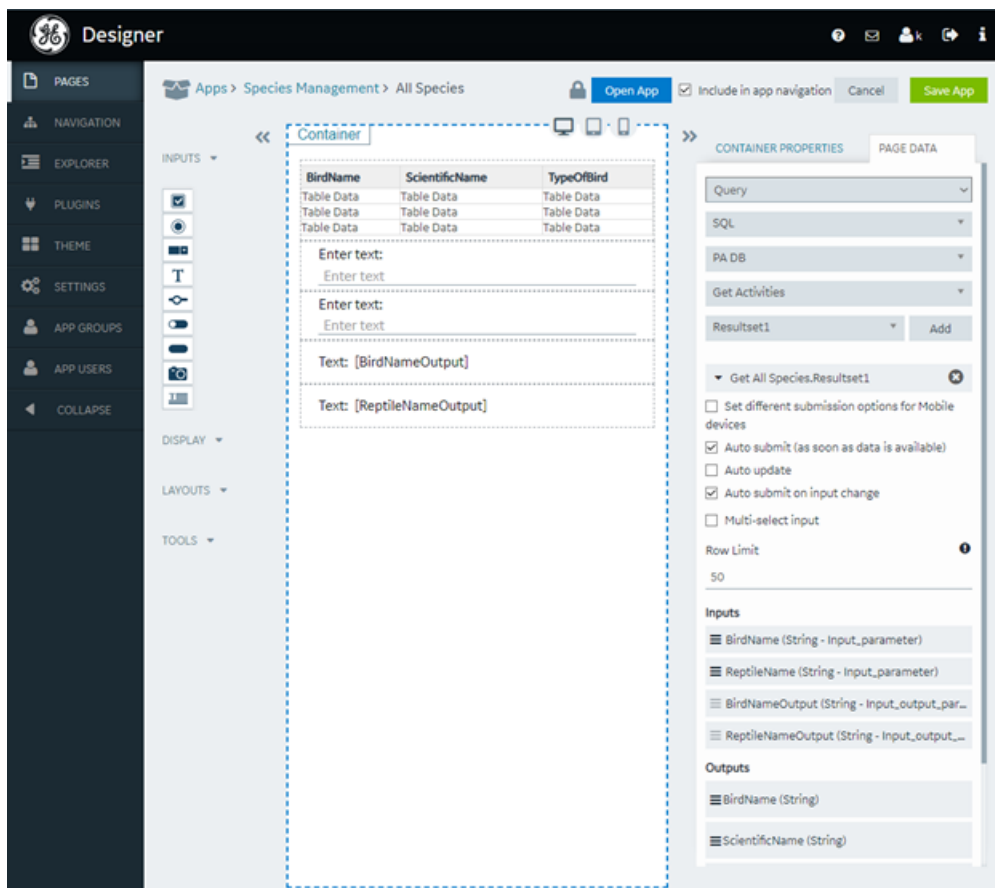
### **Note:**

- If a stored procedure has multiple result sets configured, the user must add each result set as an independent query in the page designer by choosing the result set.
- If a stored procedure contains output parameters, then all the output parameters are treated as an additional result set.


- In the case when there are multiple result sets for the query, and when the user adds them to the page, then the inputs and query execution option check boxes will be shown for the first result set, but internally they will be reflected to all the result sets for a query.
- If the query has single result set, the user can add it multiple times in the page builder. But, if the same query output is changed to contain multiple result sets at a later point, then the user has to remove the second instance of the query before adding the new result set.
- 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 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. The steps that follow describe how this page was created.

The screenshot shows the GE Designer interface for configuring a page. The page is titled 'All Species' and is part of the 'Species Management' app. The main content area contains a table with three columns: BirdName, ScientificName, and TypeOfBird. Below the table are two 'Enter text' input boxes, a 'Text: [BirdNameOutput]' label, and a 'Text: [ReptileNameOutput]' label. The right-hand side of the interface shows the 'CONTAINER PROPERTIES' panel with a 'PAGE DATA' tab. The 'Query' is set to 'SQL' and the database is 'PA DB'. The query is 'Get Activities'. The result set is 'Resultset1'. The 'Get All Species.Resultset1' section is expanded, showing options for submission, auto-submit, auto-update, and auto-submit on input change. The row limit is set to 50. The 'Inputs' section lists BirdName, ReptileName, BirdNameOutput, and ReptileNameOutput. The 'Outputs' section lists BirdName and ScientificName.

1. Add two buttons and two input boxes to the page as shown in the following figure, and make the input controls disabled.
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.

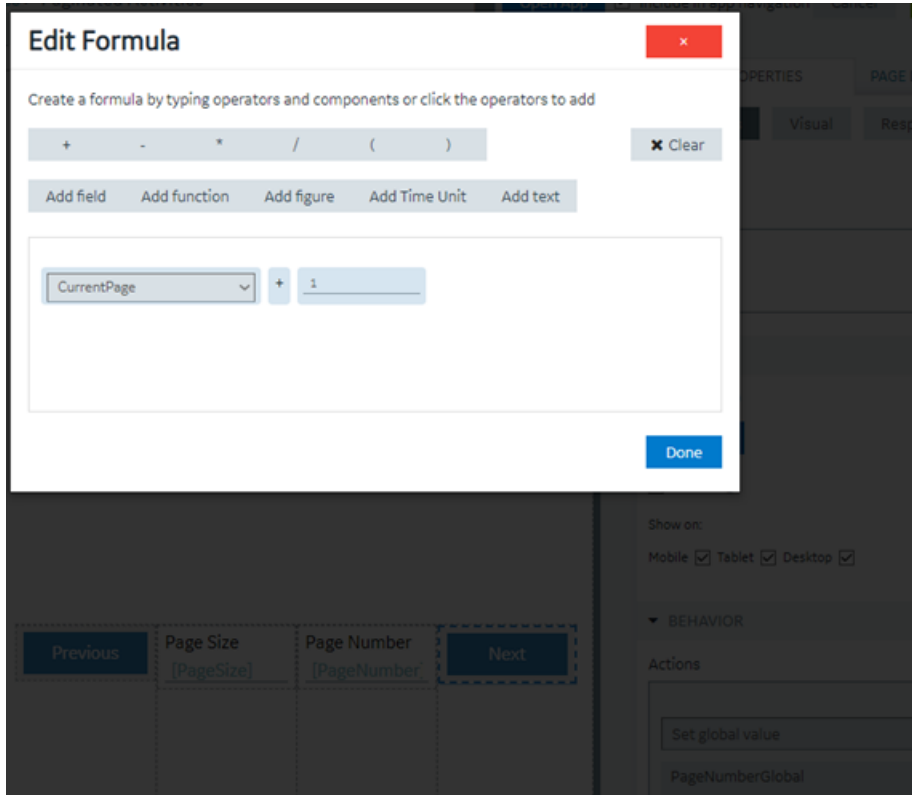
The screenshot shows the GE Designer interface for configuring a paginated activity. The main workspace contains a table with the following data:

Activity	ActivityStatusDesc	ActivityTypeDesc	ProductCode	Title
Table Data	Table Data	Table Data	Table Data	Table Data
Table Data	Table Data	Table Data	Table Data	Table Data
Table Data	Table Data	Table Data	Table Data	Table Data

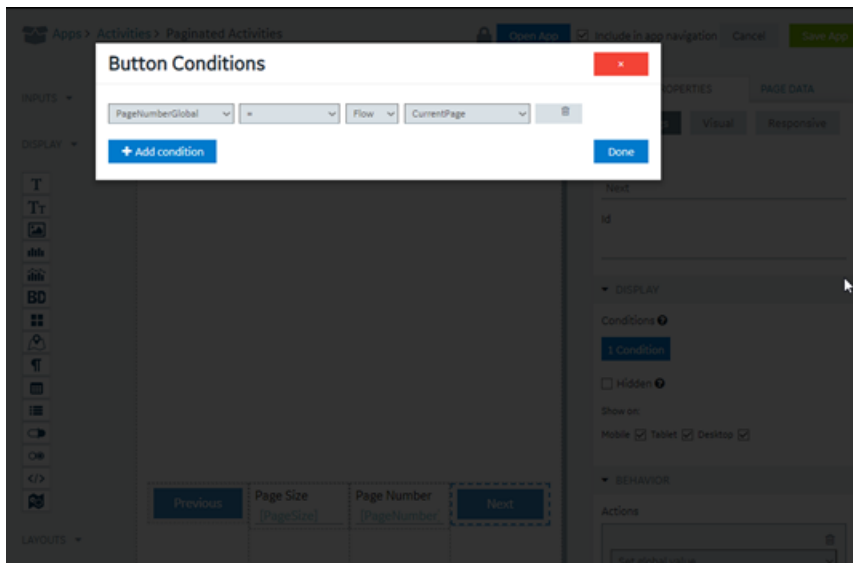
Below the table, there are four buttons: 'Previous', 'Page Size [PageSize]', 'Page Number [PageNumber]', and 'Next'. The right-hand panel shows the 'PAGE DATA' section with the following global variables:

- PageNumberGlobal** (Number): Initial Value 1
- PageSizeGlobal** (Number): Initial Value 10

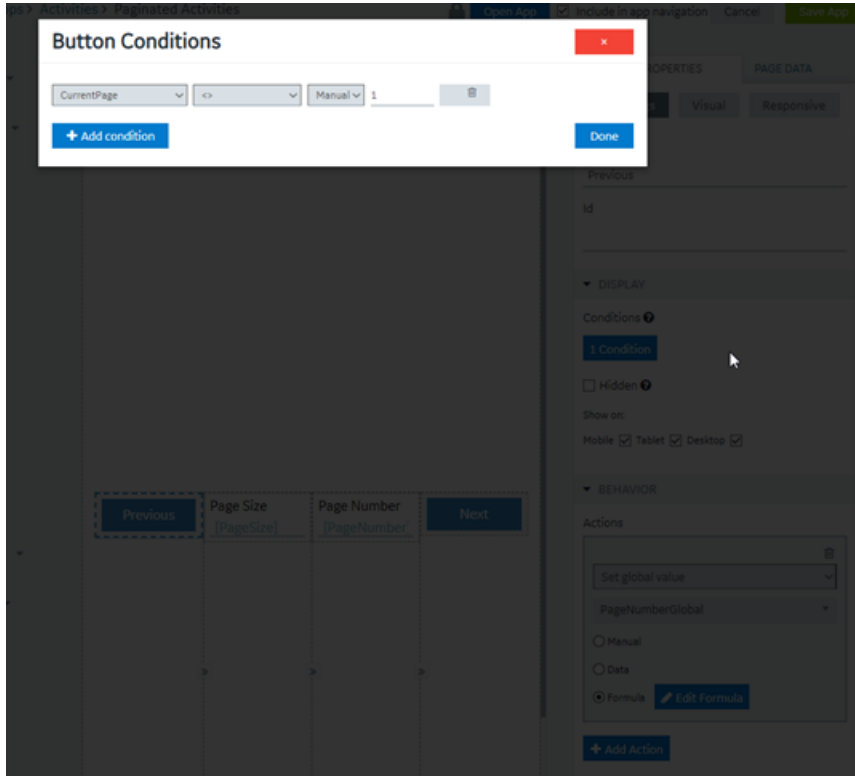
- Select each button and set the action to set the global value using a formula as show in the screenshot (+ for next, - for previous).



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







6. Select **Save App**.

The final page displays as shown in the first figure.

# 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, database tables (called entities), events, email templates, users, 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.

## *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*

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. This topic describes how to grant access to an application for individual users. You can also [grant access to a role \(page 79\)](#).

 **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.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import App [Settings] [Navigation] 1 [Navigation] 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.

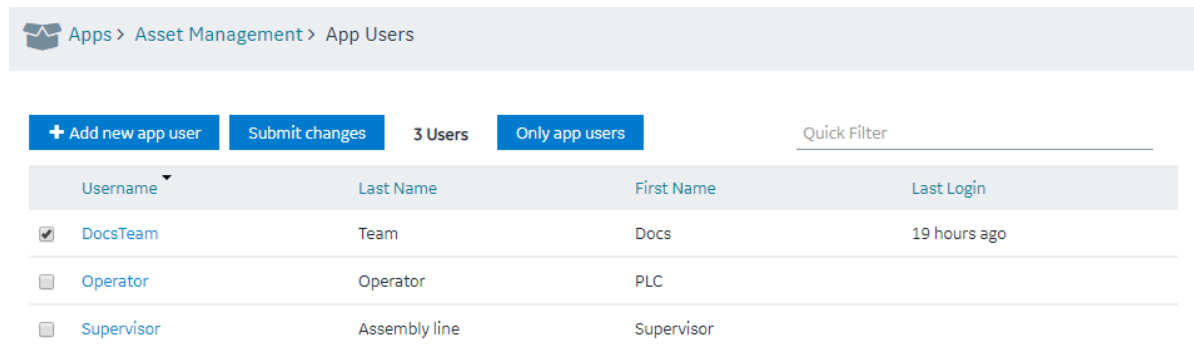
Apps > Asset Management > Pages

+ 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 **APP USERS**.

The **APP USERS** workspace appears, displaying a list of application users created in the site.



The screenshot shows the 'APP USERS' workspace. At the top, there is a breadcrumb trail: 'Apps > Asset Management > App Users'. Below this, there are several buttons: '+ Add new app user', 'Submit changes', '3 Users', and 'Only app users'. To the right of these buttons is a 'Quick Filter' input field. Below the buttons is a table with the following columns: Username, Last Name, First Name, and Last Login. The table contains three rows of data:

Username	Last Name	First Name	Last Login
<input checked="" type="checkbox"/> DocTeam	Team	Docs	19 hours ago
<input type="checkbox"/> Operator	Operator	PLC	
<input type="checkbox"/> Supervisor	Assembly line	Supervisor	

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*

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. This topic describes how to grant access to an application for user groups. You can also grant access to a role ([page](#) ).

 **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.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import App [Settings] [Navigation] 1 [Navigation] 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.

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	

- 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.
- 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

- 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	

- 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.

## Access a Recently Created Application

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 buttons for '+ Add new app', 'Import App', 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. Select **RECENTLY CREATED**.  
A list of the ten most recently created applications appears.



Apps

ALL APPS   RECENTLY CREATED   RECENTLY MODIFIED

+ Add new app   Import App   ⚙️   Quick Filter


<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*

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. Select **RECENTLY MODIFIED**.

A list of the ten most recently modified applications appears.

Apps

ALL APPS RECENTLY CREATED RECENTLY MODIFIED

+ Add new app Import App

Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Asset Management	Manage Devices	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Asset Testing	Test Devices	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"/>	ES Event Map View	Monitor Tags and Events with Map	Yesterday by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Widget font testing 2		18 hours ago by Docs Team	🔒 📄 ⚙️

## Create an Application

This topic describes how to create an application. You can also [copy an application \(page 89\)](#).

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. Select **Add new app**.

The **Create App** window

## Create App ×

App name:

Description:

Cancel
Create

appears.

- 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 \(page 218\)](#).


## Copy an Application


This topic describes how to copy an application. You can also [create an application \(page 87\)](#).

You can copy an application only if it was created in the same site. If, however, you want to copy an application that was created in a different site, you must [export the application \(page 90\)](#), and then [import \(page 92\)](#) it.

1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.

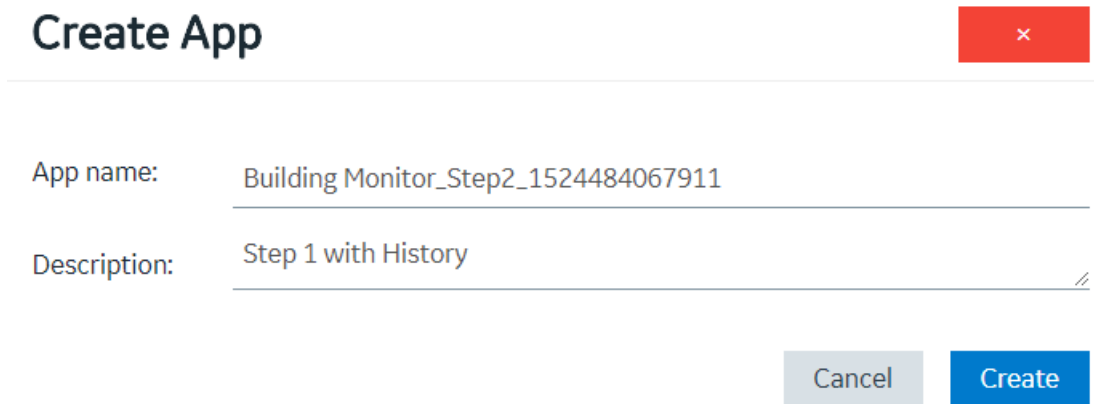
<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Asset Management	Manage Devices	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Asset Testing	Test Devices	3 months ago by Docs Team	🔒 📄 ⚙️
<input type="checkbox"/>	Building Monitor_Step1	Simple Sample App	3 months 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 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.

**i 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:

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*

If you want to use or copy an application that was created using a different site, you must export the application, and then [import \(page 92\)](#) it.


**i Tip:** If you want to export multiple applications that use the same entities and queries, export them together (instead of exporting them individually).































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 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**.

Each application is exported as a .zip file, which contains:

- a .zip file for each plug-in used in the application.
- an .xml file for the rest of the components used in the application.

[Import the application \(page 92\).](#)

## Import an Application

When you import an application, a copy of the application and its components (that is, 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.

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.

[Export the application \(page 90\)](#) that you want to import.

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. 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. Select **Import App**.

4. Navigate to the application (stored as an .xml file) that you want to import, and then select **Open**.

A copy of the selected application is created. The **Pages** workspace appears, displaying a list of pages copied from the original application.

5. Navigate to the application (stored as a .zip file) that you want to import, and then select **Open**.

A copy of the selected application is created. The **Pages** workspace appears, displaying a list of pages copied from the original application.

## *Delete an Application*


- When you delete an application, only the application is deleted; the components used by the application are not deleted.
- You cannot delete an application if it is locked.































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 each row containing an application that you want to delete, select the check box.

3. 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**.

4. Select **OK**.

The applications are deleted.

# 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.




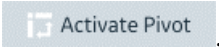
When you create an entity, you must perform the following steps:


1. Define the entity structure. To do so, [add fields \(page 103\)](#) 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 \(page 105\)](#) or [import data from a Microsoft Excel workbook \(page 107\)](#).

## 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 .
- : 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 .

 **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*

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		

- 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

This topic describes how to create an entity. You can also [copy an entity \(page 102\)](#).

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. Select **Add new entity**.  
The **Create Entity** window appears.

## Create Entity



Entity name: \_\_\_\_\_


Create

Cancel

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.

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](#)

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 \(page 105\)](#) or, if needed, [import data in to the entity \(page 107\)](#).

## *Create a Pivot Entity*

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.




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. Select **Add new pivot entity**.  
The **Create Pivot Entity** window appears.

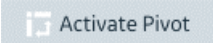
**Create Pivot Entity** ✕

Pivot entity name:

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 \(page 103\)](#) 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*

This topic describes how to copy an entity. You can also [create a new entity \(page 98\)](#).

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. 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.

6. As needed, modify the name of the entity, and then select **OK**.

The selected entity is copied.

## Create a Field in an Entity


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

The **ENTITIES** workspace appears.

The screenshot shows the 'Entities' workspace in a list view. At the top, there are two tabs: 'LIST VIEW' (selected) and 'DESIGNER'. Below the tabs is a navigation bar with a 'Quick Filter' input field and a page indicator showing '1'. There are two buttons: '+ Add new entity' and '+ Add new pivot entity', followed by 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 which you want to create a field.  
A list of fields in the entity appears, along with the data in each 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](#)

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.

5. 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.

6. In the drop-down list box in the **Type** column, modify the type of the field if needed.

7. Select **Save** or **Save and Exit**.

The field is created in the entity.

[Add a row \(page 105\)](#) or [import data in to the entity \(page 107\)](#).

## *Add a Row to an Entity*

As needed, [add fields to the entity \(page 103\)](#).

This topic describes how to add a row and enter data manually in an entity. You can also [import data \(page 107\)](#) 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 with a header bar containing 'LIST VIEW' and 'DESIGNER' tabs. Below the header is a navigation bar with 'Add new entity', 'Add new pivot entity', and a settings gear icon. A table lists various entities with columns for Name, Last updated, and action icons (lock, edit, settings).

<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.

**i 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

This topic describes how to import data in to an entity from a Microsoft Excel workbook. You can also [add a row manually in the entity \(page 105\)](#).

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. 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 ✕

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

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.

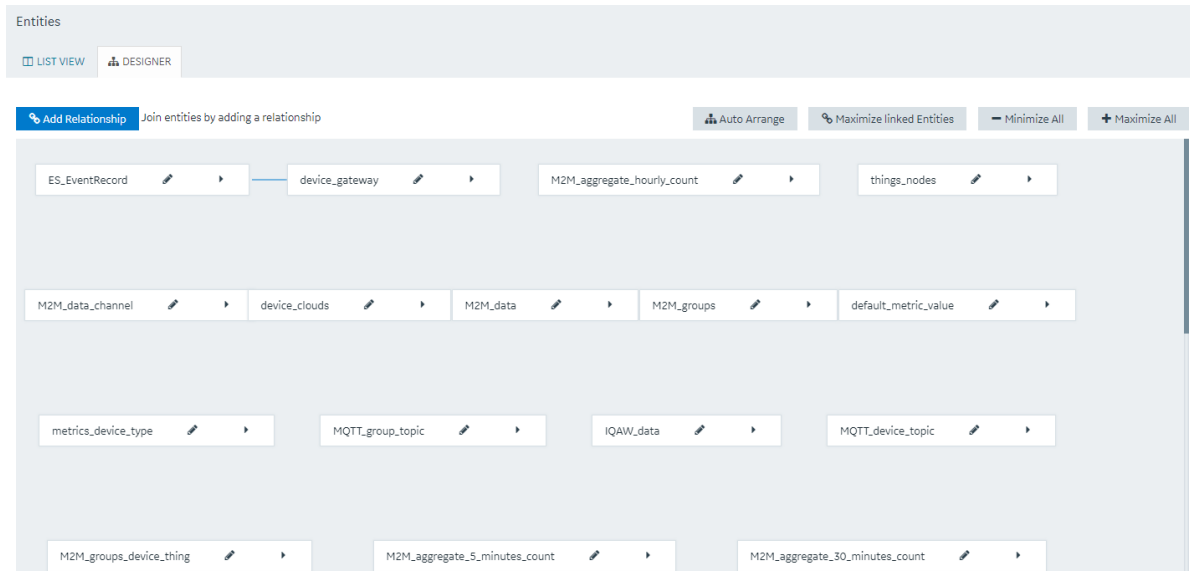
The screenshot displays the 'Entities' workspace. At the top, there are two tabs: 'LIST VIEW' (selected) and 'DESIGNER'. Below the tabs, there are navigation arrows and a 'Quick Filter' input field. A toolbar contains three buttons: '+ Add new entity', '+ Add new pivot entity', and a settings gear icon. The main area is a table with the following 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. **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.



**i 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.

4. Next to each entity for which you want to create a relationship, select ▾.

A list of fields in each entity appears.

5. 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*


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
































The **ENTITIES** workspace appears.

Entities

LIST VIEW  DESIGNER

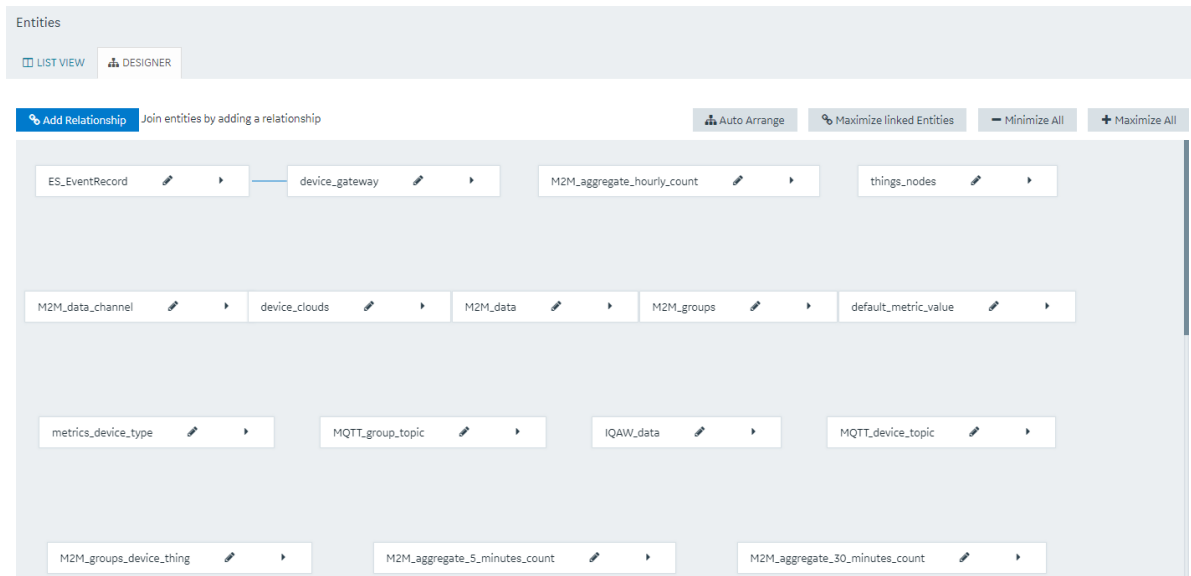
« ‹ 1 › » Quick Filter

[+ 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. 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.



3. On the line connecting the two entities whose relationship you want to delete, select **X**.  
A message appears, asking you to confirm that you want to delete the relationship.
4. Select **OK**.  
The relationship is deleted.

### *Delete a Row from an Entity*

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.

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. Select the entity from which you want to delete a row.

3. 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

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.

Entities

LIST VIEW  DESIGNER

« ‹ 1 › » 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. 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

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.

- 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. 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 an Operations Hub, as well data stored externally.

You can create the following types of queries:

- **Entity Queries:** Used to view and modify data store in Operations Hub entities.
- **SQL Queries:** Used to view and modify data stored in an external SQL database by executing existing stored procedures for that database.
- **REST Queries:** Used to view and modify data stored in external sources by accessing their exposed REST APIs, such as Historian.

## Grant Group Access to Execute a Query


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 Groups” 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

1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.


Queries

+ Add new query 

« ‹ 1 › » Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	  
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	  

- 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 a Get Query































This topic describes how to create a Get query. You can also [copy a query \(page 144\)](#).

- In the main navigation menu, select **QUERIES**. The **QUERIES** workspace appears.

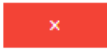
Queries

[+ Add new query](#) 

« ‹ 1 › » Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	  
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	  

2. Select **Add new query**.  
The **Create Query** window appears.

**Create Query** 

Query name: \_\_\_\_\_

[Create](#) [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 **Get**.
6. In the **Entity** box, select an entity from which you want to get results.  
The **Output Data**, **Conditions**, **Role Conditions**, and **Advanced** sections appear.

Queries > DeviceList

Description: \_\_\_\_\_

Query Type:

Get

Update

Insert

Delete

Entity: device\_gateway

Output Data


[+ Add field](#) [+ Add all fields](#)

Conditions


[+ Add](#)

Role Conditions

7. In the **Output Data** section, select **Add field**.  
The **FIELD**, **FUNCTION**, and **ACCESS** boxes appear.

 **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	Description
<b>FIELD</b>	Select the field whose values you want to get using the query.  <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.
<b>FUNCTION</b>	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.

Field	Description
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	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 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.
Operator	Select the conditional operator that you want to use to compare the value in the selected field.

Field	Description
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 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.</li> </ul>

10. In the **Role Conditions** section, select **Add role condition**, and then enter or select values as specified in the following table.

Field	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: <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> </ul> </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>Select the entity field that contains the value that you want to compare with the value in the <b>In user's role tree</b> box. This box appears only if the value in the <b>Row visibility</b> box is <b>Filter rows</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	Description
Distinct	<p>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.</p>

Field	Description
<b>Order By</b>	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.
<b>Group By</b>	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. In the **Order By** box, select the entity field that stores the user name, and then select **Asc**.
- b. In the **Group By** box, select the entity field that stores the country.

12. Select **Save** or **Save And Exit**.

The query is created.


## *Create an Update Query*

This topic describes how to create an Update query. You can also [copy a query \(page 144\)](#).































1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.



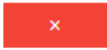
Queries

[+ Add new query](#) 

« 1 » Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	  
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	  

2. Select **Add new query**.  
The **Create Query** window appears.

**Create Query** 

Query name: \_\_\_\_\_

[Create](#) [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	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 account number is not specified, then all the fields will be updated. Therefore, use caution when selecting this value.</li></ul> <p> <b>Important:</b> Exercise extreme caution while selecting <b>Optional</b>. If used incorrectly, it can corrupt the data.</p>
Field	<p>Select the entity field based on which you want to create a condition.</p>
Operator	<p>Select the operator that you want to use to compare the value in the text box if <b>Input Field</b> is selected.</p>

Field	Description
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>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: <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 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	Description
Entity field	Select the entity field whose values you want to update using the query.

Field	Description
<b>Value</b>	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>
<b>Input Data Name</b>	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.
<b>Name</b>	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 an Insert Query*































This topic describes how to create an Insert query. You can also [copy a query \(page 144\)](#).

1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.


Queries

[+ Add new query](#) 

« 1 » Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	  
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	  

2. Select **Add new query**.  
The **Create Query** window appears.

**Create Query** 

Query name: \_\_\_\_\_

[Create](#) [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 **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

+ Add + Add all fields

Cancel Save Save As New Save And Exit

7. In the **Set Data** section, select **Add**, and then enter or select values as described in the following table.

Field	Description
<b>Entity field</b>	Select the entity field whose values you want to insert using the query.
<b>Value</b>	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>
<b>Input Data Name</b>	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.
<b>Name</b>	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 a Delete Query

1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.

Queries

+ Add new query ⚙️ ⏪ 1 ⏩ Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	🔒 ✎ ⚙️
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	🔒 ✎ ⚙️
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	🔒 ✎ ⚙️
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	🔒 ✎ ⚙️
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	🔒 ✎ ⚙️
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	🔒 ✎ ⚙️
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	🔒 ✎ ⚙️
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	🔒 ✎ ⚙️
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	🔒 ✎ ⚙️
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	🔒 ✎ ⚙️

2. Select **Add new query**.  
The **Create Query** window

**Create Query** ✕

Query name: \_\_\_\_\_

Create Cancel

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.



- In the **Query Type** box, select **Delete**.
- 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

- In the **Conditions** section, select **Add**, and then enter or select values as specified in the following table.

Field	Description
<b>Required or Optional</b>	<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 account number is not specified, the all the records are deleted.</li> </ul> <p><b>!</b> <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>

Field	Description
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: <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 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> </ul> <p>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: <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 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 a SQL Query

This topic describes how to create a SQL query. To use a relational database in an Operations Hub application, you must:

- [Create a Data Source \(page 208\)](#) 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 \(page 70\)](#).

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.

1. In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	

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 selects 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.

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.

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.

10. Add the required fields.

The following figure displays an example:

**Designer**

< New Query

Name: Get All Species

Description:

Type: Database

Data Source: SQL DB

Query Type: Stored Procedure

Schema: Species

Stored Procedure: GetAllSpecies

**Input Parameters**

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

**Output Parameters**

Key	Datatype
BirdNameOutput	VARCHAR
ReptileNameOutput	VARCHAR

**Test**

Execute

Resultset1

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

Resultset2

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

OutputParameter

BirdNameOutput(VARCHAR) ReptileNameOutput(VARCHAR)

**Output Data**

+ Add field + Add all fields

**Output Data**

+ Add field + Add all fields

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

Cancel Save Save As New Save And Exit



11. Select **Save** or **Save And Exit**.  
The query is created.


## Create a REST Query

You can create a REST query for the GET, PUT, POST, and DELETE methods.

- [Create the data source \(page 208\)](#) that you want to use in the query.
- [Create an entity \(page 98\)](#) 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 the System Variables. You should also add references to localhost as well as nodes which are targets of REST Queries to the System Variables. Be aware that the case of the environment variables for the a data source target in Operations Hub should match the case of the ones used by the Historian Server; environment variables are case-sensitive.

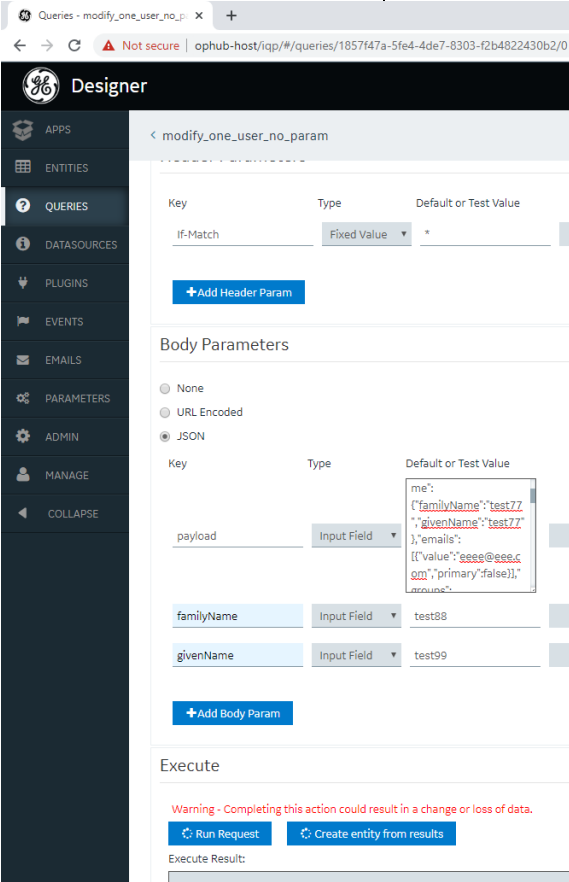
1. In the module navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.
2. Select **Add new query**.  
The **Create Query** window appears.
3. In the **Query name** box, enter a name, and then select **Create**. The name must contain at least one uppercase or lowercase letter.  
The available options for creating the query appear.
4. Provide values in the available boxes as specified in the following table.

<b>Box</b>	<b>Description</b>
<b>Description</b>	Enter a description for the query.
<b>Type</b>	Select <b>REST</b> .
<b>Method</b>	Select the method of the API you want to use in the query. Supported methods are GET, PUT, POST, and DELETE.
<b>Entity</b>	Select the entity that will specify the query response fields.   <b>Note:</b> When using a Historian data source, the Entity field will auto-populate with the entity associated with the Available API selected.
<b>Data Source</b>	Select the data source that you want to use for the query.
<b>Available API</b>	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.  The list of available APIs will be filtered based on the method selected.   <b>Note:</b> Pre-existing APIs are available only for Historian data sources. For more information see: the <a href="#">Historian API help</a> .

 **Note:** The **Base URL** and **Query URL** boxes 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 **Base URL** box is always disabled. The **Query URL** box is disabled if you select an API for a Historiana data source. If, however, you are using a custom data source, you can enter a value in the **Query URL** box.

5. In the **Parameters** section, please 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.

Type of Parameter	Description	Example
Path parameters	Identify the parameters in the path of the endpoint. These appear before the query string if query parameters are present.	For the endpoint <code>https://jsonplaceholder.typicode.com/users/1/posts</code> , the parameter between <code>users</code> and <code>posts</code> , which is the user ID, is the path parameter. The value for this parameter is 1.
Query parameters	Identify the parameters in the path of the endpoint that appear after the question mark (?).	For the endpoint <code>https://jsonplaceholder.typicode.com/posts?userId=1</code> , <code>userId</code> is the query parameter. The value for this parameter is 1.
Header parameters	Identify the parameters that you want to include in the request header. Typically, these parameters are related to authorization.	

Type of Parameter	Description	Example
<p>Body parameters</p>	<p>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.</p> <p>Body parameters can be supplied in Operations Hub as either a URL encoded format, or JSON. In the case JSON 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.</p>	

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 > Sampled Data
- Post > Calculated Data
- Post > Interpolated Data

6. In the **Query Outputs** section, provide values as specified in the following table.

Box	Description
<p><b>Raw JSON</b></p>	<p>Select this check box if you want the entire JSON 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>
<p><b>Entity</b></p>	<p>Select the entity that will specify the query response fields.</p>




Box	Description
<b>Output fields</b>	Select the entity fields that you want to map to the query response. If the <b>Raw JSON</b> check box is selected, only the first field that you select will be mapped to the query response, regardless of the field name. If the <b>Raw JSON</b> check box is cleared, the JSON response components are mapped to the entity fields with matching names. In the case of nested responses, dot notation is used to map to inner fields.

 **Note:** All REST queries must have a defined response. You can save the query only if you specify at least one output. This is true even for Delete REST API calls which do not normally return a response. In this case, please select any entity and entity field, regardless of name.

7. 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.

8. If required, select **Create Entity** from Results. This will create an entity with the appropriate output fields generated from the previous Run Request.

9. Select **Save** or **Save and Exit**.

The 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
```

## Update Preloaded REST Queries after Import

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.

Queries

+ Add new query

« ‹ 1 › » Quick Filter

<input type="checkbox"/>	Name	Description	Last updated			
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team			
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team			
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team			
<input type="checkbox"/>	Map_GetLastEVLighValue		Yesterday Docs Team			
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team			
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team			
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team			
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team			
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team			
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team			

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

<b>v1.5 API Name</b>	<b>v1.6 API Name</b>
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*

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.

Queries

+ Add new query 

« 1 » Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	  
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	  

- 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.
- 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


- Select **Save** or **Save and Exit** to save your changes. The entity display field is updated.

## Copy a Query































This topic describes how to copy a query. You can also [create a query \(page 118\)](#).

- In the main navigation menu, select **QUERIES**. The **QUERIES** workspace appears.

Queries

+ Add new query 

« 1 » Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	  
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	  


- In the row containing the query that you want to copy, select the link.
- As needed, modify values in the available fields, and then select **Save As New**.  
The **Please enter new name** window appears, displaying the name of the query that you have selected, appended with a system-generated value.
- As needed, modify the name of the query, and then select **OK**. The name must contain at least one uppercase or lowercase letter.  
The selected query is copied.

## Delete a Query































You cannot delete a query if it is locked or used in an application.


- In the main navigation menu, select **QUERIES**.  
The **QUERIES** workspace appears.



Queries

+ Add new query 

« ‹ 1 › » Quick Filter

<input type="checkbox"/>	Name	Description	Last updated	
<input type="checkbox"/>	Map_GetMetricHistory		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetDeviceEvents		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVHumidityValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVLightValue		Yesterday Docs Team	  
<input type="checkbox"/>	ES_InsertEvent		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastEVTempValue		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetMetricList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetDeviceList		Yesterday Docs Team	  
<input type="checkbox"/>	Map_GetLastLocation		Yesterday Docs Team	  
<input type="checkbox"/>	ES_GetPivotData		Yesterday Docs Team	  

- In the rows containing the queries that you want to delete, select the check boxes.
- 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**.

- 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.

To create a custom plug-in, refer to [Custom Plug-In structure \(page 152\)](#)

## 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

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

1. In the main navigation menu, select **PLUGINS**.  
The **PLUGINS** workspace appears.

Plugins Management

[+ Import](#)

Name	Category	Version			
Boilerplate	Visualization				
LiquidGauge	Visualization	1.0.0			
Neon Gauge	Visualization	0.0.2			

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.

In the page designer of an application, the imported plug-in appears in the **CUSTOM** section.

[Use the plug-in in an application \(page 148\)](#).

## *Use a Plug-in in an Application*

[Import the plug-in \(page 147\)](#) that you want to use in an application.

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	🔒 ↗️ ⚙️

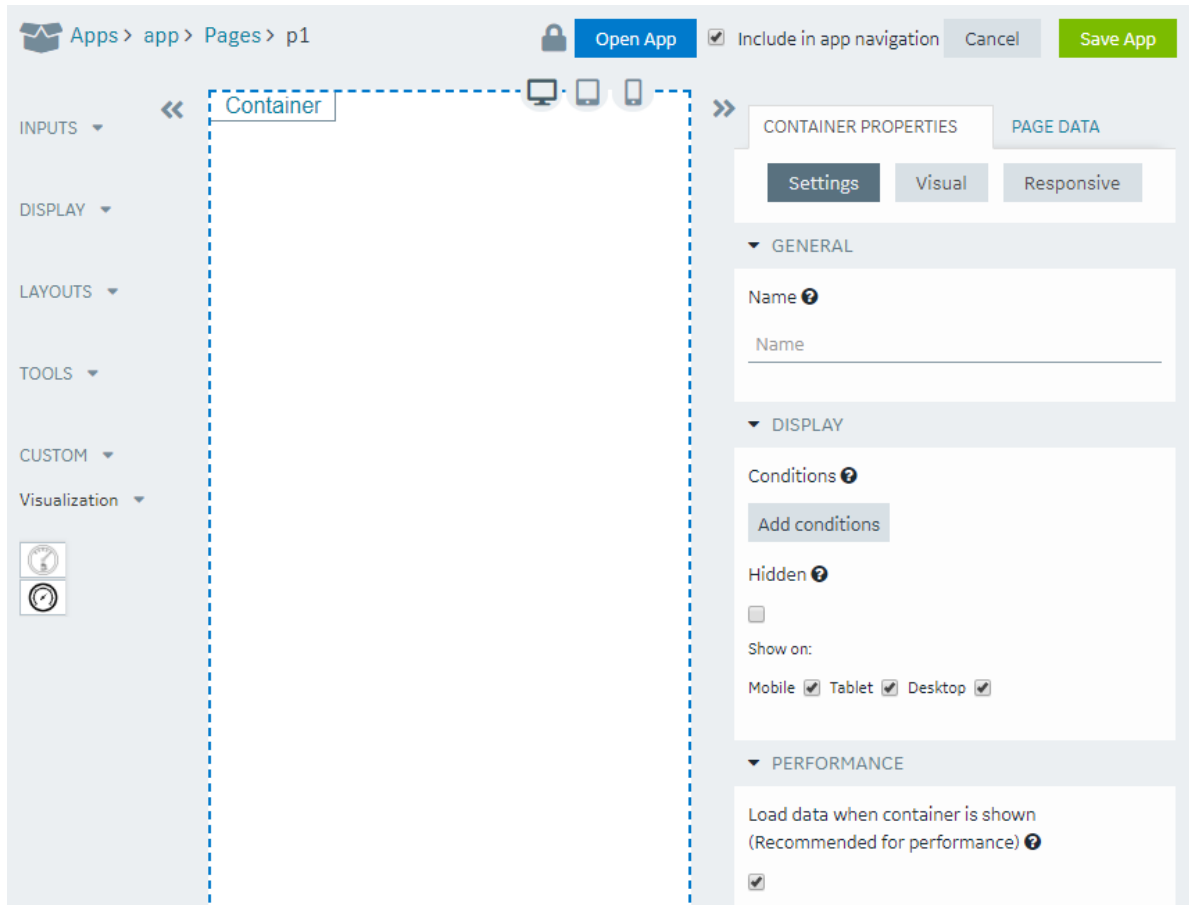
2. In the **Name** column, select the application in which you want to use the plug-in. The **PAGES** workspace appears, displaying a list of pages created in the application.

Apps > Asset Management > Pages

+ Add new page ⚙️ 🔒 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	⚙️










- 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*










- In the main navigation menu, select **PLUGINS**.  
The **PLUGINS** workspace appears.


Plugins Management			
<a href="#">+ Import</a>			
Name	Category	Version	
Boilerplate	Visualization		  
LiquidGauge	Visualization	1.0.0	  
Neon Gauge	Visualization	0.0.2	  

- 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

- 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	  

- 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


A plug-in must contain the following components:

- `index.html`: Contains the plug-in html code.
- `main.js`: Contains the plug-in javascript code.
- `manifest.json`: Contains the plug-in configuration details.
- `style.css`: Contains the plug-in stylesheet details.
- The `scripts` folder: Contains external scripts.


This topic describes the content to include in each of these components to create a plug-in.

### 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.
<code>pluginId</code> [String]	The unique ID of the plug-in. The value for this parameter must be a long, random one.

Parameter	Description
Type [String]	The type of the plug-in.
category [String]	The category of the plug-in.
Description [String]	The description of the plug-in. This value appears in Operations Hub when you design an application to include the plug-in.
info	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>
scripts [Array]	The array for the scripts that you want to use in the plug-in.
customIcon [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.
origin [String]	The origin of the plug-in. Provide the value custom for this parameter.
placeholder [String]	A placeholder for the plug-in, which will appear in Operations Hub when designing an application to include the plug-in.
preview [String]	The picture preview of the plug-in that will appear in Operations Hub when designing an application to include the plug-in.
fieldsDescription [Object]	The plug-in description for informational messages.
isNotAllowToAddFields [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 true.
schema{}	An array of the following types of schema: <ul style="list-style-type: none"> <li>• JSONSchema{}</li> <li>• UISchema{}</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>
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. The following table provides the methods used in EMBED.

Method	Description
EMBED.getRootElement()	Returns the jqLite element, which must be used as the mounting point of the root element of the plug-in.
EMBED.onChangeData(callback)	This method is a general data change listener. callback - function, which is invoked with one argument every time when data change event is triggered.
EMBED.getData()	Returns existing page data.

The following table provides the four main methods to work with the Data Source and Data Target fields.

Method	Description
EMBED.subscribeFieldToQueryChange(field, callback)	Field object: Data Source Callback: Function that is invoked when query change event received. Callback is invoked with one argument, which is a data selection as per field configuration.
EMBED.subscribeFieldToGlobalChange(field, callback)	Field object: Data Source Callback: Function that is invoked when global change event received. Callback is invoked with one argument, which is a global data as per field configuration.
EMBED.subscribeFieldToDataChange(field, callback)	Field object: Data Source Callback: Function that is invoked when global or query change event received.
EMBED.submitTarget(field, value)	Field object: Data Target Value: javascript primitives or Object/Array This method targets the input of a query or a global variable, as per field configuration.

## *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*

1. In the main navigation menu, select **EVENTS**.  
The **EVENTS** workspace appears.



Events			
+ Add new event		Quick Filter	
<input type="checkbox"/>	Name	Last updated	
<input type="checkbox"/>	ES_HighHumidity	Yesterday by Docs Team	⚙️
<input type="checkbox"/>	ES_HighTemp	Yesterday by Docs Team	⚙️

- 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.

**i** **Tip:** You can modify values in the available fields, and then select **Save** or **Save And Exit**.

## Create a Trigger Based on an Entity

This topic describes how to create a trigger based on conditions on values stored in an entity. You can also [create a trigger based on conditions on values received from a device \(page 157\)](#).

- [Access the event \(page 156\)](#) for which you want to create a trigger.
- Select **Add Entity Condition**.  
The **Entity** and **Condition** sections

### Trigger

Entity Name			
1. Entity	Select		🗑️
Condition:	Entity Field	Operator	Value
	Select	=	_____ <input type="checkbox"/> Allow End User to set value

+ Add Entity Condition

+ Add Device Condition

appear.

- 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 \(page 157\)](#).

## *Create a Trigger Based on 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.

This topic describes how to create a trigger based on conditions on values received from a device. 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 \(page 157\)](#).

1. [Access the event \(page 156\)](#) 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
MyDeviceType	Any	Any	All devices of the type MyDeviceType.
MyDeviceType	MyGroup	Any	All devices in the group MyGroup.
MyDeviceType	MyGroup	MyDevice	The device named MyDevice.

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 \(page 158\)](#).

## Create an Action to Send an Email

This topic describes how to create an action to send an email. You can also create an action to perform the following steps:

- [Run a query \(page 161\)](#)
- [Send a command to a device \(page 162\)](#)

Create a trigger based on an [entity condition \(page 157\)](#) or a [device condition \(page 158\)](#).

1. [Access the event \(page 156\)](#) for which you want to create an action.
2. Select **Send e-mail**.  
The **Send an E-mail** section

**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:  [+ Create Email Template](#)

Scheduler  Take action only on initial trigger  Take action on every trigger

appears.

3. Enter or select values as specified in the following table.

Field	Description
<b>Recipient's address</b>	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.
<b>Allow End User to set e-mail address</b>	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.
<b>Add Query Recipients</b>	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.

Field	Description
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 (page 166)</a> , select <b>Create Email Template</b> , enter values as needed, and then select <b>Save and Return</b> .
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.

## *Create an Action to Run a Query*

This topic describes how to create an action to run a query. You can also create an action to:

- [Send an email \(page 160\)](#)
- [Send a command to a device \(page 162\)](#)

Create a trigger based on an [entity condition \(page 157\)](#) or a [device condition \(page 158\)](#).

1. [Access the event \(page 156\)](#) 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	Description
<b>Query</b>	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.
<b>Scheduler</b>	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. 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, 45, and 42.</li> </ul>

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*

This topic describes how to create an action to send a command to a device. You can also create an action to:

- [Run a query \(page 161\)](#)
- [Send an email \(page 160\)](#)

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 \(page 157\)](#) or a [device condition \(page 158\)](#).

1. [Access the event \(page 156\)](#) for which you want to create an action.

2. Select **Send Command to Device**.

The **Send a command to a device** section

#### Send a command to a device

Function: Function Name

Select ▼

Scheduler  Take action only on initial trigger  Take action on every trigger

appears.

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

Option	Description
<b>Function</b>	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.
<b>Input Source</b>	Select <b>Fixed value</b> if you want to send a fixed value to the device when the event is triggered.
<b>Value</b>	Enter the fixed value that you want to send to the device when the event is triggered.
<b>Allow End User to set value</b>	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.

Option	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 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

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.

<input type="checkbox"/>	Name	Last updated	⚙️
<input type="checkbox"/>	ES_HighHumidity	Yesterday by Docs Team	⚙️
<input type="checkbox"/>	ES_HighTemp	Yesterday by Docs Team	⚙️

2. In the rows containing the events that you want to delete, select the check boxes.



- 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**.

- 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

- 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	

- 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


This topic describes how to create an email template. You can also [copy an email template \(page 167\)](#).

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.

## Create Email Template

Email Template Name:

**Create** Cancel

- 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.
- In the **Subject**, **Body**, and **URL** sections, select the options for which you want to add details.



Option	Description
<b>Add Text</b>	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.
<b>Add Parameter</b>	<a href="#">Parameters (page 169)</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.
<b>Add Paragraph</b>	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.
<b>Add Newline</b>	When you select <b>Add Newline</b> , a line appears after the current element.

- As needed, in the **URL** section, enter a URL that you want to include in the email template.
- Select **Save** or **Save And Exit**.  
The email template is created.

## Copy an Email Template

This topic describes how to copy an email template. You can also [create an email template \(page 166\)](#).

- In the main navigation menu, select **EMAILS**.  
The **EMAILS** workspace appears.

Email Templates		
<a href="#">+ Add new email template</a> 		Quick Filter
<input type="checkbox"/>	Name	Last updated
<input type="checkbox"/>	HighTemp	1 hour ago Docs Team 

- In the row containing the email template that you want to copy, select the link. The email template appears.

Email Templates > HighTemp

---

Subject

[Add text](#) [Add Parameter](#)

[Alert]: High tempe

---

Body

[Add text](#) [Add Parameter](#) [Add Paragraph](#) [Add Newline](#)

Temperature in the

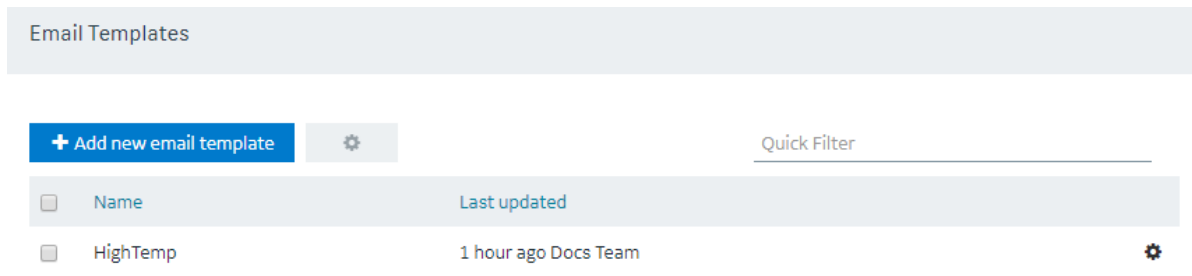
- Modify the email template as needed, and then select **Save As New**. A window appears, asking you to enter a name for the email template. By default, the name contains the name of the original email template, appended with a system-generated value.


4. Modify the default name, and then select **OK**.  
The email template is copied.



## Delete an Email Template

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.



2. 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**.

3. 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.

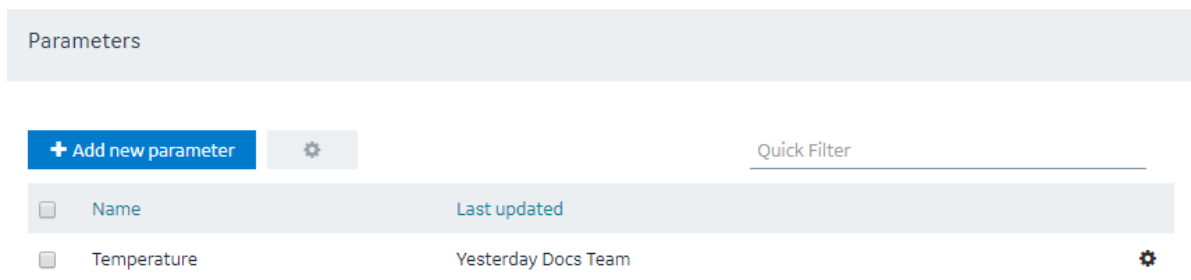
- **From Query:** Stores the results of a Get query with inputs from event time values. This allows you to retrieve additional data about the device or entity that triggered the event from another entity on the system.

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*

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


This topic describes how to create a parameter. You can also [copy a parameter \(page 173\)](#).

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.

## Create Parameter



Parameter name: \_\_\_\_\_

Create

Cancel

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.

Parameters > Temperature

Select Existing Parameter ▾

Value Source

Fixed 24

Event Variable

From Query

Cancel

Save

Save As New

Save And Exit

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


### Option

**Fixed**

### Description

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.



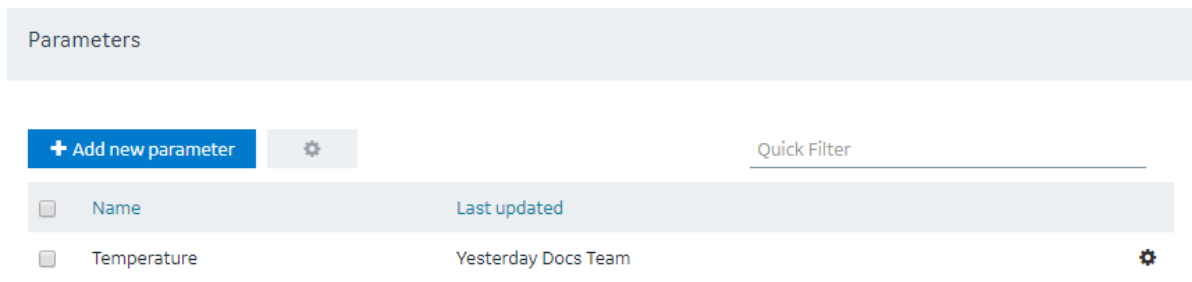
Option	Description
Event Variable	<p>Select this option if you want to create a parameter using an event variable, and then select values in the <b>Select Event</b>, <b>Event Condition</b>, and <b>Condition Value</b> boxes that appear.</p> <ul style="list-style-type: none"> <li>• <b>Select Event:</b> 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> <p> <b>Note:</b> The query that you want to use in a parameter should return only a single value.</p>

5. Select **Save** or **Save And Exit**.  
The parameter is created.

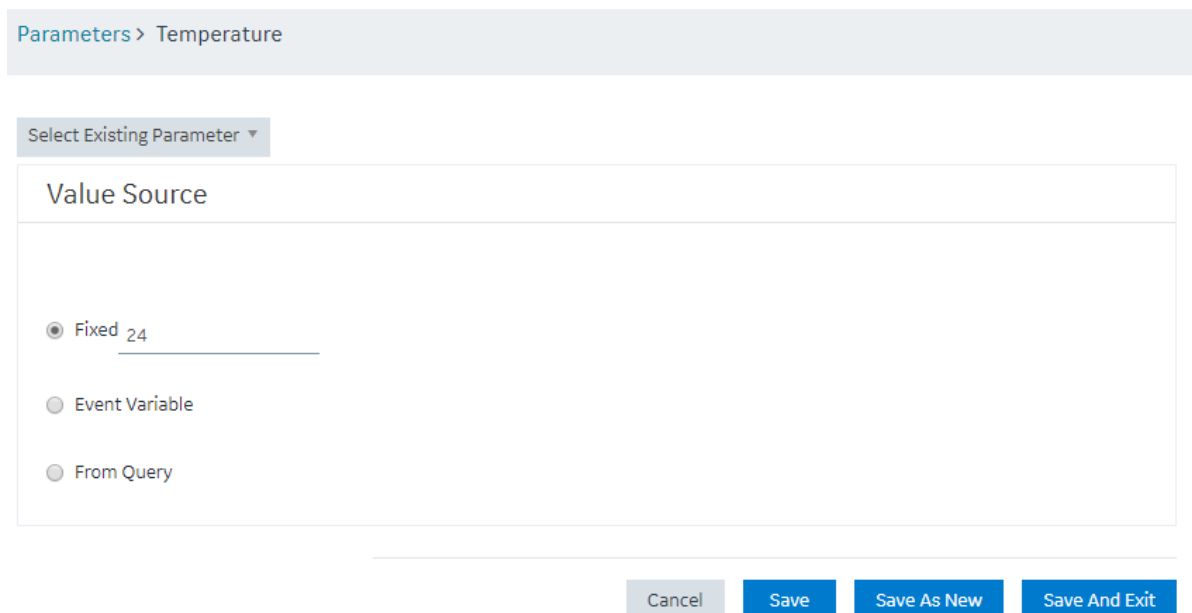
## Copy a Parameter

This topic describes how to copy a parameter. You can also [create a parameter \(page 173\)](#).

1. In the main navigation menu, select **PARAMETERS**.  
The **PARAMETERS** workspace appears.



2. In the row containing the parameter that you want to copy, select the link.  
The workspace for the parameter appears.






3. 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.
4. Modify the name of the parameter, and then select **OK**.  
The parameter is copied.

## *Delete a Parameter*

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

- In the rows containing the parameters that you want to delete, select the check boxes.
- 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**.

- 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.

### Access a User

- 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

- 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

- 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** ×

---

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

Only a tenant administrator can create and manage developers.

1. In the main navigation menu, select **MANAGE**, and then select **Developers** or **App Users**.
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	Description
<b>Username</b>	Enter the user name that the user will use to log in to Operations Hub. The value must be unique.
<b>E-mail</b>	Enter the email ID of the user. The value must be unique.
<b>First Name</b>	Enter the first name of the user.
<b>Last Name</b>	Enter the last name of the user.
<b>Password</b>	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>
<b>Repeat Password</b>	Enter the password that you have entered in the Password field.
<b>Only GE Groups</b>	Select this check box if you only want to view groups associated with GE products in the Groups list box.
<b>Groups</b>	Select the UAA group that you want to assign to this user.

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*

This topic describes how to grant access to a role. You can also [grant access to an application \(page 79\)](#).

1. In the main navigation menu, select **MANAGE**, and then select **App Users**.

The **App Users** workspace appears, displaying a list of application users.

App Users		
<a href="#">+ Add new app user</a>	3 Users	Quick Filter
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 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

- In the **Apps** box, select the applications to which you want to grant access to the user.
- 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.

**i 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.

- Select **Save**.

The user can now access the selected applications, categories, and groups.

## Revoke Access to an Application

1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.

The screenshot shows the 'Apps' workspace with the following table of applications:

<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 revoke access.  
The **PAGES** workspace appears.



Apps > Asset Management > Pages

+ Add new page    ⚙️    🔒    [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 **APP USERS**.

The **APP USERS** workspace appears, displaying a list of application users created in the site.

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

4. 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*

You cannot delete your user account.

1. In the main navigation menu, select **MANAGE**, and then select **App Users**.

The **App Users** workspace appears.

Apps > Asset Management > App Users

+ Add new app user   Submit changes   3 Users   Only app users   Quick Filter

Username	Last Name	First Name	Last Login
<input checked="" type="checkbox"/> DocsTeam	Team	Docs	19 hours ago
<input type="checkbox"/> Operator	Operator	PLC	
<input type="checkbox"/> Supervisor	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

- Select **Delete**.

A message appears, asking you to confirm that you want to delete the user.

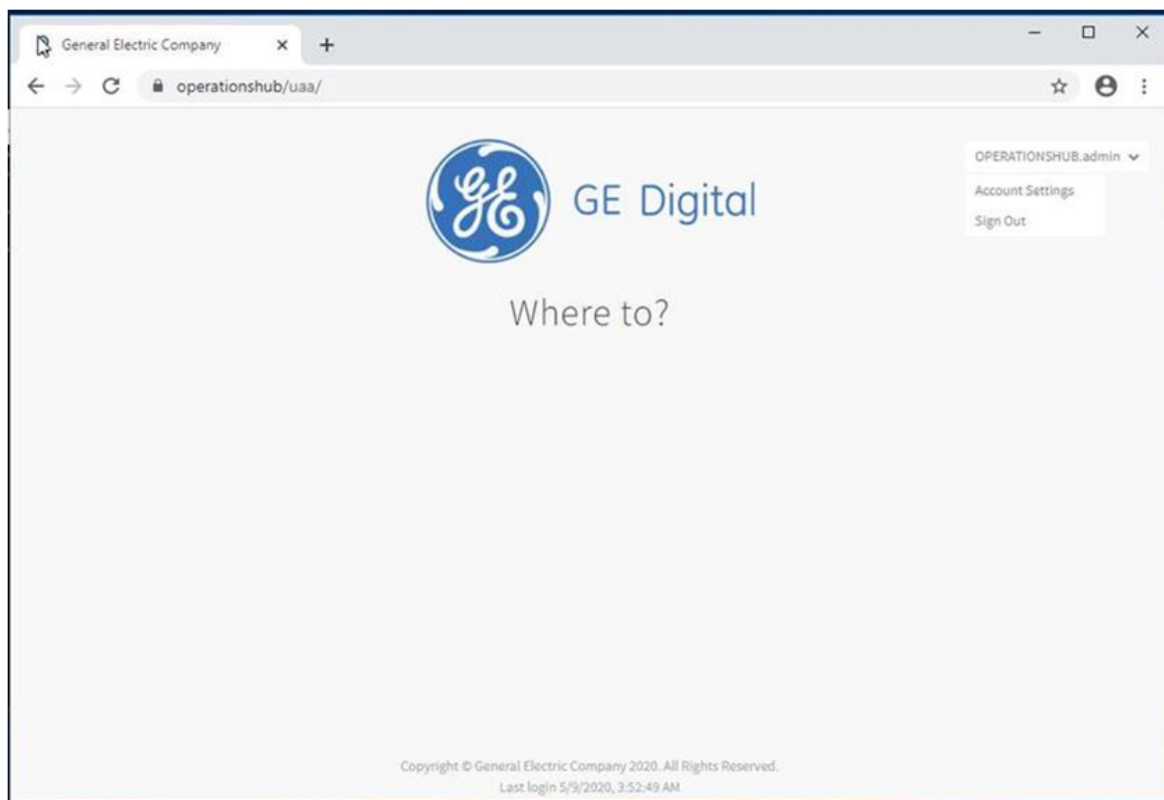
4. Select **OK**.

The user is deleted.

## *Change Your Password*

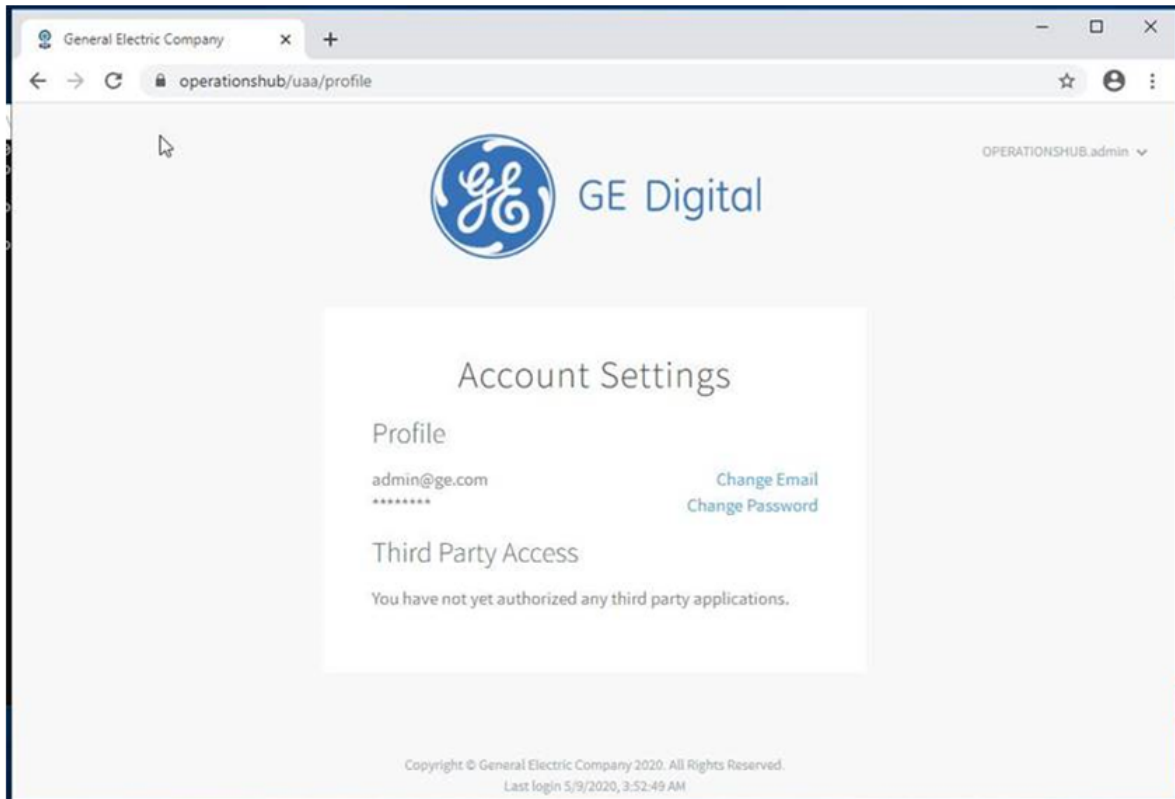
If a user wants to change his or her password in Operations Hub, use the following steps to do so.

1. Log out of all instances of Operations Hub, and close your browser.
2. Reopen your browser, and go to this page: <https://machineName/uaa/login>.  
The following screen appears.



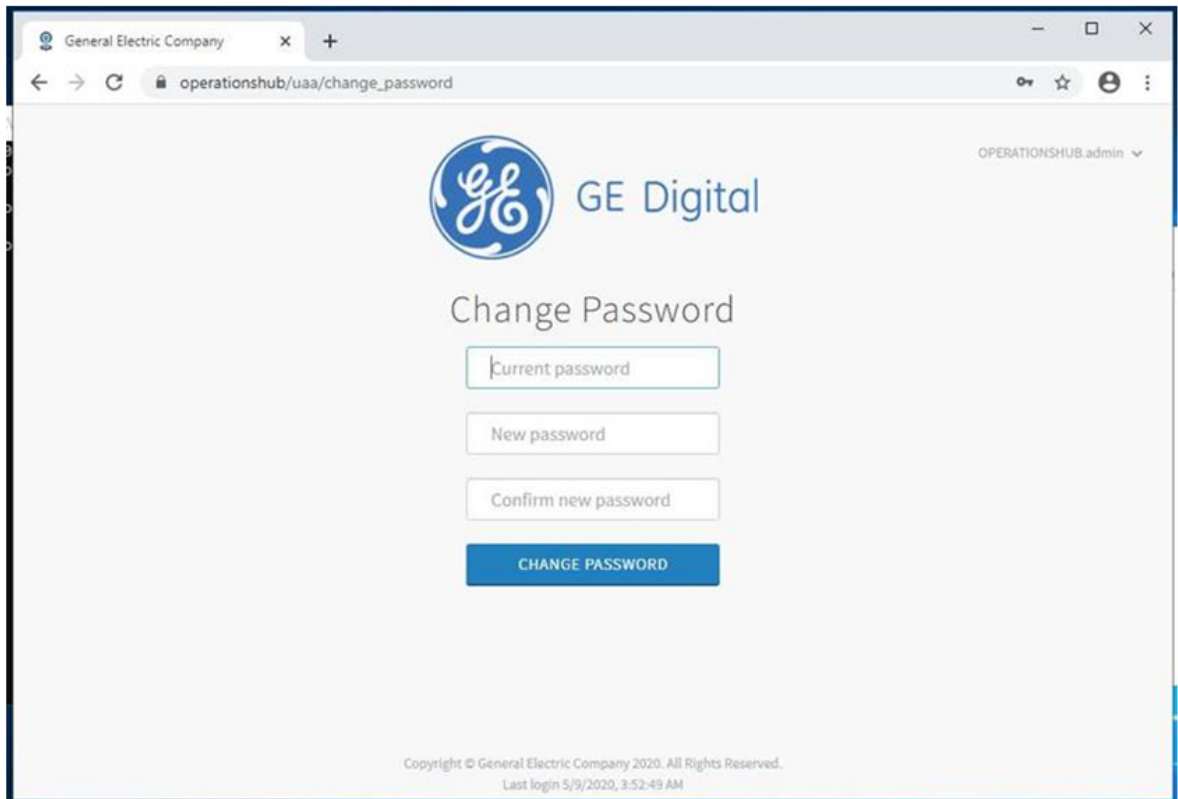
3. In the upper right-hand corner of the screen, click **Account Settings**.

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 text "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." and a timestamp: "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
  - 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*

1. In the main navigation menu, select **MANAGE**, and then select **Roles**.  
The **Roles** workspace appears, displaying a list of categories and groups.

Roles



+ Add New Category   + Collapse All      Save

 Department 	+ Add New Group	
Finance 	+ Add New Group	
Supervisors 	+ Add New Group	
Human Resources 	+ Add New Group	
 Location 	+ Add New Group	
Japan 	+ Add New Group	
 India 	+ Add New Group	
Bangalore 	+ Add New Group	
Hyderabad 	+ Add New Group	

- In the row containing the category that you want to access, select . The category expands, displaying a hierarchical view of groups.

 **Tip:** You can select **Expand All** to expand all categories and groups.

- If you want to access a group, navigate to the group in the hierarchy.


 **Tip:** If needed, you can modify the name of a category or a group by selecting  next to the name.













## Create a Category

- In the main navigation menu, select **MANAGE**, and then select **Roles**. The **Roles** workspace appears, displaying a list of categories.



Roles

+ Add New Category   + Collapse All      Save

<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">  </div> <div> <b>Department</b>  </div> </div>	<div style="display: flex; gap: 10px;"> <span style="background-color: #0070c0; color: white; padding: 2px 10px; border-radius: 3px;">+ Add New Group</span> <span style="background-color: #c00000; color: white; padding: 2px 10px; border-radius: 3px;">×</span> </div>
Finance 	<div style="display: flex; gap: 10px;"> <span style="background-color: #0070c0; color: white; padding: 2px 10px; border-radius: 3px;">+ Add New Group</span> <span style="background-color: #c00000; color: white; padding: 2px 10px; border-radius: 3px;">×</span> </div>
Supervisors 	<div style="display: flex; gap: 10px;"> <span style="background-color: #0070c0; color: white; padding: 2px 10px; border-radius: 3px;">+ Add New Group</span> <span style="background-color: #c00000; color: white; padding: 2px 10px; border-radius: 3px;">×</span> </div>
Human Resources 	<div style="display: flex; gap: 10px;"> <span style="background-color: #0070c0; color: white; padding: 2px 10px; border-radius: 3px;">+ Add New Group</span> <span style="background-color: #c00000; color: white; padding: 2px 10px; border-radius: 3px;">×</span> </div>
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">  </div> <div> <b>Location</b>  </div> </div>	<div style="display: flex; gap: 10px;"> <span style="background-color: #0070c0; color: white; padding: 2px 10px; border-radius: 3px;">+ Add New Group</span> <span style="background-color: #c00000; color: white; padding: 2px 10px; border-radius: 3px;">×</span> </div>
Japan 	<div style="display: flex; gap: 10px;"> <span style="background-color: #0070c0; color: white; padding: 2px 10px; border-radius: 3px;">+ Add New Group</span> <span style="background-color: #c00000; color: white; padding: 2px 10px; border-radius: 3px;">×</span> </div>
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">  </div> <div> <b>India</b>  </div> </div>	<div style="display: flex; gap: 10px;"> <span style="background-color: #0070c0; color: white; padding: 2px 10px; border-radius: 3px;">+ Add New Group</span> <span style="background-color: #c00000; color: white; padding: 2px 10px; border-radius: 3px;">×</span> </div>
Bangalore 	<div style="display: flex; gap: 10px;"> <span style="background-color: #0070c0; color: white; padding: 2px 10px; border-radius: 3px;">+ Add New Group</span> <span style="background-color: #c00000; color: white; padding: 2px 10px; border-radius: 3px;">×</span> </div>
Hyderabad 	<div style="display: flex; gap: 10px;"> <span style="background-color: #0070c0; color: white; padding: 2px 10px; border-radius: 3px;">+ Add New Group</span> <span style="background-color: #c00000; color: white; padding: 2px 10px; border-radius: 3px;">×</span> </div>

2. Select **Add New Category**.

A window appears, asking you to enter a name for the category.

Please enter name for new category ×

---

Cancel
OK

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 \(page 188\)](#).

## Create a Group

[Create a category \(page 188\)](#).

1. In the main navigation menu, select **Roles**.  
The **Roles** workspace appears, displaying a list of categories.

The screenshot shows the 'Roles' workspace. At the top, there is a header bar with the word 'Roles'. Below the header, there are three buttons: '+ Add New Category', '+ Collapse All', and a lock icon. On the right side, there is a 'Save' button. The main content area displays a list of categories and their sub-groups. Each category has a dropdown arrow and a pencil icon. The categories are 'Department', 'Location', and 'India'. Under 'Department', there are 'Finance', 'Supervisors', and 'Human Resources'. Under 'Location', there are 'Japan' and 'India'. Under 'India', there are 'Bangalore' and 'Hyderabad'. Each sub-group has a blue '+ Add New Group' button and a red 'x' button.

Category	Sub-Group	+ Add New Group	x
Department	Finance	+ Add New Group	x
	Supervisors	+ Add New Group	x
	Human Resources	+ Add New Group	x
Location	Japan	+ Add New Group	x
India	Bangalore	+ Add New Group	x
	Hyderabad	+ Add New Group	x

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*

1. In the main navigation menu, select **MANAGE**, and then select **Roles**.  
The **Roles** workspace appears.

Roles

+ Add New Category   + Collapse All      Save

 Department 	+ Add New Group	
Finance 	+ Add New Group	
Supervisors 	+ Add New Group	
Human Resources 	+ Add New Group	
 Location 	+ Add New Group	
Japan 	+ Add New Group	
 India 	+ Add New Group	
Bangalore 	+ Add New Group	
Hyderabad 	+ Add New Group	

- 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.

- Select **OK**. The category or group is deleted.

## Administration

### Runtime Model

You create a model to build the runtime structure and content. You 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 for supplying data.

*Figure: Where to Begin*

The Model Editor user interface helps you create and modify your model. You can also use the model template to manually build and modify your model structure and then import it. For information about the template, see [Model Template Description \(page 202\)](#).

## Model Editor

Use the Model Editor to create and modify asset object types and asset objects in your model.

To begin building a model, follow these tasks:

- [Set Up Data Source Servers \(page 194\)](#)
- [Configure Data Distributor Settings \(page 195\)](#)
- [Set Up the Data Model Structure \(page 195\)](#)
- [Define Objects \(page 195\)](#)
- [Set Up Runtime Navigation \(page 197\)](#)

## 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

## Set Up Data Source Servers

You define the data source servers used to populate data in your model.

You can set up multiple Historian servers.

1. In the Administration environment, select **Set Up** and then **Server**.  
The **Server Details Management** screen appears.
2. To add each data source, do the following:
  - a. Select + above the table.
  - b. In **SystemAlias**, enter the alias for the server.
  - c. In **SystemType**, select the data source type from where data originates.
  - d. In **SystemName**, specify the Historian server name.
3. Select **Save**.

## *Configure Data Distributor Settings*

Set up the Historian data source in the [ADMIN \(page 194\)](#) and **DATA SOURCES** sections.

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*

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.

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. In 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 Historian.
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*

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.

- 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:
    - a. Select its **Historical Data Alias**.



- b. Enter the historical data source tag ID to use for retrieving data for this variable, which can appear on Trend charts.

7. Select **Save**.

## *Duplicate Objects*

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.

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*

Use the Navigation app to visually structure the runtime hierarchy of objects.

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.

FinishedWaterPumpStation

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.



children.

- 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, SunctionValveA is a descendant of DisplacementPump1D.



- 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.



- Optional:** To delete an object from the hierarchy, select its check box and then - at the top of the left panel.
- Optional:** At any time, you can remove the hierarchy and start with a blank app area by selecting **Clear Hierarchy**.
- To save the runtime hierarchy that you created, select **Save**.

## Change Server Details

You can remove a server and change its system alias, type, and system name. When you change the server alias name, all objects using that alias are automatically updated.

- In the Administration environment, select **Set Up**.  
The **Server Details Management** screen appears listing the data source servers.
- In the table, make the changes as needed.
- To delete a server, select the check box next to it and select **Delete**.

4. Select **Save**.

## *Modify Object Types*

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.

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*

When you delete a child from an asset object type, it is also removed from all objects using it.

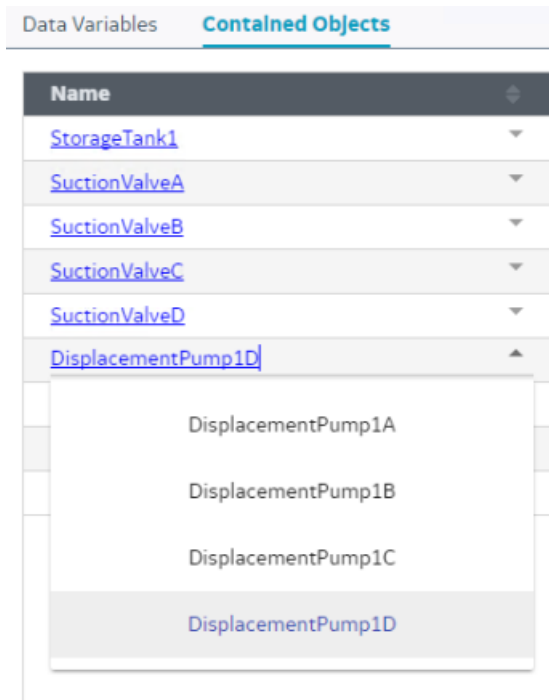
1. In the Administration environment, navigate to **Assets > Object Types**.  
The **Object Type Information** screen appears listing all the asset object types.
2. In the left panel, select the asset object type whose children you want to modify.
3. Select the **Contained Types** tab.
4. To remove children 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*

You can quickly replace contained objects by browsing through a list of similar objects that are assigned to the same object type.

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*

You can remove an asset object as well as change its data sources.

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 the Model*

You can generate a file containing the required section headers to get you started if your model is not yet created. You can also export an existing model to make changes to it.


1. In the Administration environment, select the Model Import/Export icon, .
2. In the **Export** area, enter a model file name to generate in CSV format.
3. Select **Export**.
4. Retrieve the model file from the Windows Downloads folder.

## *Import a Model*

After creating or modifying your model, you can import it. If, however, you want to replace an existing model, you must first [delete \(page 207\)](#) the old one before importing the new one.

1. In the main navigation menu, select .
2. Navigate to the model file, and then select **Import**.
3. Follow these instructions to view and download the log file in these browsers:

Option	Description
<b>Chrome</b>	<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>
<b>Microsoft Edge</b>	<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.

## Access the Model Template

The model template, `ModelStarterTemplateSteps.xlsxm`, provides a structure to help you create your model.

1. Navigate to `\Program Files\Proficy\ProficyWebServer\Tools\ModelStarterTemplateSteps.xlsxm`.
2. Follow the instructions in `ModelStarterTemplateSteps.xlsxm`.
3. When done, select **Save Model to CSV** to save the model to a CSV file, which you can then import.

## Model Template Description

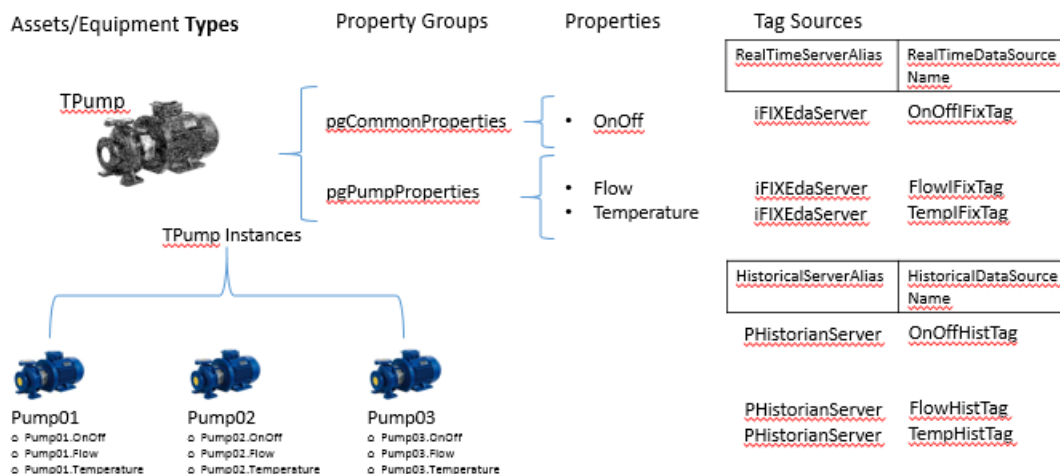
The model template provides sections to help you build the runtime model structure for trending historical data.

## Model Concepts

Review this illustration before creating your runtime model.

 **Note:** Although this model describes HMI/SCADA data sources, such as iFIX, this release only pertains to data from Historian data sources. A later release will include these data sources.

## Model Concepts




## Concept Terminology Differences

The model template and Model Editor user interface use different concept terminology, as shown in the following table.

Model Template	Model Editor
Asset type	Object type
Asset	Object
Property	Data variable

## Hierarchy

You must 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.

 **Note:** Since only one root node is allowed in this hierarchy, do not define more than one asset to a root parent.

Property	Description
HierarchyFlagsHeader	Header column with the keyword <code>HierarchyFlags</code> .
HierarchyFlags	Specifies whether to update or overwrite the asset hierarchy when importing the model file.
OverwriteHierarchy	<ul style="list-style-type: none"> <li>• <code>True</code> creates a new hierarchy based on the exact content of the imported model file.</li> <li>• <code>False</code> updates any existing imported hierarchical relationships.</li> </ul>
OverwriteAssetChildren	<ul style="list-style-type: none"> <li>• <code>True</code> replaces existing child assets with child assets in the model template file.</li> <li>• <code>False</code> adds child assets from the model template file to the existing child assets.</li> </ul>

## Asset Types

Asset types define the structure of the equipment pieces within your model. For each asset type, such as a `StorageTank`, you set up all the property names, such as `TankLevel`, that any asset instance associated with this type can reuse in its own definition.

Property	Description
AssetTypeHeader	Header column with the keyword <code>AssetType</code> .
Asset Type Name	Name of the asset type.
Description	Description of the asset type.

<b>Property</b>	<b>Description</b>
Property Groups of the Asset Type	Collection of properties associated with the asset type. Assets assigned to this asset type inherit these properties. An asset type can contain more than one property group.

## Property Groups

Property groups assemble a set of properties for a piece of equipment. This enables you to create a common set of properties to reuse across multiple asset types.

<b>Property</b>	<b>Description</b>
PropertyGroupHeader	Header column with the keyword <code>PropertyGroup</code> .
Property Group Name	Name of the property group.
Description	Description of the property group.

## Assets

Assets are the instances of equipment, such as `StorageTank1`, in the model. When you assign an asset to an asset type, it inherits all the properties created for that asset type.

You must arrange assets in to hierarchical relationships in the Hierarchy section to appear in the Runtime context selection. Each asset has a parent in the hierarchy.

<b>Property</b>	<b>Description</b>
AssetHeader	Header column with the keyword <code>Asset</code> .
Asset Name	Name of the asset instance.
Description	Description of the asset instance.
Asset Type Name	Name of its associated asset type.
Parent Asset Name	Name of the parent asset. One asset in the list must have a parent asset set to <code>\</code> (root).



Property	Description																																																																																										
Parent Property Name	Ties this asset instance to an asset property definition in the <code>Parent Asset Name</code> type definition. For example, the <code>TPumpStation</code> type contains the <code>InletTank</code> and <code>OutletTank</code> as properties of type <code>Asset</code> . When you create instances of the <code>TPumpStation</code> (for example, <code>PumpStation01</code> , <code>PumpStation02</code> ), you must also create instances for <code>InletTank</code> (for example, <code>InletTank01</code> , <code>InletTank02</code> ) and <code>OutletTank</code> (for example, <code>OutletTank01</code> , <code>OutletTank02</code> ) and point them to the <code>InletTank</code> and <code>OutletTank</code> properties of the <code>TPumpstation</code> type using this <code>Parent Property Name</code> column, as shown in the following example.																																																																																										
	<table border="1"> <thead> <tr> <th>#AssetTypeHeader</th> <th>Asset Type Name</th> <th>Description</th> <th>Property Groups of the Asset Type</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>AssetType</td> <td>TEnterpriseStation</td> <td></td> <td>TEnterpriseStationGroup</td> <td></td> <td></td> </tr> <tr> <td>AssetType</td> <td>TPumpStation</td> <td></td> <td>TPumpStationPropertyGroup</td> <td></td> <td></td> </tr> <tr> <td>AssetType</td> <td>TStorageTank</td> <td></td> <td>StorageTankShape</td> <td>AssetType</td> <td></td> </tr> <tr> <th>#PropertyDefinitionHeader</th> <th>Property Group Name</th> <th>Property Name</th> <th>Property Type</th> <th>AssetType (if the property type is Asset)</th> <th></th> </tr> <tr> <td>PropertyDefinition</td> <td>TPumpStationPropertyGroup</td> <td>InletTank</td> <td>Asset</td> <td>StorageTank</td> <td></td> </tr> <tr> <td>PropertyDefinition</td> <td>TPumpStationPropertyGroup</td> <td>OutletTank</td> <td>Asset</td> <td>StorageTank</td> <td></td> </tr> <tr> <th>#AssetHeader</th> <th>Asset Name</th> <th>Description</th> <th>Asset Type Name</th> <th>Parent Asset Name (\ - root)</th> <th>Parent Prop Name</th> </tr> <tr> <td>Asset</td> <td>EnterpriseStation</td> <td></td> <td>TEnterpriseStation</td> <td>\</td> <td></td> </tr> <tr> <td>Asset</td> <td>PumpStation01</td> <td></td> <td>TPumpStation</td> <td>EnterpriseStation</td> <td></td> </tr> <tr> <td>Asset</td> <td>InletTank01</td> <td></td> <td>TStorageTank</td> <td>PumpStation01</td> <td>InletTank</td> </tr> <tr> <td>Asset</td> <td>OutletTank01</td> <td></td> <td>TStorageTank</td> <td>PumpStation01</td> <td>OutletTank</td> </tr> <tr> <td>Asset</td> <td>PumpStation02</td> <td></td> <td>TPumpStation</td> <td>EnterpriseStation</td> <td></td> </tr> <tr> <td>Asset</td> <td>InletTank02</td> <td></td> <td>TStorageTank</td> <td>PumpStation02</td> <td>InletTank</td> </tr> <tr> <td>Asset</td> <td>OutletTank02</td> <td></td> <td>TStorageTank</td> <td>PumpStation02</td> <td>OutletTank</td> </tr> </tbody> </table>	#AssetTypeHeader	Asset Type Name	Description	Property Groups of the Asset Type			AssetType	TEnterpriseStation		TEnterpriseStationGroup			AssetType	TPumpStation		TPumpStationPropertyGroup			AssetType	TStorageTank		StorageTankShape	AssetType		#PropertyDefinitionHeader	Property Group Name	Property Name	Property Type	AssetType (if the property type is Asset)		PropertyDefinition	TPumpStationPropertyGroup	InletTank	Asset	StorageTank		PropertyDefinition	TPumpStationPropertyGroup	OutletTank	Asset	StorageTank		#AssetHeader	Asset Name	Description	Asset Type Name	Parent Asset Name (\ - root)	Parent Prop Name	Asset	EnterpriseStation		TEnterpriseStation	\		Asset	PumpStation01		TPumpStation	EnterpriseStation		Asset	InletTank01		TStorageTank	PumpStation01	InletTank	Asset	OutletTank01		TStorageTank	PumpStation01	OutletTank	Asset	PumpStation02		TPumpStation	EnterpriseStation		Asset	InletTank02		TStorageTank	PumpStation02	InletTank	Asset	OutletTank02		TStorageTank	PumpStation02	OutletTank
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## Property Definitions

Property definitions describe the actual pieces of data that come from a data source. Among other things, it defines how to use a property in views. For example, you can define a property to appear as a trend line on Trend views. Properties comprise a property group.

Property	Description
PropertyDefinitionHeader	Header column with the keyword <code>PropertyDefinition</code> .
Property Group Name	Property group name in which to associate this property.
Property Name	Name of the property.
Property Type	Property type: <code>Boolean</code> , <code>number</code> , <code>string</code> , or <code>asset</code> .  Property definitions of an asset type can be contained types or child asset references. You must define the child asset type in the <code>AssetType</code> column.
AssetType	When the property type is <code>asset</code> , use this property definition. To assign an asset to a property, you must define this asset type. It allows you to nest child assets in the asset type.
Trendable	Property displays as a trend line on Trend views.
ControlGroupID	Unique ID of the control group, allowing you to group properties that can be modified. Any properties with a control group ID are grouped together in an auto-generated Control Card. If the control group has an associated Control Point, an operator can change its value on the Control View at runtime.

Property	Description
ControlPoint	Setpoint for the current HMI/SCADA property value. Both the current property and its control point must be in the same control group.  A property can be controlled by itself or by another property in the asset type. To read and write to the same property, specify it as its own control point. A property without a control point is read-only.
HmiDataType	Data type from the underlying SCADA system. This is not required for this release.

## Server Details

A server alias offers an indirect route between the model's data sources and the model itself, making it easier to transfer model data sources between servers. By using an alias to reference your data source (such as an iFIX node and OPC UA server) and associating it with your tag sources, you can change the node for a set of tag sources by changing the server name.

Property	Description
ServerDetailsHeader	Header column with the keyword <code>ServerDetails</code> .
Server Alias	Name of the server alias.
Server Name	Name of the server for the data source.
Server Type	Type of server from which data originates.

## Tag Sources

A tag source defines where to retrieve asset property data, including real-time and historical data sources.

Property	Description
TagSourceHeader	Header column with the keyword <code>TagSource</code> .
Parent Asset Name	Name of the parent asset with a property with the tag source.
Property Name	Name of the property associated with the tag source.
Realtime Server Alias	Name of the real-time server alias to use with this tag source.
Realtime Data Source Name	HMI/SCADA data source tag ID that feeds data to this model property.
Historical Server Alias	(Optional) Name of the server alias to retrieve historical data for Trend views and the last known current value for Mimic Card views.
Historical Data Source Name	(Optional) Name of the historical tag ID to retrieve historical data for Trend views and the last known current value for Mimic Card views.

## NameSpace Table

This table pertains to CIMPLICITY only and does not apply to this release. Populate this table using the project server and namespace information that was exported to a CSV file using the **Export to Web HMI** function on the CIMPLICITY Project menu.

Here is a sample NameSpace table:

#NameSpaceTableHeader	ServerAlias	NameSpaceIndex	NameSpaceUri
NameSpaceTable	<projectname>	2	<a href="http://ge.com/ua/CIMPLICITY">http://ge.com/ua/CIMPLICITY</a>
NameSpaceTable	<projectname>	3	<a href="http://ge.com/ua/CIMPLICITY/&lt;projectname&gt;">http://ge.com/ua/CIMPLICITY/&lt;projectname&gt;</a>
NameSpaceTable	<projectname>	4	<a href="http://ge.com/ua/CIMPLICITY/&lt;projectname&gt;/project">http://ge.com/ua/CIMPLICITY/&lt;projectname&gt;/project</a>

## Define Trend Data

You can view trend-line analysis of variable data for a selected time frame in Historian. You select which historical variables to view.

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

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 \(page 201\)](#) 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.

## *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*

1. In 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*

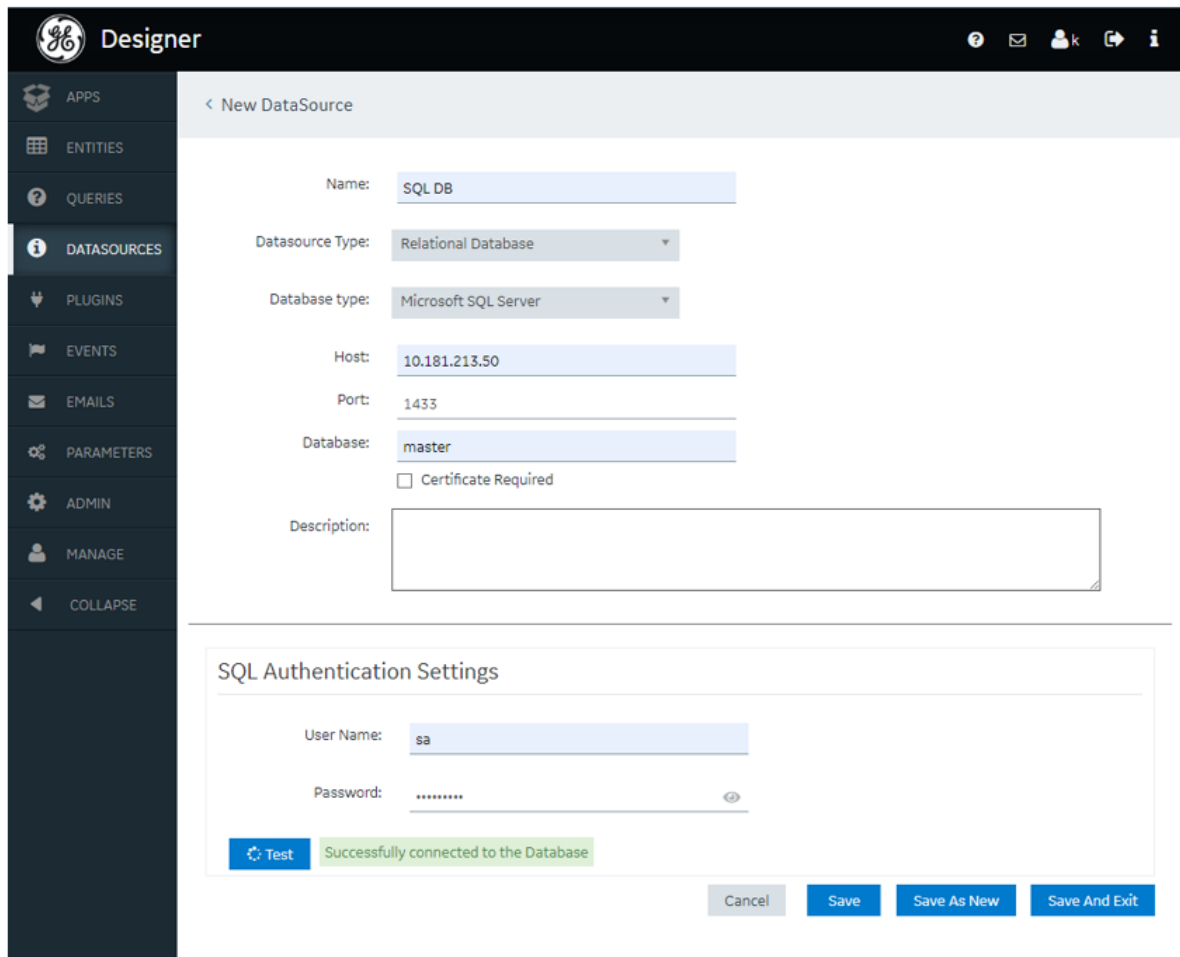
1. In the main navigation menu, select **DATASOURCES**.  
The **DATASOURCES** workspace appears, displaying a list of data sources.
2. Select **Add New Data Source**, and then enter values as specified in the following table.

Item	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 one of the following types of the data sources: <ul style="list-style-type: none"> <li>• <b>Historian</b></li> <li>• <b>Relational Database</b></li> <li>• <b>Custom</b></li> </ul>


3. For a Relational Database data source, enter the following:

<b>Item</b>	<b>Description</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: 10.181.213.211 or databaseserver01.</i>
	This field only appears if you select Relational Database as the Datasource 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 Datasource Type.
<b>Database</b>	Enter the database name that you want to connect to.
	This field only appears if you select Relational Database as the Datasource 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>	After the required fields are filled in, click the <b>Test</b> button.  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.  If it fails, it reads: "Failed to connect to the Database. More Details." Click the "More Details" link to view detailed reason in a popup.

The following example shows a successful SQL Database connection.



4. For a Historian or Custom REST data source enter the following:

Item	Description
<b>Base URL</b>	Enter the URL of the data source in the following format: https://<host name or IP address of the data source>:<port number>  <b>Note:</b> The port number should not be used if your data source is Historian 8.x. This field only appears if you select Historian or Custom for the Datasource 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>Ignore TLS/SSL</b>	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.  This field only appears if you select Historian or Custom for the Datasource Type.

5. If authentication to the Historian system API is required, perform the following steps:

- a. Select the **System API Authentication Required** check box. This check box is applicable only for a Historian data source. If you want to use a Historian data source in a trend chart, you must select this check box.

The **User Name** and **Password** boxes appear, allowing you to enter the credentials to authenticate system API.

- b. Enter values in the **User Name** and **Password** boxes, and then select **Test**.  
A message appears, confirming whether connection to the system API is established. The connection is tested using the data source base URL and the authentication details of the system APIs.

6. If authentication to a REST API is required, perform the following steps:

- a. Select the **REST Authentication Required** check box. If this check box is selected, Operations Hub sends authorization details along with a request while connecting to a data source.

The **Auth Type** box appears.

- b. Select one of the following types of authentication:

- **Basic Auth:** Sends a verified user name and password along with the request.
- **Bearer Token:** Sends an access key along with the request.
- **OAuth:** Retrieves an access key to access an API, and then uses the key to authenticate future requests.


Depending on the authentication type you select, a few boxes appear.

- c. Enter values in the available boxes as specified in the following table.

<b>Box</b>	<b>Applicable Authentication Types</b>	<b>Description</b>
Auth Grant Type	OAuth	Select one of the following types of granting the authentication: <ul style="list-style-type: none"> <li>• <b>client_credentials</b></li> <li>• <b>password</b></li> </ul>
Auth Token	Bearer Token	Enter the access key required to authenticate the APIs. The access key is included in the request header.
Username	OAuth and Basic Auth	Enter the user name of the user who can access the APIs.
Password	OAuth and Basic Auth	Enter the password of the user who can access the APIs.
Auth URL	Bearer Token	Enter the URL for the endpoint of the authentication server. This value is used to exchange the authorization code for an access token.


Box	Applicable Authentication Types	Description
Auth Client ID	OAuth	The client identifier issued to the client during the application registration process.
Auth Client Secret	OAuth	The client secret issued to the client during the application registration process.

- d. If you want to provide a certificate for authentication, select **Choose Certificate** and navigate to the certificate. Alternatively, you can select the **Use DataSource Cert** check box if you want to use the same certificate that is used by the data source.

 **Note:** You can use certificates only in the base-64-encoded format. A DER-encoded certificate is not supported.

- e. If you want to use the OAuth authentication type, select **Test**. Otherwise, skip to the next step.

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.

 **Note:** 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.

## 7. 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:**



< Local Historian

Name: Local Historian Description:

Type: Historian

Base URL: https://hist7server:8443/

Certificate Required  
 Ignore TLS/SSL

Certificate: [Choose Certificate](#) LocalHistorianCert.cer

System API Authentication Required  
 REST Authentication Required

---

System Api Authentication Settings

User Name: Administrator

Password: .....

[Test](#)

Rest Authentication Settings

Auth Type: OAuth Auth URL: https://hist7server:8443/uaa/oauth/token

Auth Grant Type: client\_credentials Auth Client Id: admin

Certificate: [Choose Certificate](#) LocalHistorianCert.cer Auth Client Secret: .....

Use DataSource Cert

[Test](#)

[Cancel](#) [Save](#) [Save As New](#) [Save And Exit](#)

### Example of Historian 8 Data Source:

Designer

< HistorianServer

Name: HistorianServer Description:

Type: Historian

Base URL: https://hist8server

Certificate Required  
 Ignore TLS/SSL

System API Authentication Required  
 REST Authentication Required

---

System Api Authentication Settings

User Name: Administrator

Password: .....

[Test](#)

Rest Authentication Settings

Auth Type: OAuth Auth URL: https://hist8server/uaa/oauth/token

Auth Grant Type: client\_credentials Auth Client Id: hist8Server.admin

Auth Client Secret: .....

[Test](#)


[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.

## Delete a Data Source

1. In 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.

## *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*

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	

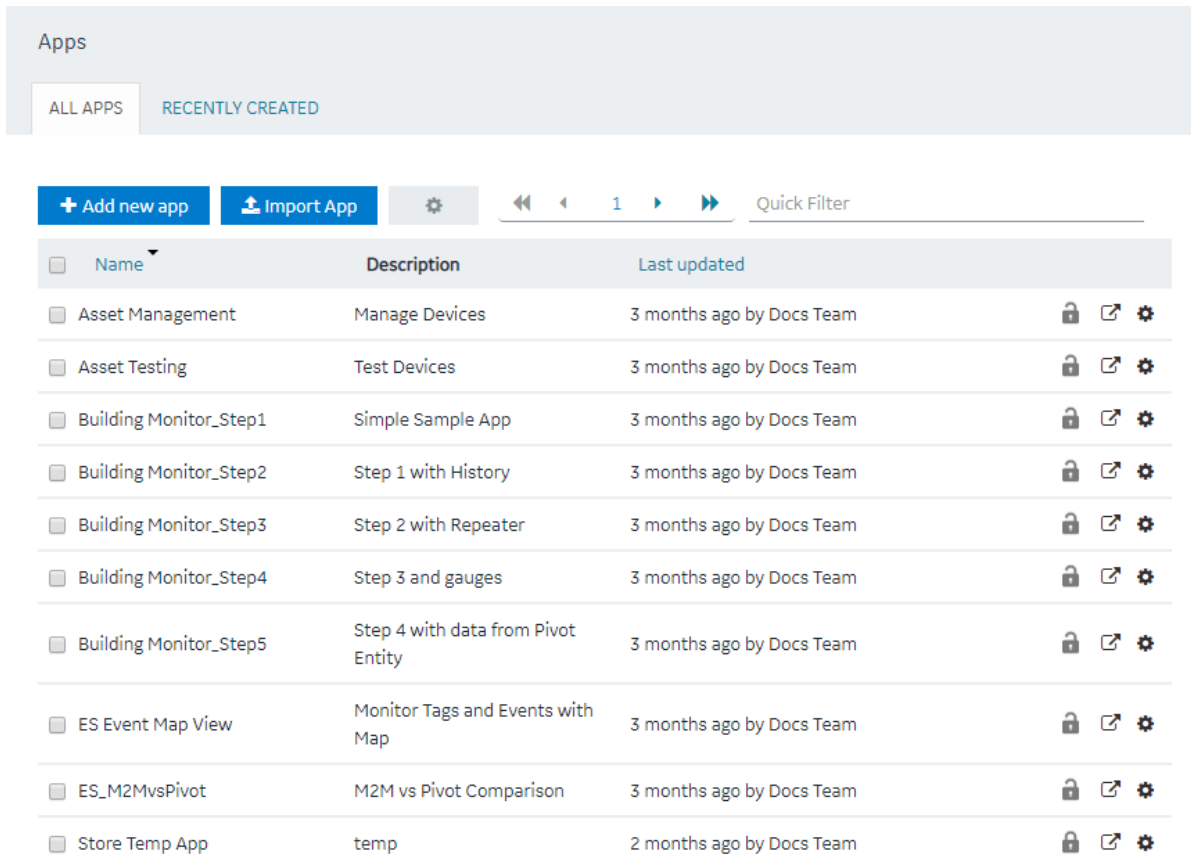
- In the **Name** column, select the application to which you want to grant access.  
The **PAGES** workspace appears, including a column summarizing the current page permissions. By default, newly created pages display “All users”, indicating all users who have access to the application will have access 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

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

The **APPS** workspace appears, displaying a list of applications created in the site.

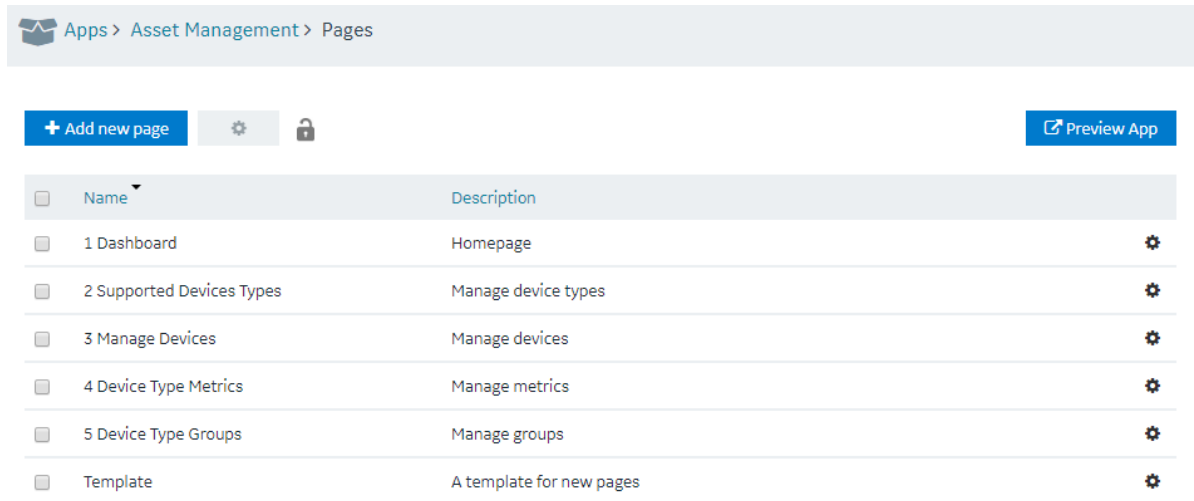


The screenshot shows the 'Apps' workspace interface. At the top, there are two tabs: 'ALL APPS' (selected) and 'RECENTLY CREATED'. Below the tabs are two buttons: '+ Add new app' and 'Import App', followed by a settings gear icon, a pagination control showing '1', and a 'Quick Filter' input field. The main content is a table with the following columns: 'Name', 'Description', and 'Last updated'. Each row includes a checkbox, the application name, a description, the last update time 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. 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



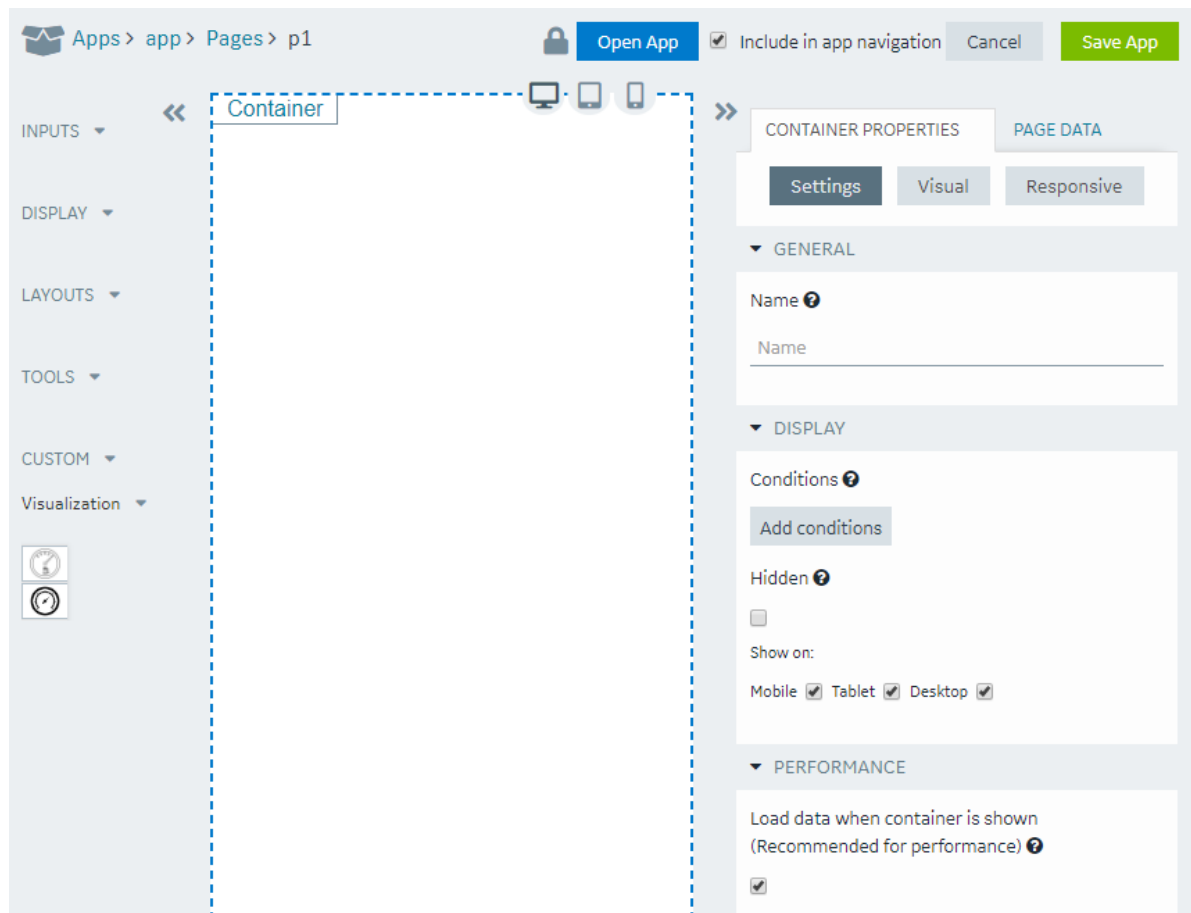
The screenshot shows the 'Pages' workspace with a breadcrumb trail 'Apps > Asset Management > Pages'. At the top, there is a '+ Add new page' button, a settings gear, a lock icon, and a 'Preview App' button. Below is a table with columns 'Name' and 'Description'. Each row has a checkbox on the left and a gear icon on the right.

<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	⚙️

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.



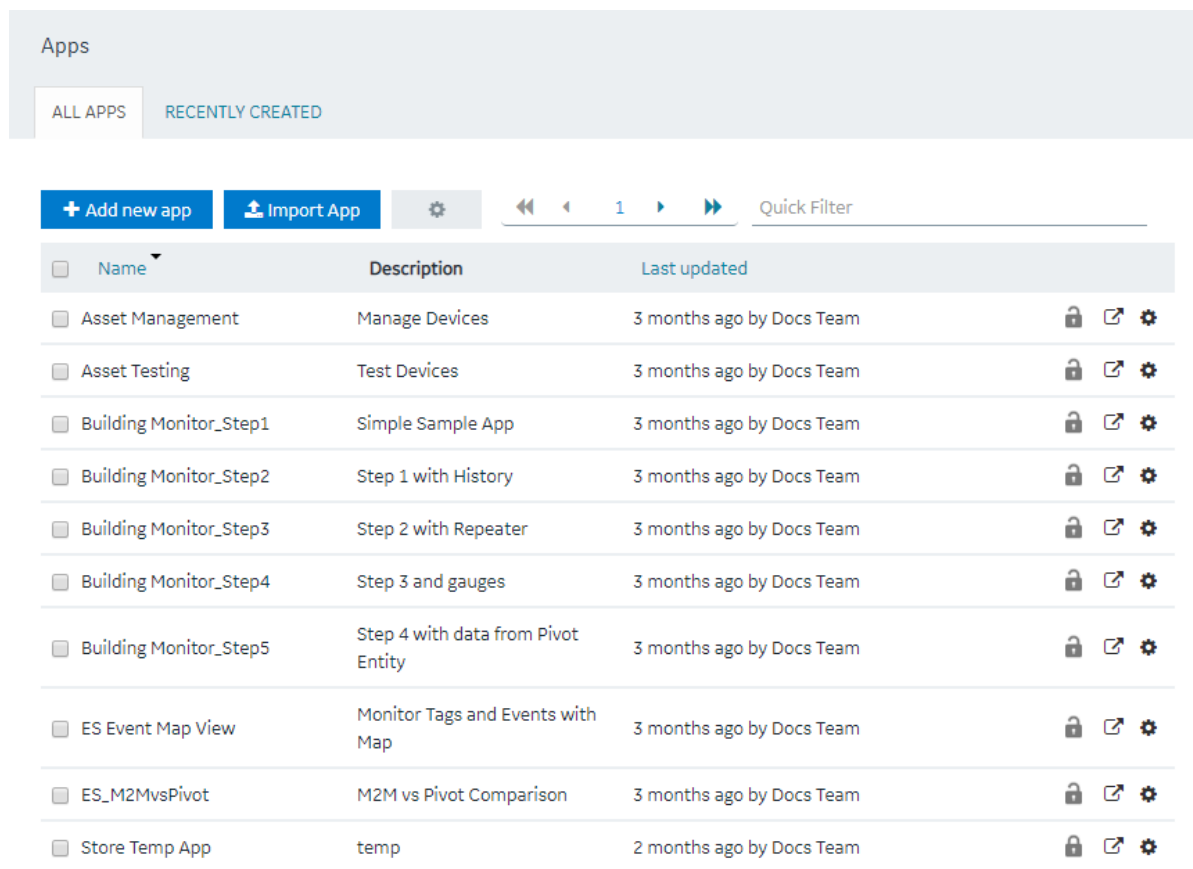
The screenshot shows the 'Page Designer' interface. The breadcrumb trail is 'Apps > app > Pages > p1'. At the top right, there are buttons for 'Open App', 'Include in app navigation' (checked), 'Cancel', and 'Save App'. The main workspace shows a 'Container' being edited, with a dashed blue border and device icons (desktop, tablet, mobile) above it. On the left is a sidebar with categories: INPUTS, DISPLAY, LAYOUTS, TOOLS, CUSTOM, and Visualization. On the right is a 'CONTAINER PROPERTIES' panel with tabs for 'Settings', 'Visual', and 'Responsive'. The 'GENERAL' section has a 'Name' field. The 'DISPLAY' section has 'Conditions' (with an 'Add conditions' button), a 'Hidden' checkbox, and 'Show on:' options for Mobile, Tablet, and Desktop (all checked). The 'PERFORMANCE' section has a checkbox for 'Load data when container is shown (Recommended for performance)' which is checked.

**i Tip:** If needed, you can [add or remove elements from a container in the page](#), or [modify the properties of a container \(page 321\)](#), and then select **Save App** to save your changes.

## Create a Page

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

The **APPS** workspace appears, displaying a list of applications created in the site.



The screenshot shows the 'Apps' workspace interface. At the top, there are two tabs: 'ALL APPS' (selected) and 'RECENTLY CREATED'. Below the tabs, there are two buttons: '+ Add new app' and 'Import App'. To the right of these buttons are navigation arrows and a 'Quick Filter' input field. The main content is a table with the following columns: 'Name', 'Description', and 'Last updated'. Each row in the table includes a checkbox in the 'Name' column and three icons (lock, share, settings) in the rightmost column.

<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.

Apps > Asset Management > Pages

+ Add new page    ⚙️    🔒    [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. Select **Add new page**.  
The **Create Page** window appears.

## Create Page ✕

Page name:

Page description:

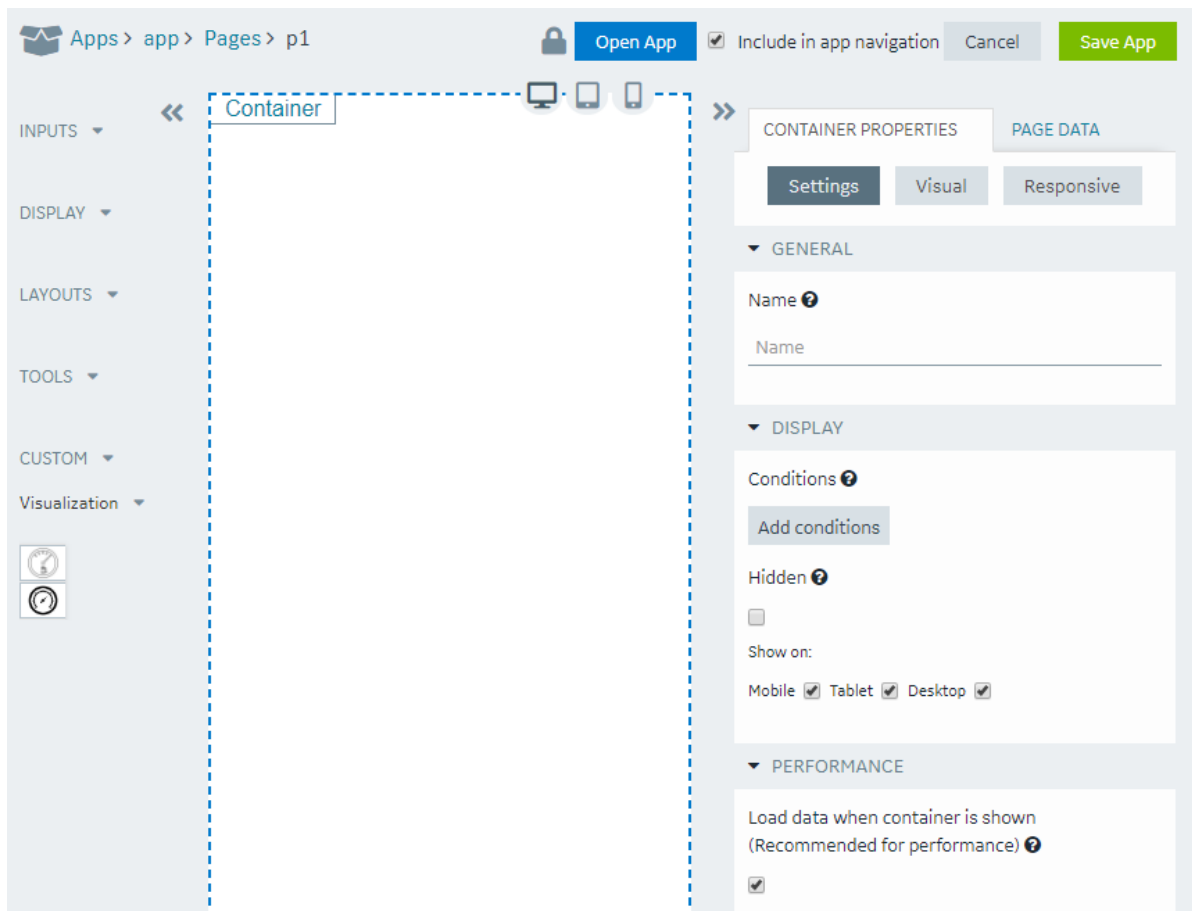
Include in app navigation:

[Create](#) [Cancel](#)

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

Field	Description
<b>Page name</b>	Enter a name for the page. The name must contain at least one uppercase or lowercase letter.
<b>Page description</b>	Enter a description for the page.
<b>Include in app navigation</b>	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. As needed, [add components to the page \(page 321\)](#).
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.

## Copy a Page

1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.

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 App', 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.

<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 rows containing the pages that you want to copy, select the check boxes.

4. In the workspace heading, select , and then select **Duplicate Pages**.

A message appears, asking you to confirm that you want to copy the pages.

 **Tip:** Alternatively, in each row containing a page that you want to copy, select , and then select **Duplicate page**.

5. Select **OK**.

A window appears, asking you to enter a name for each page that you want to copy. By default, the name contains the name of the original page, appended with a system-generated value.

6. Enter a name for each page that you want to copy, and then select **OK**. The name must contain at least one uppercase or lowercase letter.

The pages, along with the UI components, queries, and global variables used in them, are copied. However, the global variables that are linked to UI components are not copied.

## *Delete a Page*

When you delete a page, the global variables used in the page are also deleted.

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 **Name** column, select the application that contains the page that you want to delete. The **PAGES** workspace appears.



Apps > Asset Management > Pages

+ Add new page ⚙️ 🔒 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 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**.


4. 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:

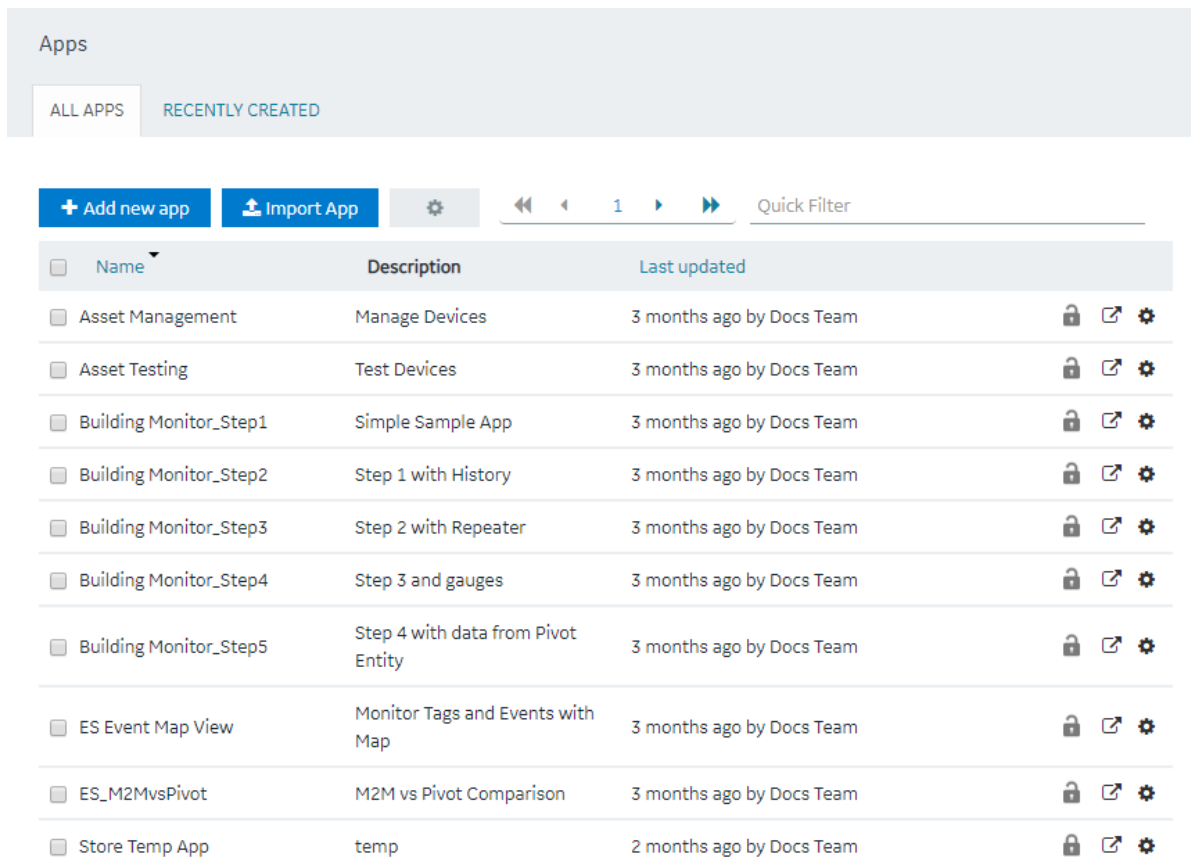
- Add a page to the navigation menu of the application.
- Remove a page from the navigation menu of the application.
- Specify the name of the page that should appear in the navigation menu of the application.
- Specify the sequence of the pages that should appear in the navigation menu of the application.

## Add a Page to the Navigation Menu of an Application

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.



The screenshot shows the 'Apps' workspace with two tabs: 'ALL APPS' and 'RECENTLY CREATED'. Below the tabs are buttons for '+ Add new app', 'Import App', and a settings gear. A pagination bar shows '1' and a 'Quick Filter' input. 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 for which you want to add a page to the navigation menu.

The **PAGES** workspace appears.

Apps > Asset Management > Pages

+ Add new page    ⚙️    🔒    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.

## Add Pages ×

---

5 Device Type Groups

---

3 Manage Devices

---

4 Device Type Metrics

---

Template

---



2 Supported Devices Types

---

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.

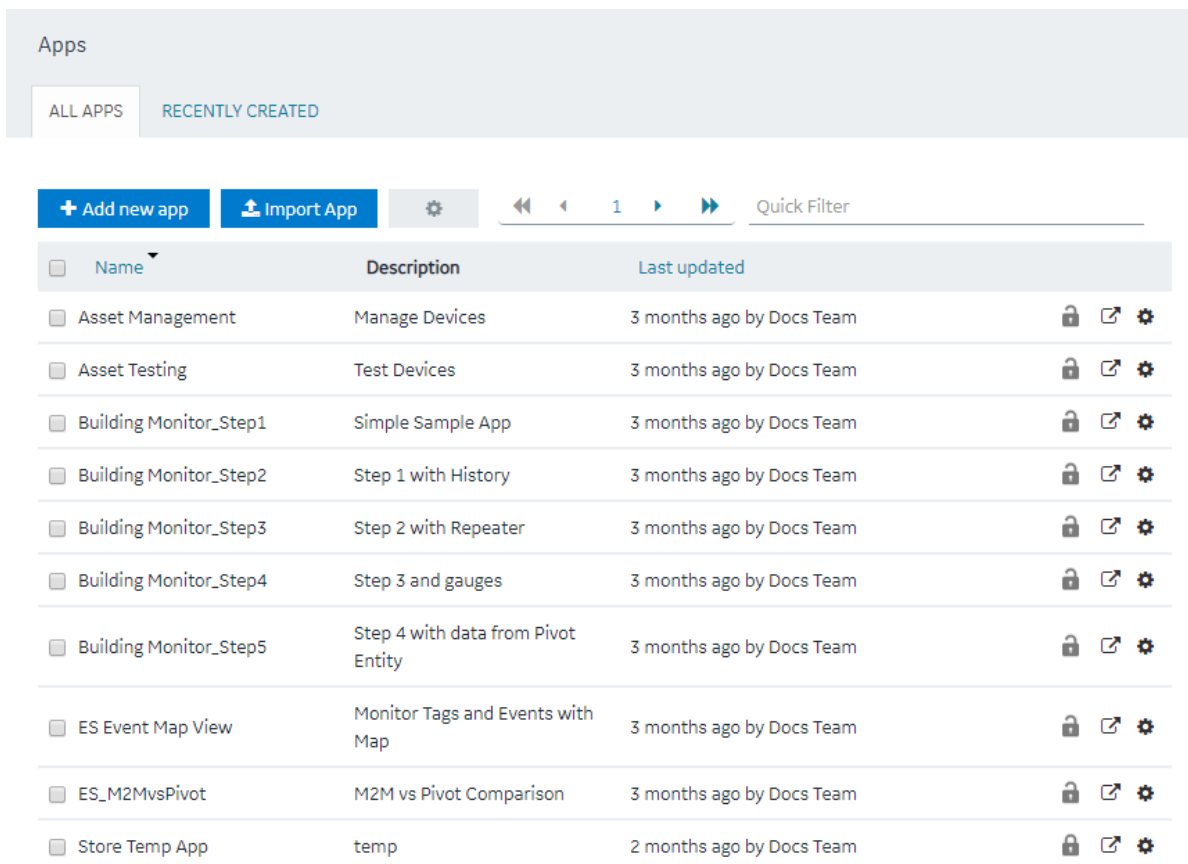
**i Tip:**































- 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

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

The **APPS** workspace appears, displaying a list of applications 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 in which you want to change the application navigation menu.

The **PAGES** workspace appears.

Apps > Asset Management > Pages

+ Add new page    ⚙️    🔒    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 already been added to the application navigation menu.


Apps > Asset Management > Navigation

+ Add Pages    Preview App

Display Name	Page Name	
Dashboard	1 Dashboard	✎️ 🗑️

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*

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*

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

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 **Name** column, select an application.  
The **PAGES** workspace appears.

Apps > Asset Management > Pages

+ Add new page    ⚙️    🔒    [Preview App](#)

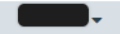
<input type="checkbox"/> Name	Description	
<input type="checkbox"/> 1 Dashboard	Homepage	⚙️
<input type="checkbox"/> 2 Supported Devices Types	Manage device types	⚙️
<input type="checkbox"/> 3 Manage Devices	Manage devices	⚙️
<input type="checkbox"/> 4 Device Type Metrics	Manage metrics	⚙️
<input type="checkbox"/> 5 Device Type Groups	Manage groups	⚙️
<input type="checkbox"/> Template	A template for new pages	⚙️


- 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 .
- 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 

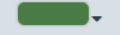
Background Color   Use gradient

Background Image URL


Font Type

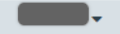
Loader color 

### 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 

**i 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

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.

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	🔒 ↗️ ⚙️

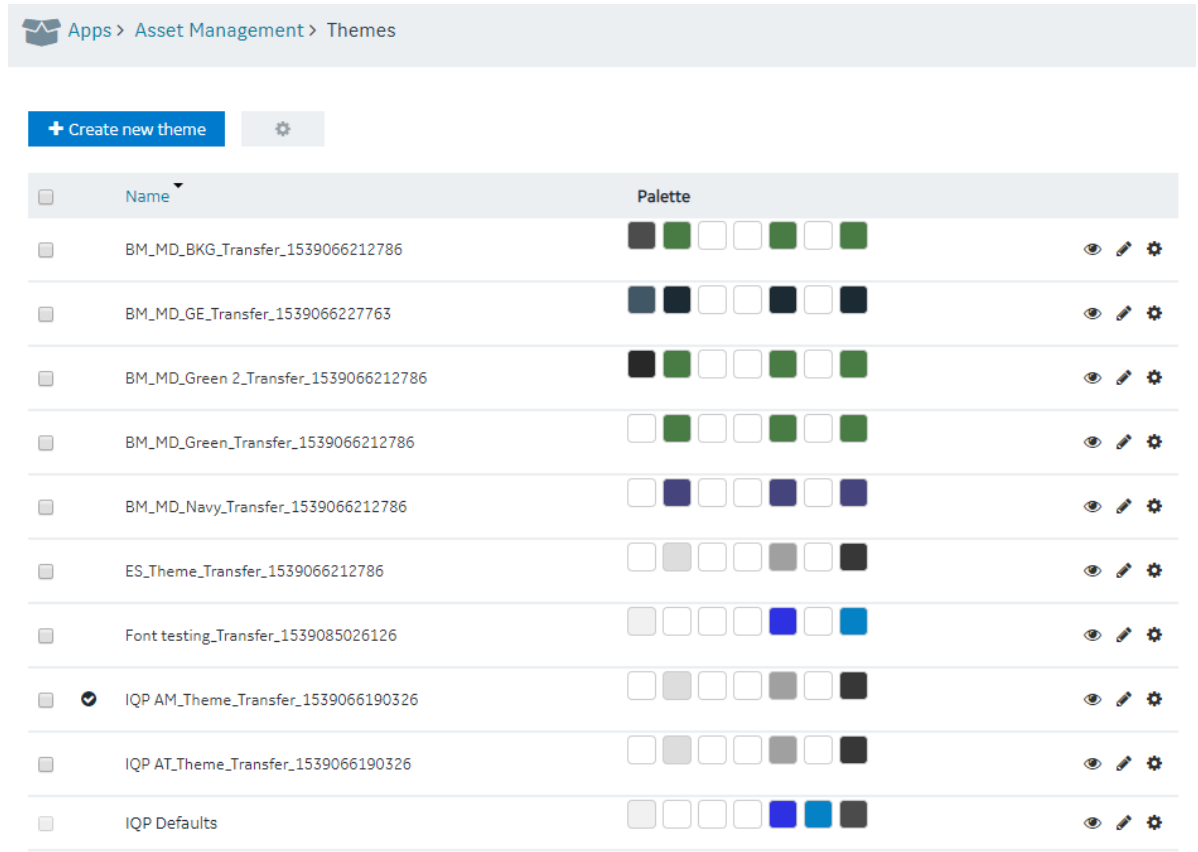
- In the **Name** column, select an application.  
The **PAGES** workspace appears.

Apps > Asset Management > Pages

+ Add new page ⚙️ 🔒 Preview App

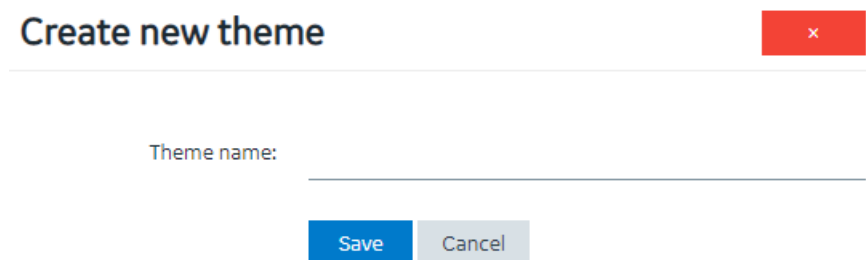
<input type="checkbox"/> Name	Description	
<input type="checkbox"/> 1 Dashboard	Homepage	⚙️
<input type="checkbox"/> 2 Supported Devices Types	Manage device types	⚙️
<input type="checkbox"/> 3 Manage Devices	Manage devices	⚙️
<input type="checkbox"/> 4 Device Type Metrics	Manage metrics	⚙️
<input type="checkbox"/> 5 Device Type Groups	Manage groups	⚙️
<input type="checkbox"/> Template	A template for new pages	⚙️

- In the main navigation menu, select **THEME**.  
The **THEME** workspace



appears.

- Select **Create new theme**.  
The **Create new theme** window appears.



- 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.
- 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

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 an application.

The **PAGES** workspace appears.

Apps > Asset Management > Pages

+ Add new page    ⚙️    🔒    [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 **THEME**.  
The **THEME** workspace appears.

Apps > Asset Management > Themes

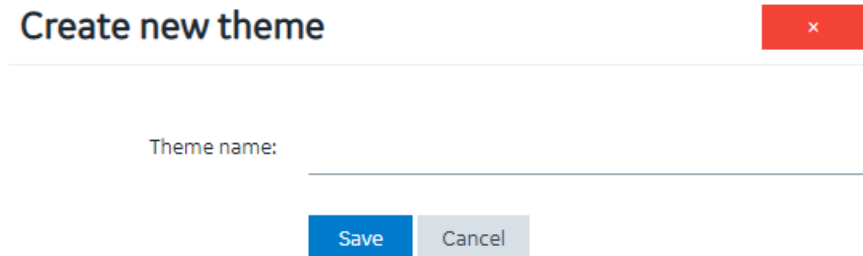
+ Create new theme    ⚙️

<input type="checkbox"/> Name	Palette	
<input type="checkbox"/> BM_MD_BKG_Transfer_1539066212786		<input type="checkbox"/>
<input type="checkbox"/> BM_MD_GE_Transfer_1539066227763		<input type="checkbox"/>
<input type="checkbox"/> BM_MD_Green 2_Transfer_1539066212786		<input type="checkbox"/>
<input type="checkbox"/> BM_MD_Green_Transfer_1539066212786		<input type="checkbox"/>
<input type="checkbox"/> BM_MD_Navy_Transfer_1539066212786		<input type="checkbox"/>
<input type="checkbox"/> ES_Theme_Transfer_1539066212786		<input type="checkbox"/>
<input type="checkbox"/> Font testing_Transfer_1539085026126		<input type="checkbox"/>
<input checked="" type="checkbox"/> IQP AM_Theme_Transfer_1539066190326		<input type="checkbox"/>
<input type="checkbox"/> IQP AT_Theme_Transfer_1539066190326		<input type="checkbox"/>
<input type="checkbox"/> IQP Defaults		<input type="checkbox"/>



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.



Theme name:

**Save** **Cancel**

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*

You cannot delete a baseline theme or a theme that is used in an application.

1. In the main navigation menu, select **APPS**.  
The **APPS** workspace appears.

Apps

ALL APPS RECENTLY CREATED

+ Add new app Import App [Settings] [Navigation] 1 [Navigation] 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	

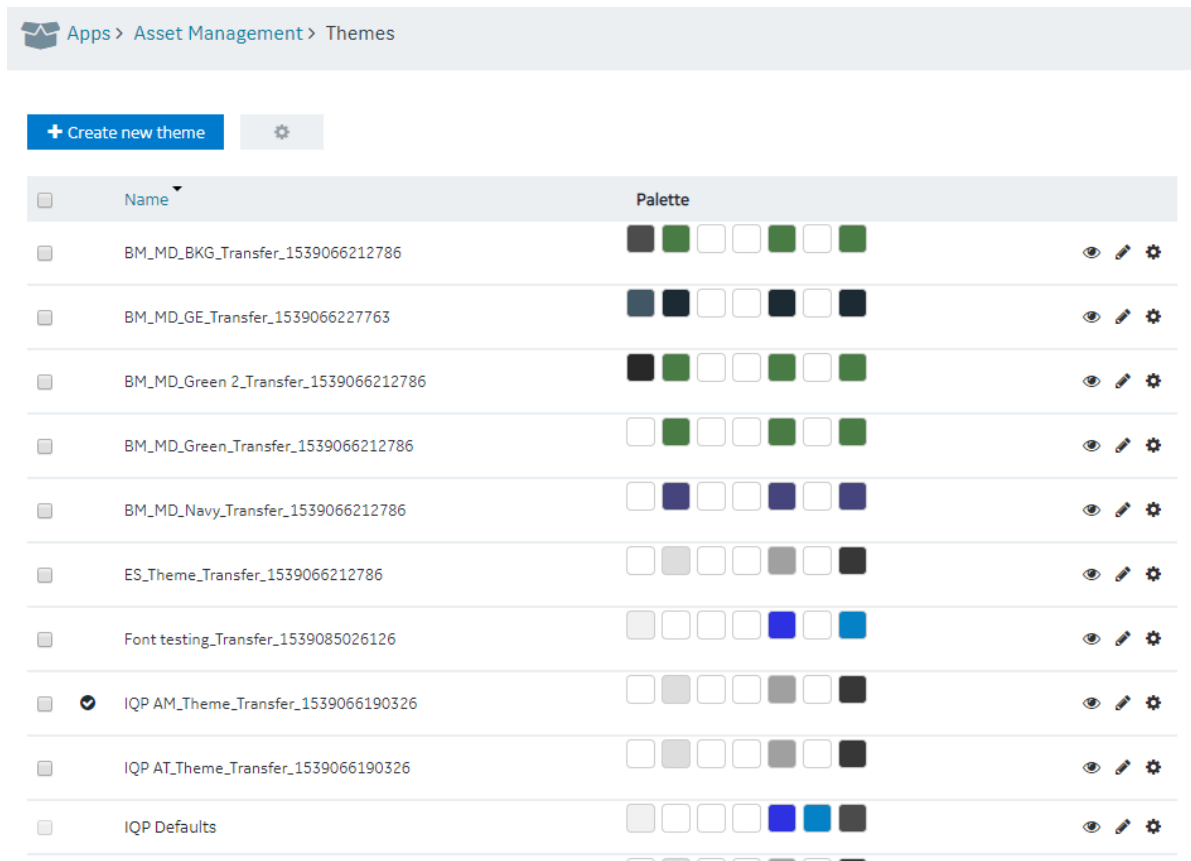
2. In the **Name** column, select an application.  
The **PAGES** workspace appears.



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	

- In the main navigation menu, select **THEME**.  
The **THEME** workspace appears.



- In each row containing a theme that you want to delete, select the check box.
  - 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.
- i Tip:** Alternatively, in each row containing a theme that you want to delete, select , and then select **Delete theme**.
- 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

## *Modify Settings*

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	🔒 ↗️ ⚙️

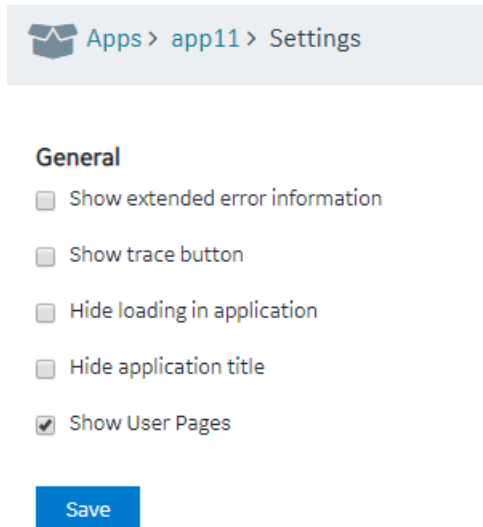
2. In the **Name** column, select the application whose settings you want to modify. The **PAGES** workspace appears.

Apps > Asset Management > Pages

+ Add new page ⚙️ 🔒 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 **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 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.

## 5. Select **Save**.

The settings are modified.

# Widgets

## About Widgets

When you design a page for an application, you can add widgets to the page to display the required information. This article provides information on using the following widgets available in Operations Hub.

## Native Widgets

- Inputs:
  - [Check Box \(page 244\)](#)
  - [Radio Button \(page 245\)](#)
  - [Dropdown \(page 246\)](#)
  - [Input \(page 249\)](#)
  - [Slider \(page 251\)](#)
  - [Toggle \(page 252\)](#)
  - [Button \(page 253\)](#)
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  - [Text Area \(page 255\)](#)
- Display:
  - [Text \(page 255\)](#)
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  - [Image \(page 257\)](#)
  - [Graph \(page 258\)](#)
  - [Visualization \(page 260\)](#)
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## Integration Widgets

- [Trend Chart Overview \(page 310\)](#)
- [Configure the Task Client \(page 316\)](#)

## Custom Widgets

Custom widgets 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 \(page 146\)](#) section.

## *Native Widgets*

### 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.

## Check Box Settings

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:

Type of the Setting	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.
<b>Source</b>	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>



## Using a 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.

 **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.

## Properties

- **Options:** Since radio buttons require multiple options that are mutually exclusive, there are various ways to enter options for each radio button. The following options are available:
  - **Hard Coded:** Options that are created manually by clicking the **Add Option** button. Adding an option creates a button with a user-defined text (that is, option text) and the option value. The target data defines where the information will be sent.
  - **Database:** Instead of specifying the options manually, it is possible to use predefined entities to create the options for a radio button. The target data defines where the information will be sent.
  - **Dynamic:** While the database option can select data directly from an entity, the **Dynamic** option allows values to be selected from queries and displayed directly from the query information.
- **Required:** Specify if an input must be sent to the query.

- **Submit on Charge:** If selected, changing the value of the input submits the query, to which this input is assigned.

## 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.

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

A dropdown is a graphical user interface element that allows a user to select one option out of a set of predefined options. Check boxes can allow for multiple selections, but, like radio buttons, dropdowns require that only one option be selected (multiple selections are not possible). 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.

## Properties

- **Options:** Since dropdowns, like radio buttons, require multiple options that are mutually exclusive, there are various ways to enter options for each dropdown. The following options are available:
  - **Hard Coded:** Options that are created manually by clicking the **Add Option** button. Adding an option creates a button with a user-defined text (that is, option text) and the option value. The target data defines where the information will be sent.
  - **Database:** Instead of specifying the options manually, it is possible to use predefined entities to create the options for a radio button. The target data defines where the information will be sent.
  - **Dynamic:** While the database option can select data directly from an entity, the **Dynamic** option allows values to be selected from queries and displayed directly from the query information.
- **Required:** Specify if an input must be sent to the query.

- **Submit on Charge:** If selected, changing the value of the input submits the query, to which this input is assigned.
- **First Option:** By default, the first option will be blank. But, in many cases, it is recommended to manually insert the first option since this option will be seen by the end user.

## 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.

In this sample, 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.

The image shows a configuration interface for a dropdown menu, titled "Page Data". It has two tabs: "Dropdown Properties" and "Page Data". Under "Page Data", there are three sub-tabs: "Settings" (selected), "Visual", and "Responsive".

The interface is organized into two main sections:

- General:**
  - Label: Select an option
  - Id: [Empty text box]
  - Global Data:
  - Conditions: Add conditions
  - Hidden:
- Data:**
  - Target Data: No available dat... (dropdown)
  - Options: Database (dropdown)
  - Entity: Wiki (dropdown)
  - Value: PREF (dropdown)
  - Display: PREF (dropdown)
  - Source:
    - Data
    - Manual
  - Required:
  - Submit on change:
  - First Option:
    - Option text
    - Option value

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, for example.

In such an application, the **Submit on change** check box should be selected to pass the selected option value to the query.

## *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 in to a database.

## Properties

- **Type:** 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:
  - Text
  - Password
  - Number
  - Hidden
  - Date
  - Time
  - DateTime
  - URL
  - E-mail
- **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**

Wiki Form -> ADDR Value:  Input Data Name:

Wiki Form -> NAME Value:  Input Data Name:

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.
7. In the Button Properties section for the button widget, specify the action to execute the insert query, as shown in the following image.

The image shows a configuration interface for a button. At the top, there are two tabs: 'Button Properties' and 'Page Data'. Below the tabs are three sub-tabs: 'Settings', 'Visual', and 'Responsive'. The 'Settings' sub-tab is active. The interface is divided into two main sections: 'General' and 'Behavior'.  
 In the 'General' section, there are four items:  
 - 'Text': A text input field containing the word 'Submit'.  
 - 'Id': An empty text input field.  
 - 'Conditions': A button labeled 'Add conditions'.  
 - 'Hidden': A checkbox that is currently unchecked.  
 In the 'Behavior' section, there is an 'Actions' list. It contains two items: 'Submit' and 'Wiki Form Add'. Below the list is a blue button labeled '+ Add Action'.

8. 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.

### Slider Settings

- **Source:** The data source can be 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.
- **Submit on Charge:** 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.

## Toggle Settings


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.

Setting	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.
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.

## Button Settings

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.

You can configure the following actions for a button widget.

Action	Description
<b>Submit</b>	Sends information to an entity.
<b>Go to Page</b>	Redirects a user to a different page in the application (for example, from the home page to a different page in the navigation).
<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

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 Settings

When you use a camera widget, in addition to the default settings, the following settings are available.

Setting	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.

## Text Area Settings

To use a text area widget, in addition to the default settings, the following settings are available.

Setting	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 Charge</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.

## Text Settings

To use a text area widget, in addition to the default settings, the following settings are available.

Setting	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.

**Setting****Description**

**Format** You can select one of the following values:

- **Text**
- **DateTime**
- **Date**
- **Time**

The default value is **Text**.

**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*

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 Settings**

To use a header widget, in addition to the default settings, the following settings are available.

**Setting****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.

<b>Setting</b>	<b>Description</b>
----------------	--------------------

<b>Format</b>	You can select one of the following values:
---------------	---

- **Text**
- **DateTime**
- **Date**
- **Time**

The default value is **Text**.

## 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.

## Image Settings

When you use an image widget, in addition to the default settings, the following setting is available:

- **Source:** The data source can be based on which queries have been added in the **Page Data** 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.

## Graph Settings

To use a graph widget, in addition to the default settings, you must specify one of the following types of graphs.

Type of Graph	Description												
<b>Bars</b>	Bar graphs show comparison among categories vertically. Specify the following settings for a bar graph:												
	<table border="1"> <thead> <tr> <th>Setting</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><b>X-axis Label</b></td> <td>Displayed below the graph horizontally.</td> </tr> <tr> <td><b>Y-axis Data</b></td> <td>The data source for the bars.</td> </tr> <tr> <td><b>Y-axis Label</b></td> <td>Displayed on the left side of the bar graph.</td> </tr> <tr> <td><b>Add All Fields</b></td> <td>This will add all the columns from the chosen entity. Each column can be labeled independently.</td> </tr> <tr> <td><b>Sort By</b></td> <td>Since an entity can contain several different types of data, it is possible to sort the data depending on the data in an entity.</td> </tr> </tbody> </table>	Setting	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.
Setting	Description												
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<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.												
<b>Columns</b>	Column graphs are similar to bar graphs but are shown vertically instead of horizontally. Specify the following settings for a column graph:												
	<table border="1"> <thead> <tr> <th>Setting</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><b>X-axis Label</b></td> <td>Displayed below the graph horizontally.</td> </tr> <tr> <td><b>X-axis Data</b></td> <td>The data source for the columns.</td> </tr> <tr> <td><b>Y-axis Label</b></td> <td>Displayed on the left side of the graph.</td> </tr> <tr> <td><b>Add All Fields</b></td> <td>This will add all the columns from the chosen entity. Each column can be labeled independently.</td> </tr> <tr> <td><b>Sort By</b></td> <td>Since an entity can contain several different types of data, it is possible to sort the data depending on the data in an entity.</td> </tr> </tbody> </table>	Setting	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.	<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.
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<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.												

## Type of Graph

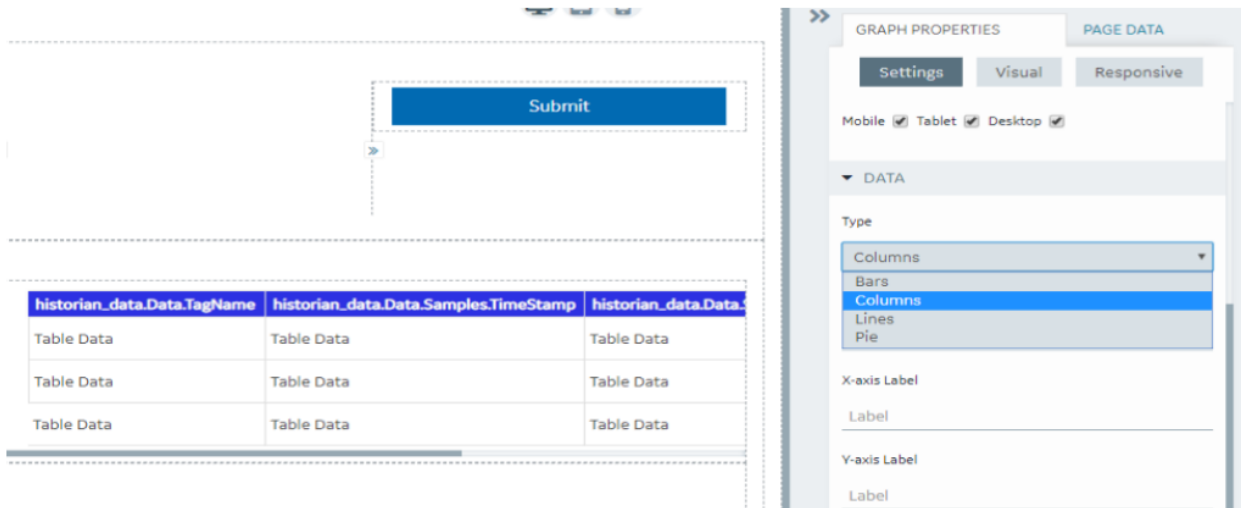
## Description

**Lines** Line graphs show how data changes over specific intervals of time. Specify the following settings for a line graph:

Setting	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:

Setting	Description
<b>Value</b>	The data source for the pie graph.
<b>Title</b>	The title of the graph.
<b>Y-axis Label</b>	Displayed on the left side of the bar graph.
<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

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

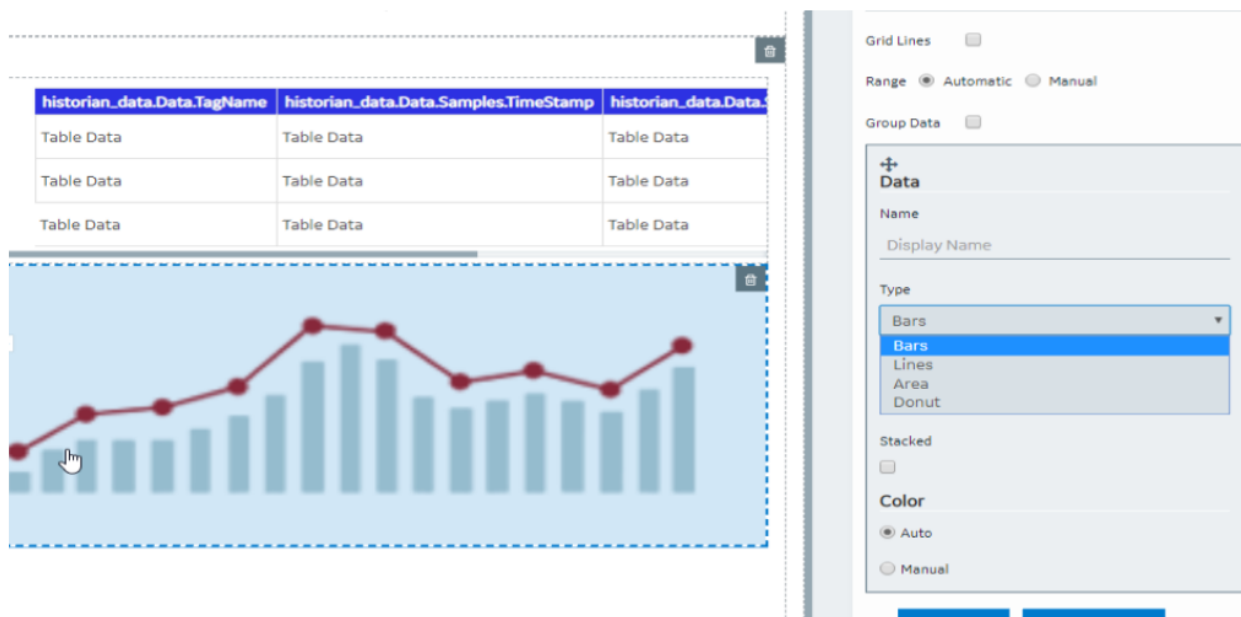
 **Important:** Due to the format of the data returned by Historian REST calls, the Visualization widget cannot display data from Historian sources.

## Visualization Settings

When you use a visualization widget, in addition to the default settings of a widget, the following settings are available.



Setting	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>	<p>Provide values in the following boxes for x-axis settings:</p> <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.</li> <li>• <b>Grid lines:</b> Select this check box if you want to show grid lines.</li> </ul>
<b>Y-axis</b>	<p>Provides values in the following boxes for y-axis settings:</p> <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.



## 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.

Setting	Description
<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.
<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*

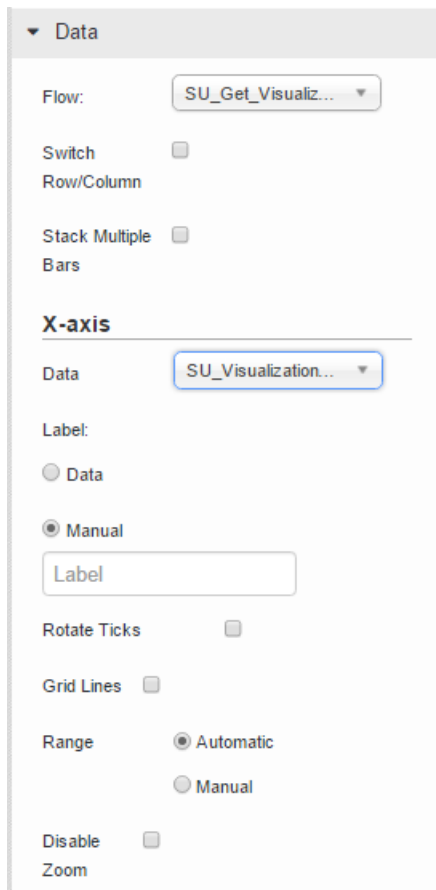
The big data widget is a visualization widget that supports big data. Compared to the visualization widget, the big data widget allows you to specify the range more accurately.

 **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 Settings

When you use a big data widget, in addition to the default settings of a widget, the following settings are available.



The screenshot shows the settings panel for a Big Data widget, titled "Data". The settings are organized as follows:

- Flow:** A dropdown menu set to "SU\_Get\_Visualiz...".
- Switch Row/Column:** A checkbox that is currently unchecked.
- Stack Multiple Bars:** A checkbox that is currently unchecked.
- X-axis:**
  - Data:** A dropdown menu set to "SU\_Visualization...".
  - Label:** Radio buttons for "Data" (unchecked) and "Manual" (checked). Below the "Manual" option is a text input field containing the word "Label".
  - Rotate Ticks:** A checkbox that is currently unchecked.
  - Grid Lines:** A checkbox that is currently unchecked.
  - Range:** Radio buttons for "Automatic" (checked) and "Manual" (unchecked).
  - Disable Zoom:** A checkbox that is currently unchecked.

Tick Culling  Automatic  
 Manual

---

**Y-Axis**

Label:

Data

Manual

Grid Lines

Range  Automatic  
 Manual

Disable

Zoom

Group Data

---

Second Y-axis

**Data**

Name

Type  ▼

Data  ▼

---

**Color**

Auto

Manual

---

**Data**

Name

Type  ▼

Data  ▼

---

**Color**

Auto

Manual

For instructions on configuring these settings, refer to [Visualization \(page 260\)](#).







## 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

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 Settings

When you use a grid widget, in addition to the default settings of a widget, the following settings are available.

Setting	Description
<b>Allow Export</b>	<p>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.</p> <p> <b>Note:</b> This option is not available on iOS.</p>
<b>Tooltips</b>	<p>Select this check box if you want tooltips to appear in the application.</p>
<b>Flow</b>	<p>Select the query that should be used to retrieve information in the grid.</p>
<b>Tree View</b>	<p>Select this check box if you want to display data in a hierarchical view. When you select this check box, the <b>Nested flow</b> box appears, allowing you to select the query that fetches the data for the child level in the hierarchy.</p>
<b>Name</b>	<p>Enter the name of the grid column.</p>
<b>Data</b>	<p>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.</p>
<b>Formula</b>	<p>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.</p>
<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.

Box	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

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).

To display asset locations on the map, you must [access the API key generated by Google \(page 32\)](#).




## Map Settings

When you use a map widget, in addition to providing values for the default fields for a widget, you must define the following settings.

Setting	Description
<b>Label</b>	Identifies the title of the map.



Setting	Description
<b>Display</b>	<p>Identifies the type of the map. You can select one of the following values:</p> <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>	<p>Identifies the layer that you want to display on the map. You can select one of the following values:</p> <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>	<p>Identifies the center point of the map. You can specify the center point using one of the following sources:</p> <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. <ul style="list-style-type: none"> <li>📌 <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.</li> </ul> </li> <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. <ul style="list-style-type: none"> <li>📌 <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.</li> </ul> </li> </ul>

Setting	Description												
<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.												
	<table border="1"> <thead> <tr> <th>Section</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><b>Position</b></td> <td>           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> </td> </tr> <tr> <td><b>Label</b></td> <td>           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 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> </td> </tr> <tr> <td><b>Marker Icon</b></td> <td>Select the icon and color of the marker.</td> </tr> <tr> <td><b>Condition</b></td> <td>           Select <b>Add conditions</b>, and then specify the conditions for displaying the marker.           <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> </td> </tr> <tr> <td><b>Actions</b></td> <td>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).</td> </tr> </tbody> </table>	Section	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>	<b>Label</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 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>	Select <b>Add conditions</b> , and then specify the conditions for displaying the marker. <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>	<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).
Section	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>												
<b>Label</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 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>												
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<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).												

Setting	Description										
<b>SHAPES</b>	<p>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.</p>										
	<p>Select <b>Add Shape</b>, and then enter or select values in the following sections or boxes that appear.</p>										
	<table border="1"> <thead> <tr> <th>Section</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><b>Position</b></td> <td> <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> </td> </tr> <tr> <td><b>Radius</b></td> <td> <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 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> </td> </tr> <tr> <td><b>Color</b></td> <td> <p>Select the color of the shape. You can also specify the opacity.</p> </td> </tr> <tr> <td><b>Condition</b></td> <td> <p>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.</p> </td> </tr> </tbody> </table>	Section	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>	<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 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>	<b>Color</b>	<p>Select the color of the shape. You can also specify the opacity.</p>	<b>Condition</b>	<p>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.</p>
Section	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>	<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 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>										
<b>Color</b>	<p>Select the color of the shape. You can also specify the opacity.</p>										
<b>Condition</b>	<p>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.</p>										

### Table

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 Settings

When you use a table widget, in addition to the default settings for a widget, the following settings are available.

Setting	Description
<b>Allow Download</b>	<p>Select this check box if you want to provide an option to application users to download the data displayed in the table.</p>
<b>Flow</b>	<p>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.</p>
<b>Name</b>	<p>Enter the name of the table column.</p>

Setting	Description
<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" button</b> 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" button:</b> 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.

## List Settings

When you use a list widget, in addition to the default settings of a widget, the following setting is available.

Setting	Description
<b>Source</b>	Identifies the source of the list values. You can specify one of the following types of sources: <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.

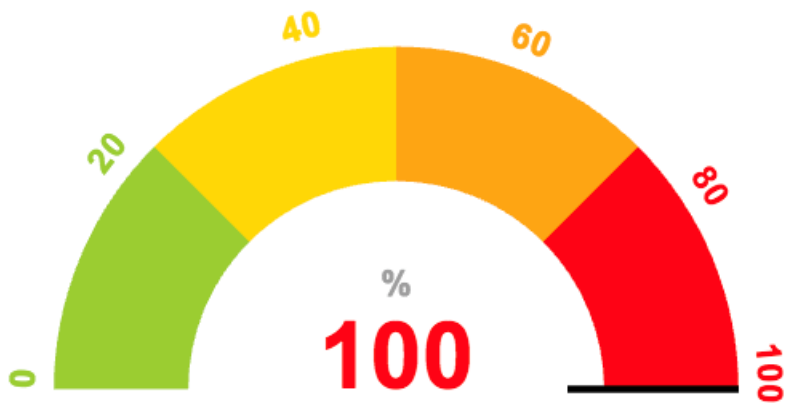
## Types of Gauge Widgets

The following types of gauge widgets are available:

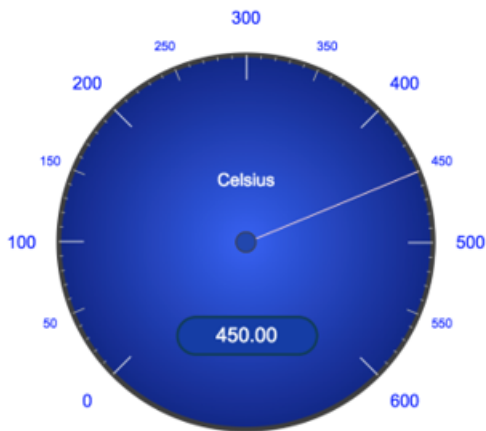
- **Battery:** In this gauge type, the value is plotted on a horizontal scale. This is the default gauge type. For example, the following image can represent a gauge that plots the speed of a vehicle in kph. The color-coded scale highlights whether the speed of the vehicle is safe or risky.



- **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.



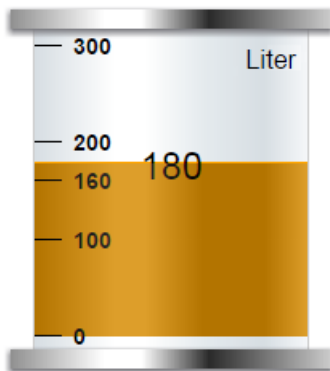
- **Meter - Radial:** In this gauge type, the value is plotted on a circular scale. The gauge can be an internal radial or an external radial depending on whether the scale appears inside the radial or outside. For example, the following image represents an external radial meter gauge that plots the 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.



## Gauge Settings

When you use a gauge widget, in addition to providing values for the default fields for a widget, you must define the following settings:

Type of the Setting	Applicable Gauge Types	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>


Type of the Setting	Applicable Gauge Types	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. For example, suppose you want to plot the speed of a vehicle. You want to categorize the speed range as follows:</p> <table border="1"> <thead> <tr> <th>Speed Range (in kph)</th> <th>Category</th> </tr> </thead> <tbody> <tr> <td>0 - 100</td> <td>Acceptable</td> </tr> <tr> <td>101 - 160</td> <td>Slightly risky</td> </tr> <tr> <td>161 - 200</td> <td>Risky</td> </tr> <tr> <td>200 - 260</td> <td>Highly risky</td> </tr> </tbody> </table> <p>In this case, you will create four sectors and define the following settings:</p> <table border="1"> <thead> <tr> <th>Sector number</th> <th>Start position</th> <th>Color</th> <th>Label</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>Green</td> <td>Acceptable</td> </tr> <tr> <td>2</td> <td>101</td> <td>Yellow</td> <td>Slightly risky</td> </tr> <tr> <td>3</td> <td>161</td> <td>Orange</td> <td>Risky</td> </tr> <tr> <td>4</td> <td>200</td> <td>Red</td> <td>Highly risky</td> </tr> </tbody> </table> <p> <b>Tip:</b> In the <b>Color</b> box, you can enter a color name or the hexadecimal code of the color.</p>	Speed Range (in kph)	Category	0 - 100	Acceptable	101 - 160	Slightly risky	161 - 200	Risky	200 - 260	Highly risky	Sector number	Start position	Color	Label	1	0	Green	Acceptable	2	101	Yellow	Slightly risky	3	161	Orange	Risky	4	200	Red	Highly risky
Speed Range (in kph)	Category																															
0 - 100	Acceptable																															
101 - 160	Slightly risky																															
161 - 200	Risky																															
200 - 260	Highly risky																															
Sector number	Start position	Color	Label																													
1	0	Green	Acceptable																													
2	101	Yellow	Slightly risky																													
3	161	Orange	Risky																													
4	200	Red	Highly risky																													
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</b>, <b>Maximum</b>, <b>Units</b>, and <b>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>																														



Type of the Setting	Applicable Gauge Types	Description
Visual	All gauges	<p>Identifies the color for the markings and the background of the widget. The following settings are available:</p> <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>



### Html

A 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 a dropdown widget, you can use html code, along with css code, to create the drop-down list box with customized look and feel.

 **Note:** The interaction of the html code can change based on how the responsive design works for some elements.

## Html Settings

When you use a html widget, in addition to the default settings of a widget, the following settings are available.

Setting	Description
<b>Add Field</b>	<p>Select this button to add an entity field for which you want to use html code. Using these fields, you can connect data to components that you create using the html widget.</p> <p> <b>Tip:</b> You can select Add All Fields to add all the entity fields at once.</p>
<b>Edit Code</b>	<p>Select this button to access a code editor for html, css, and javascript codes. You can enter the custom code in the code editor.</p> <p> <b>Tip:</b> The javascript code editor contains instructions on how to use the javascript API.</p>

Setting	Description
<b>Scoped css?</b>	<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 a Html widget

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. Using page designer, add the html and dropdown widgets to the page.
2. Provide values in the **Dropdown Properties** section as specified in the following table.

Box	Description
<b>Label</b>	Enter Select an option.
<b>Id</b>	Enter ytID.
<b>Global Data</b>	Select the check box.

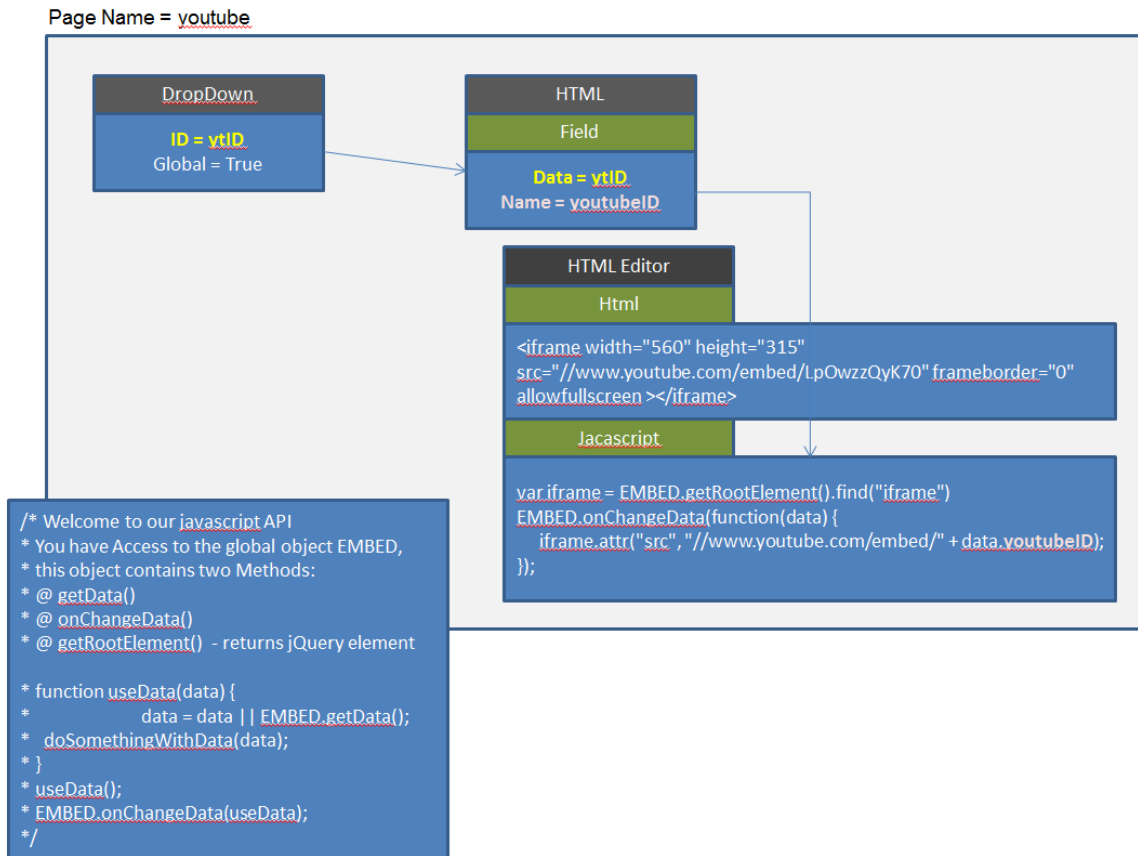
3. Provide values in the **HTML Properties** section as described in the following table.

Box	Description
<b>Data</b>	Select the check box, and then select the variable that stores the drop-down list box values.

The

4. Specify the name of the dropdown widget as ytID, and set it to global so that the html widget can access options in the drop-down list box.

A relationship is created between the dropdown and html widgets as shown in the following image.

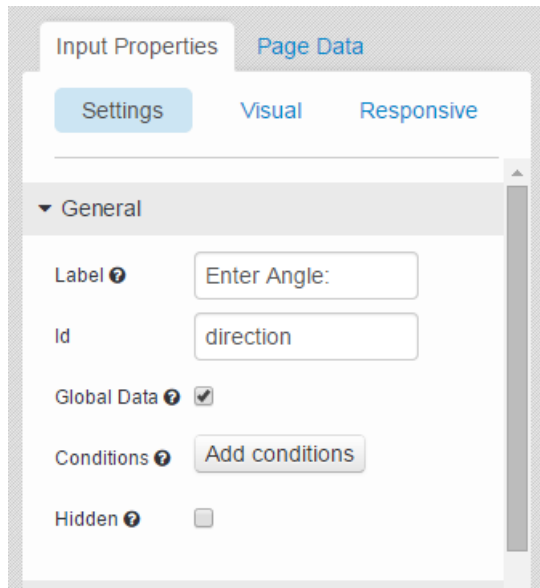


Suppose you want to create an application with the following pages:

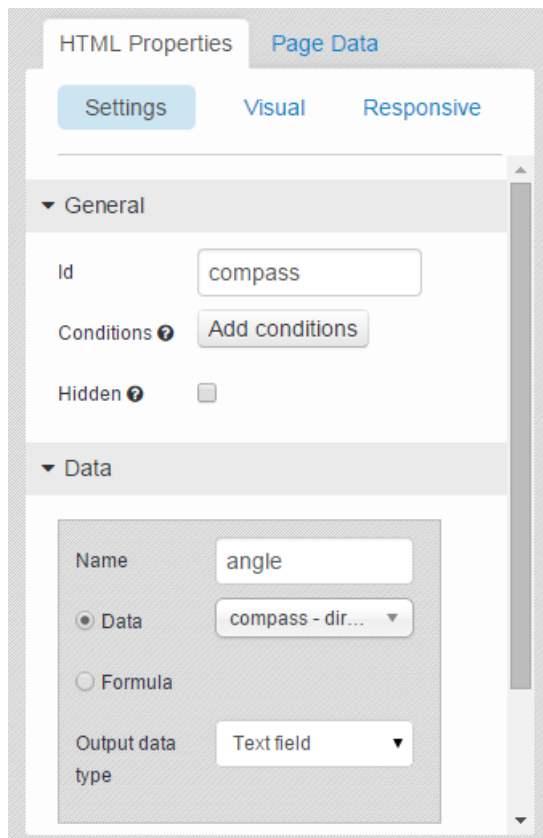
- **Compass:** Displays a compass with the needle indicating the angle that an application user enters.
- **Stylish Header:** Displays text in a header with special effects.
- **Tiles:** Displays tiles of various colors.
- **Marquee:** Displays text that moves from one end to the other of the page.

To do so, perform the following steps:

1. In the page designer for the **Compass** page:
  - a. Add a text widget, and provide values as shown in the following image.



b. Add a html widget below the text widget, add a field, and provide values as shown in the following image.



c. In the **Html** section, enter the lines of code shown in the following image.

```

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>

```

d. In the **Css** section, 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 {

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;
} }
```

e. In the **Javascript** section, enter the lines of code as shown in the following image.

```

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

```

2. In the page designer for the **Stylish Header** page:

a. In the **Html** section, enter the following lines of code:

```
<h1>3d text effect</h1>
```

b. In the **Css** section, enter the following lines of code:

```

body{
    text-align:center;
    background:#dfdfff;
}
h1{
    text-transform:uppercase;
    font-size:72px;
    font-family:'Verdana';
    padding:30px;
}

```

c. In the **Javascript** section, enter the following lines of code:

```

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)');
    });
}

```



```
});
```

3. In the page designer for the **Tiles** page:

a. Add a html widget.

b. In the **Html** section, enter the following lines of code:

```
<div class="tile"></div>
```

c. In the **Css** section, enter the lines of code as shown in the following image.

```

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
14     100%); /* FF3.6+ */
15     background: -webkit-gradient(linear, left top, left bottom, color-stop(0%,#f0b7a1), color-
16     stop(50%,#8c3310), color-stop(51%,#752201), color-stop(100%,#bf6e4e)); /* Chrome,Safari4+
17     */
18     background: -webkit-linear-gradient(top, #f0b7a1 0%,#8c3310 50%,#752201 51%,#bf6e4e
19     100%); /* Chrome10+,Safari5.1+ */
20     background: -o-linear-gradient(top, #f0b7a1 0%,#8c3310 50%,#752201 51%,#bf6e4e 100%); /*
21     Opera 11.10+ */
22     background: -ms-linear-gradient(top, #f0b7a1 0%,#8c3310 50%,#752201 51%,#bf6e4e 100%); /*
23     IE10+ */
24     background: linear-gradient(to bottom, #f0b7a1 0%,#8c3310 50%,#752201 51%,#bf6e4e 100%);
25     /* W3C */
26     filter: progid:DXImageTransform.Microsoft.gradient( startColorstr='#f0b7a1',
27     endColorstr='#bf6e4e',GradientType=0 ); /* IE6-9 */
28 }

```

4. In the page designer for the **Marquee** page:

a. Add a html widget.

b. In the **Html** section, enter the lines of code as shown in the following image.

```

Html  Css  Javascript
1 <marquee><h1>This text will scroll from right to left</h1></marquee>
2 </br>
3 <marquee direction="up">
4   <div class="up1">once upon a time</div>
5   <div class="up2">far far a way</div>
6 </marquee>

```

c. In the **Css** section, enter the lines of code as shown in the following image.

```

Html  Css  Javascript
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 #b9b9b9,
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 }

```

5. Save the application, and preview it.

The application contains the four pages.

### 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 Settings

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.

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.

Setting	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 predefined 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>

Setting	Description
<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>
<b>Image</b>	Identifies the image for the marker. This setting appears only if you have selected <b>Image</b> in the <b>Marker Type</b> setting.  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.
<b>Size</b>	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.
<b>Label</b>	Identifies the text for the marker label if you want to display the label.
<b>Label Color</b>	Identifies the color of the label as it appears in the application.
<b>Data Label</b>	Identifies the data that is associated with the marker.  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.  You can select one of the following types of data labels: <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 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> </ul>
<b>Data Label Color</b>	Identifies the color and opacity of the data label.
<b>Conditions</b>	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.
<b>Actions</b>	Identifies the actions to be performed when the marker is selected.

 **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

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

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

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.

<b>Setting</b>	<b>Description</b>
Show/Hide	You can show or hide a container from the application for each of the following device types: <ul style="list-style-type: none"> <li>• Mobile</li> <li>• Tablet</li> <li>• Desktop</li> </ul>

Setting	Description
Conditions	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.
Performance	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.

## 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

## Repeater Settings

When you use a repeater, in addition to providing values to the default fields for a widget, you must define the following settings.




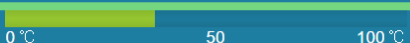
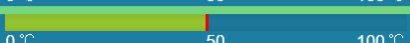
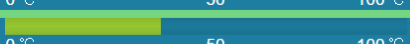



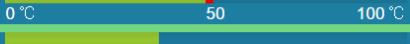
Setting	Description
Flow	Identifies the query to use to fetch data displayed in the repeater.
Multi-select	This setting is used in combination with a map or a graph widget. If you select this check box, a check box appears in each row of the repeater in the application, allowing the user to select which 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	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.  You can add multiple actions.

Setting	Description																						
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> <table> <thead> <tr> <th>Device 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> <thead> <tr> <th>Device ID</th> <th>Latest Time Stamp</th> <th>Device 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>	Device 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	Device ID	Latest Time Stamp	Device 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
Device ID	Latest Time Stamp																						
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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																						
Device ID	Latest Time Stamp	Device 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																				

## 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

To do so, perform the following steps:

1. Create the following queries:

- **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: M2M\_data

---

**Output Data**

Field	Function	Access	
M2M_data -> device_id	None	All users	🗑️

[+ Add field](#) [+ Add all fields](#)

---

**Conditions**

Required  M2M\_data -> metric = Fixed value String Temperature

[+ Add](#)

---

**Role Conditions**

[+ Add role condition](#)

---

**Advanced**

Distinct:

Order By: M2M\_data -> device\_id Order: Asc

[+ Add](#)

Group By: [+ Add](#)

- **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.

Queries > GetLastDeviceTemperature 🔒

Description: \_\_\_\_\_

Query Type:  Get  
 Update  
 Insert  
 Delete

Entity: M2M\_data

---

### Output Data

Field	Function	Access	
M2M_data -> device_id	None	All users	🗑️
M2M_data -> data	None	All users	🗑️
M2M_data -> timestamp	None	All users	🗑️

[+ Add field](#) [+ Add all fields](#)

---

### Conditions

Required	M2M_data -> device_id	=	Input field	DeviceID	String	And	🗑️
Required	M2M_data -> metric	=	Fixed value	String	Temperature		🗑️

[+ Add](#)

---

### Role Conditions

[+ Add role condition](#)

---

### Advanced

Distinct:

Order By:

M2M_data -> timestamp	Order: Desc	🗑️
-----------------------	-------------	----

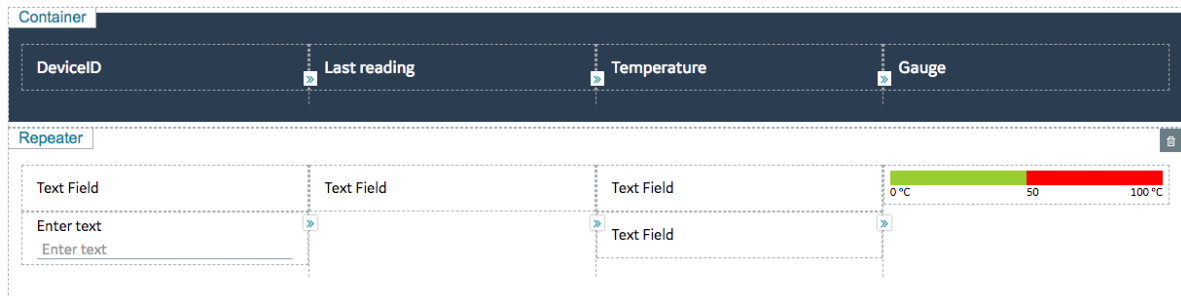
[+ Add](#)

Group By: [+ Add](#)

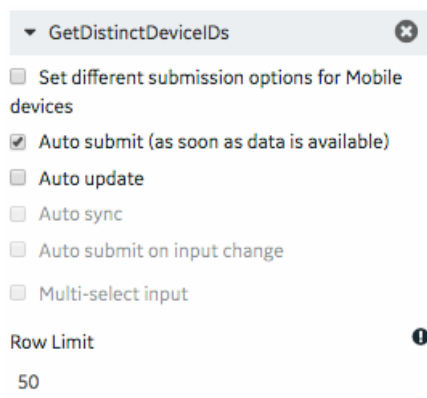
2. Create an application, and then add a page.
3. Add a container to the page for the heading row, and perform the following steps:
  - a. Split the container into four columns.
  - b. In each column, add a header widget to contain the column headings.
  - c. Specify the following column headings:
    - 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.



- 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 GetDIstinctDeviceIDs 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:
  - Drag DeviceID to the input widget in the first column of the repeater.
  - Drag M2M\_data.timestamp to the text widget in the second column of the repeater.
  - 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.

Text Conditions ✕

M2M\_data.data <= Manual 50

+ Add condition Done

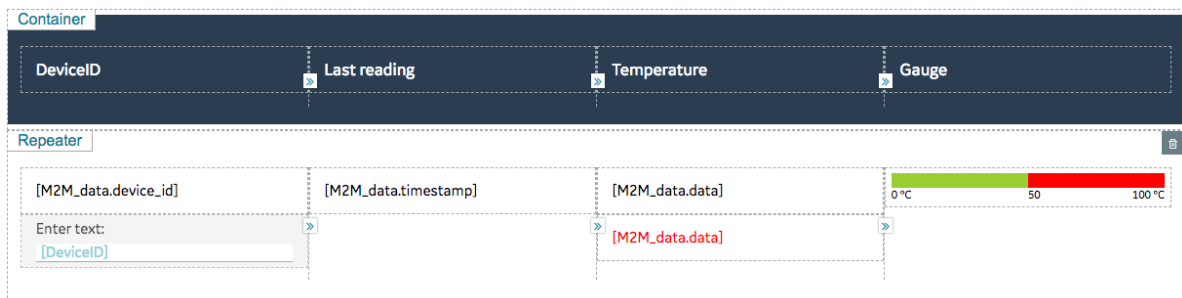
13. Select the second text widget in the third column of the repeater, and in the **TEXT PROPERTIES** section, perform the following steps:
  - a. In the **Visual** section, select the **Custom Colors** check box, and then in the **Color** box, select red.
  - b. Select **Add Conditions**, and then specify 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.

**i Tip:** If you want to enter °C, you can copy it from a Microsoft Word document.

The repeater widget appears as shown in the following image.



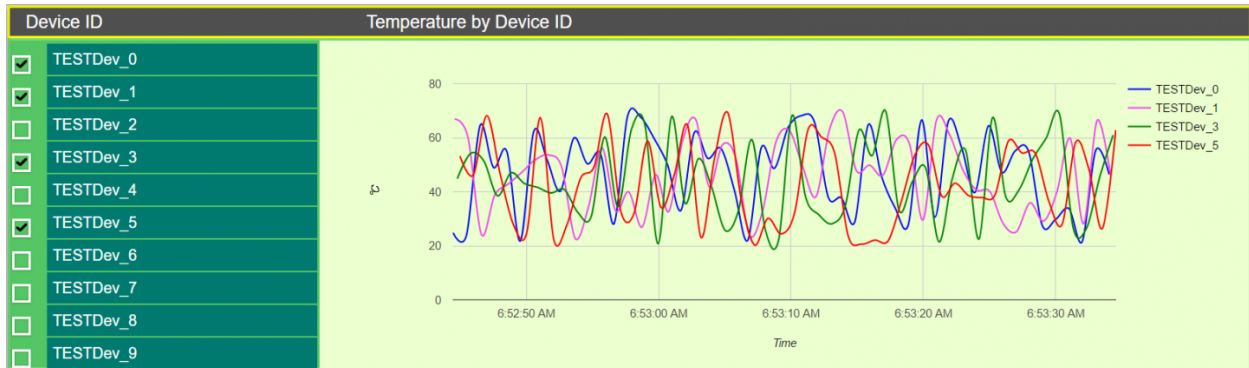
15. Save the application, and preview it.

The application appears as shown in the following image.

DeviceID	Last reading	Temperature	Gauge
ev1230	03/12/2019 06:10:58.295 pm	45.03	
ev1231	03/12/2019 06:10:58.497 pm	44.16	
ev1232	03/12/2019 06:10:58.703 pm	51.88	
ev1233	03/12/2019 06:10:58.908 pm	55.7	
ev1234	03/12/2019 06:10:59.112 pm	52.65	
ev1235	03/12/2019 06:10:59.318 pm	45.53	
ev1236	03/12/2019 06:10:59.521 pm	57.99	
ev1237	03/12/2019 06:10:59.727 pm	42.5	
ev1238	03/12/2019 06:10:59.930 pm	43.5	
ev1239	03/12/2019 06:11:00.134 pm	47.32	

## Using a 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.



To do so, perform the following steps:

1. Create the following queries:
  - 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: M2M\_data

---

**Output Data**

Field	Function	Access	
M2M_data -> device_id	None	All users	🗑️

[+ Add field](#) [+ Add all fields](#)

---

**Conditions**

Required  M2M\_data -> metric = Fixed value String Temperature [🗑️](#)

[+ Add](#)

---

**Role Conditions**

[+ Add role condition](#)

---

**Advanced**

Distinct:

Order By: M2M\_data -> device\_id Order: Asc [🗑️](#)

[+ Add](#)

Group By: [+ Add](#)

- **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.



Queries > GetLastDeviceTemperature 🔒

Description: \_\_\_\_\_

Query Type:  Get  
 Update  
 Insert  
 Delete

Entity: M2M\_data

---

### Output Data

Field	Function	Access	
M2M_data -> device_id	None	All users	🗑️
M2M_data -> data	None	All users	🗑️
M2M_data -> timestamp	None	All users	🗑️

[+ Add field](#) [+ Add all fields](#)

---

### Conditions

Required	M2M_data -> device_id	=	Input field	DeviceID	String	And	🗑️
Required	M2M_data -> metric	=	Fixed value	String	Temperature		🗑️

[+ Add](#)

---

### Role Conditions

[+ Add role condition](#)

---

### Advanced

Distinct:

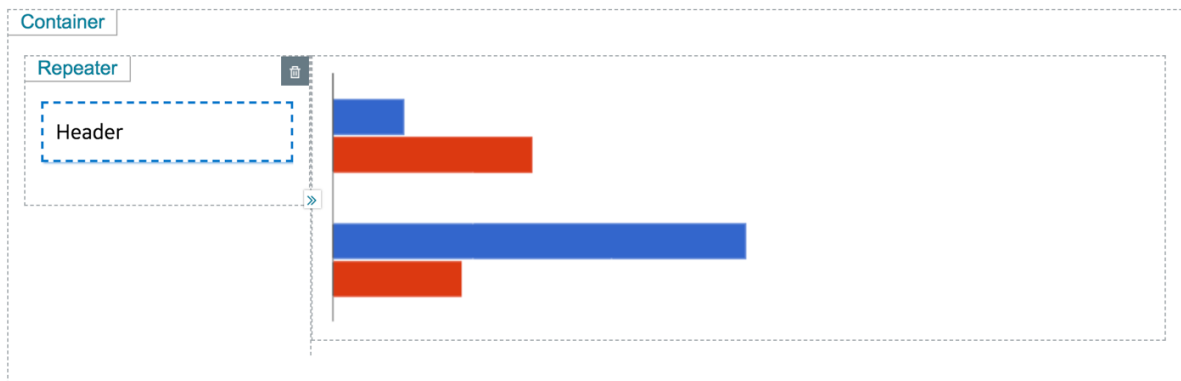
Order By:

M2M_data -> timestamp	Order: Desc	🗑️
-----------------------	-------------	----

[+ Add](#)

Group By: [+ Add](#)

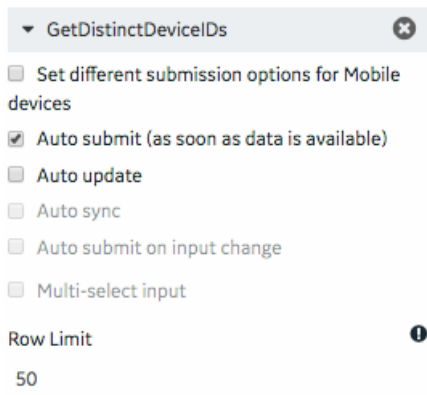
2. Create an application, and then add a page.
3. Add a container with six columns.
4. Except for the first column, merge the other five columns.
5. Add a repeater and a graph widget to the container, and add a header widget to the repeater, as shown in the following image.



- 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.



- 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

Interval 2

Units

Seconds

Auto sync

Auto submit on input change

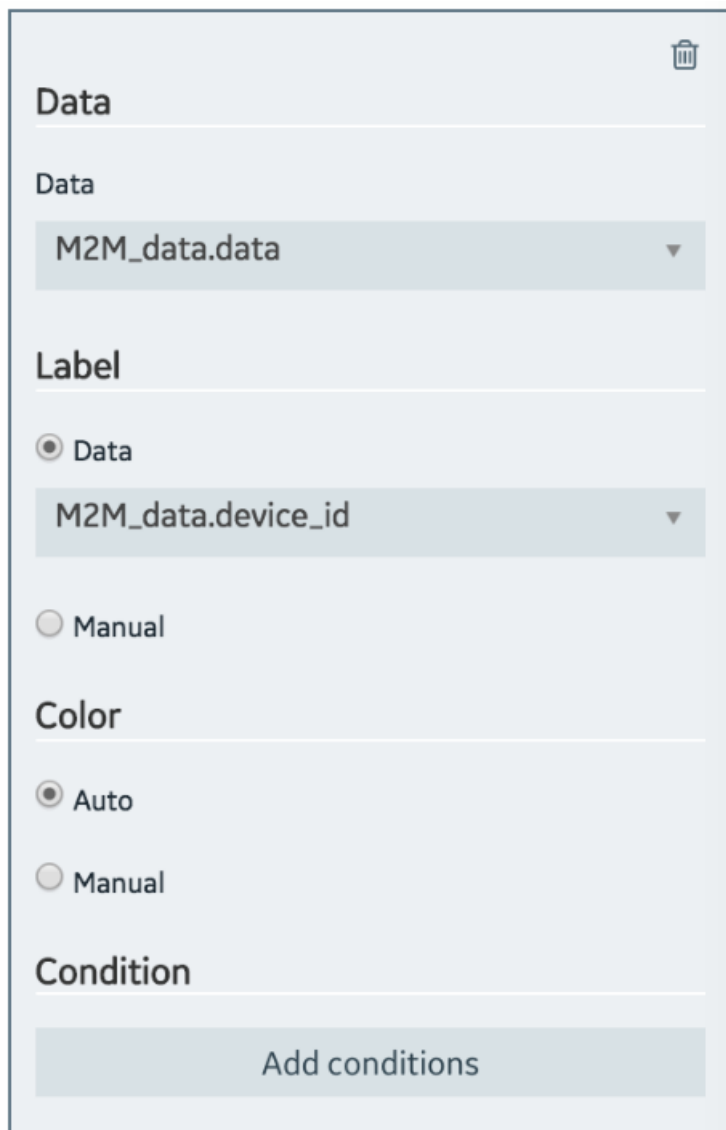
Multi-select input


DeviceID ▼

Row Limit ⓘ

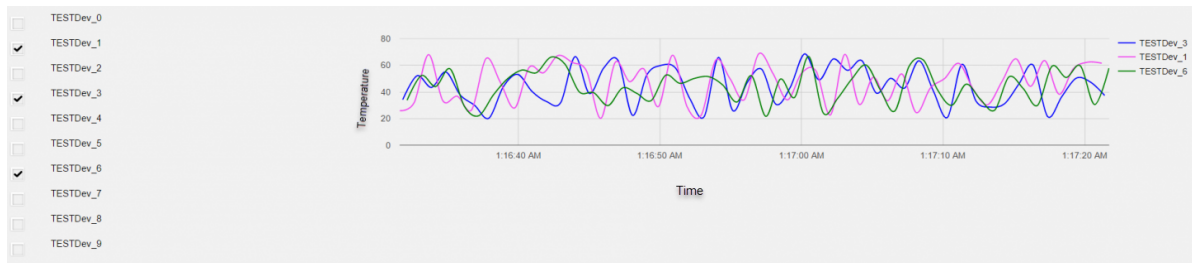
50

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:
  - In the **Type** box, select **Lines**.
  - In the **X-axis Data** box, select M2M\_data.timestamp from the GetLatestDeviceTemperature query.
  - In the **X-axis Label** box, enter Time.
  - In the **Y-axis Label** box, enter Temperature.
  - In the **Data** box, select M2M\_data.data from the GetLatestDeviceTemperature query.
  - 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.

### Using the Event Settings Widget to Control an Event

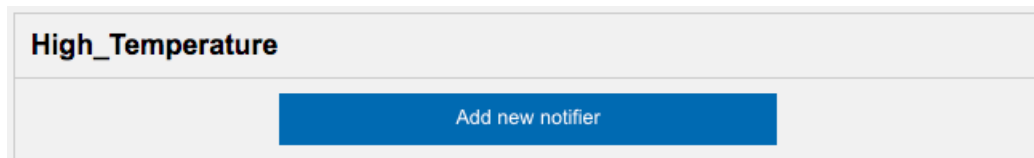
Suppose you want to trigger an event to send email notifications when the temperature recorded by a device reaches a certain limit, and you want users to specify the limit using the application. To do so, perform the following steps:

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.

**i** **Tip:** For information on creating an event, refer to the [Events \(page 156\)](#) 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.

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.

## Upload Excel Settings

When you use an upload excel widget, in addition to providing values for the default fields for a widget, you must define the following settings.

**!** **Important:** Only workbooks with a single worksheet are supported in the upload excel widget.

Setting	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 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 Row Names</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>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.  <b>Tip:</b> If you want to import data in all the rows in the workbook, leave the <b>to row</b> box blank.
<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.

Setting	Description
<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.

**Using the Upload Devices Widget**

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 device gateway or asset. This is the ID that the device will use when sending data using REST APIs or MQTT APIs.	This column is required.	device_gateway M2M_groups_device_thing	device_id 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.		



<b>Column Heading</b>	<b>Purpose</b>	<b>Usage</b>	<b>Mapped to Entity</b>	<b>Mapped to Entity Field</b>
group_name	Identifies the name of the device group. If the group does not exist in Operations Hub, it will be created.	This column is required. If devices are not grouped, we recommend that you enter the same value as in the device_type column.	M2M_groups M2M_groups_device_thing	group_name group_name
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 Widgets

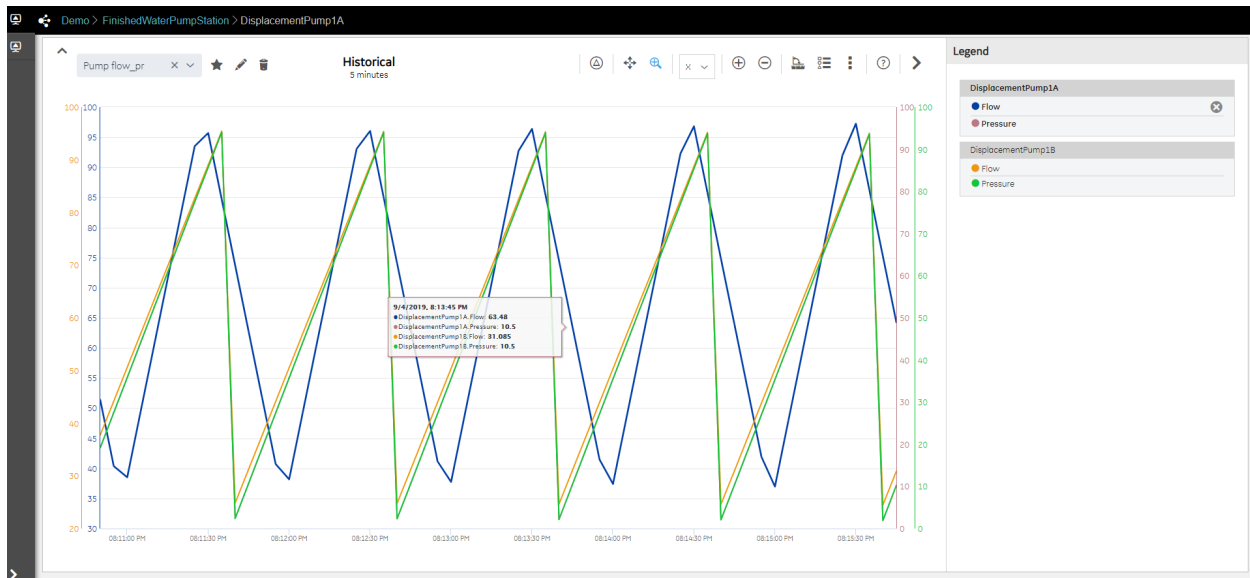
### Trend Chart

#### Trend Chart Overview


The trend chart widget allows you to plot real time data and historical data from Historian servers. You can plot the data using the context of a model or browse for a Historian 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.



The following image shows an example of a trend chart.



The following table provides the tasks that you can perform on a trend chart.





Task	Procedure
Access the properties used in a trend chart.	The properties used in a trend chart appear in the <b>Legend</b> section.
Remove a property from a trend chart.	In the <b>Legend</b> section, in the row containing the property, select  .

Task	Procedure
Increase the area of a trend chart.	<ul style="list-style-type: none"> <li>• Hide the toolbar by selecting .</li> <li>• Hide the <b>Legend</b> section by selecting .</li> </ul>
Pause the data flow of a trend chart.	In the toolbar, select  . You can resume the data flow by selecting  . This option is available only for the live mode.
View the delta value between two data points.	In the toolbar, select  , and select the two data points whose delta value you want to view. The delta value appears in the <b>Legend</b> section.
Drill down a trend chart.	<p>In the toolbar, select  to drill down a trend chart for more granular information. You can select  to zoom out of the chart.</p> <p>If you want to zoom in or zoom out a single axis, select the axis in the drop-down list box adjacent to .</p> <p>If you want to enlarge an area on the chart, select , and then select the area on the chart.</p>
Pan across a trend chart.	In the toolbar, select  , and then drag the mouse pointer to the area on that chart that you want to view.
Mark a trend chart view as favorite. It is an easy way to view the trend chart for commonly used configuration settings.	<p>In the toolbar, select , enter a name for the view, and then select <b>Add</b>. To access a favorite view, in the drop-down list box adjacent to , select the view.</p>
View the statistics of tags plotted on a trend chart.	<p>In the toolbar, select . The statistical data of the Historian tags used in the trend chart appear below the chart. You can remove the statistical data from below the chart by selecting  again.</p>
Export the trend chart data.	In the toolbar, select  , and then select  . The trend chart data is exported as a CSV file as defined by the Historian sampling mode for a selected duration.
Print a trend chart.	In the toolbar, select  , and then select  .

Task	Procedure
Reset the trend chart options.	In the toolbar, select  , and then select  . Any changes you have made to the duration, axis preferences, and properties are reverted.

## Recommendations While Using a Trend Chart


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.

### Configure Trend Chart Settings

1. [Create a data source to connect to Historian \(page 208\)](#).
2. [Set up the Historian server \(page 194\)](#).

1. Access the trend chart whose settings you want to configure.

2. In the toolbar of the chart, select . The **Trend Configuration** window appears.

### Trend Configuration ✕

**Mode** Live Historical

**Duration** 1M 5M 30M 1H 2H 4H 8H 24H Custom

0 : 0 : 5 : 0

**Start** 2019-09-04 20:10:45 📅

**Sampling Mode** Interpolated ▼

**Sampling Increment** By Time ▼ 5 Second ▼

**Notes**




**Items**









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		Source Type
<input checked="" type="checkbox"/>	Assets	
<input type="checkbox"/>	Historian	
<input type="checkbox"/>	Mode	H
<input checked="" type="checkbox"/>	Flow	H
<input type="checkbox"/>	OperatingMode	H
<input checked="" type="checkbox"/>	Pressure	H
<input type="checkbox"/>	RunningStatus	H

3. Modify the trend chart settings as specified in the following table.

Setting	Description
<b>Mode</b>	<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.</li><li>• <b>Historical</b>: Plots historical data from a Historian server.</li></ul>
<b>Duration</b>	<p>Select the duration for which you want to plot the data. If you want to select a duration that is not included in the default options, select <b>Custom</b>.</p> <p> <b>Note:</b> For historical data, instead of duration, you can specify a start date in the <b>Start</b> box.</p>
<b>Start</b>	<p>Select the start date for the historical data. This option is available only for the historical mode.</p> <p> <b>Note:</b> Instead of the start date, you can specify a duration in the <b>Duration</b> box.</p>
<b>Sampling Mode</b>	<p>Select the sampling mode that you want to use to plot the data. This option is available only for the historical mode. For information on the various sampling modes, refer to the Historian documentation.</p>
<b>Sampling Increment</b>	<p>Select whether you want to increment the sampling data based on time or count, and then specify the time or count, respectively.</p> <p> <b>Note:</b> The sampling increment may not always be honored. The maximum number of data points plotted on the trend chart is 500. You can zoom in to view more accurate data.</p>

Setting	Description
<p><b>Notes</b></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> <p> <b>Note:</b> You cannot modify or delete a note; if you want to augment a note, you can add additional notes.</p> <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 property 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>
<p><b>Items</b></p>	<p>Select the properties or tags that you want to add to the trend chart. The following options are available:</p> <ul style="list-style-type: none"> <li><b>Assets:</b> Displays the asset model that has been 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.</li> <li><b>Historian:</b> Displays the Historian servers configured in the system. You can browse through the servers for tags that you want to add to the trend chart.</li> </ul> <p> <b>Tip:</b> You can search for a tag or a property by selecting . You can also perform a wild card search by entering *.</p>

## Task Client

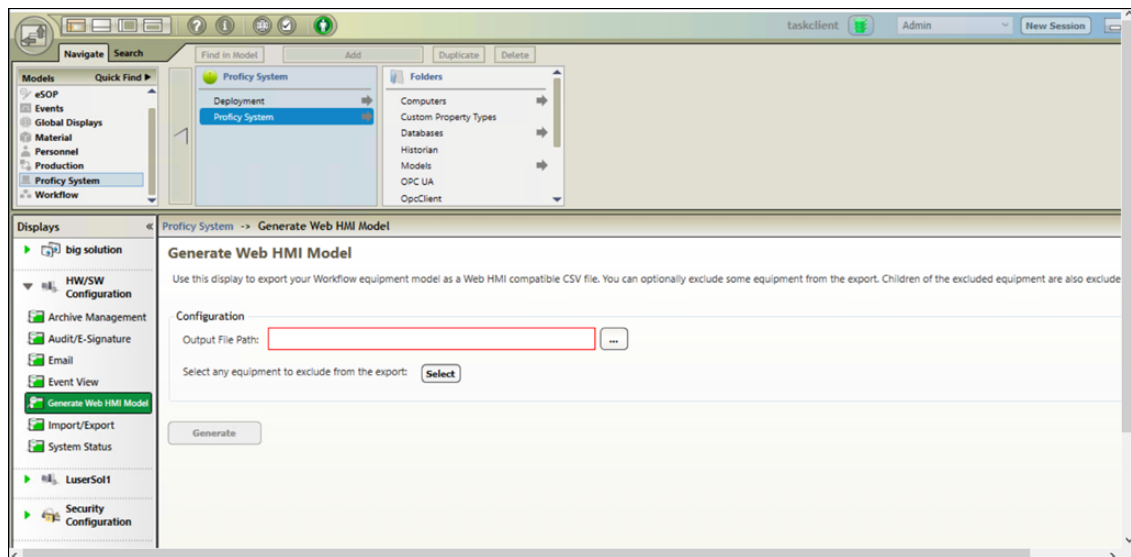
### *Configure the Task Client*

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 Web HMI 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 \(page 317\)](#) section.
  - 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 [Import Equipment Model \(page 317\)](#) section.


### 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.

- 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*

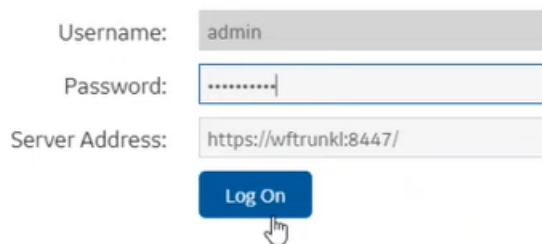
Use the Task Client widget to display task lists from the Workflow application in Operations Hub.

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.

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.

- 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

- Enter the details as specified in the following table:


Field	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.


- Select **Log On**.




The task count icon indicates the status of your workflow connection.


Status	Description
	<p>Indicates that the Workflow server is disconnected due to either of these reasons:</p> <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> <p> <b>Note:</b> All tasks in Operations Hub remain disabled until a connection is established.</p>
	<p>Indicates that the Workflow server is connected.</p> <p>Once connected, the task count shows the number of workflow tasks. If the count is 0, it means there are no workflows.</p>

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
	<p>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.</p>

Icon	Description
	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>
	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><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>

 **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.

## General Reference

### Elements of a Page

This topic describes the various elements that you can add to a page and the settings that you can configure.

#### Elements

You can add UI elements of the following categories to a page:

- **Inputs:** Contains UI elements that receive input from application users, such as a button, check box, drop-down list box, slider, toggle, and other elements.
- **Display:** Contains UI elements that display information in the application, such as plain text, image, graph, map, table, and other elements.
- **Layouts:** Contains UI elements that are used to create a layout in the page, such as a container, separator, new line, and repeater.
- **Tools:** Contains UI elements that allow application users to upload an Excel worksheet to load data into an entity, upload a list of devices in a CSV format, or manage events.
- **Custom:** Contains custom UI plug-in elements that have been uploaded by an application developer.

#### Settings

The following table describes the settings that you can configure for a UI element. This list is not comprehensive.

Setting	Description
Actions	The action that should be triggered when the element is selected.
Allow Export	Indicates whether data that appears in the element can be exported. By default, this check box is cleared.
Conditions	The condition based on which the element appears in the application. For example, you can create a condition that a control button or a warning image be displayed if the temperature recorded by the sensor exceeds 40 degrees Celsius.
Disabled	Indicates whether you want the element to appear as disabled in the application.
False Label	The label of the element that should appear when a toggle or an indicator is set to OFF.

Setting	Description
First Option	The first option that appears in an element of the type drop-down list box (for example, select an asset).
Global Data	Indicates whether the value of the element is available globally for use by other elements or query inputs. This check box is enabled only after you specify an ID for the element.
Hidden	Indicates whether the element should appear in the application. By default, this check box is cleared. You can configure hidden elements to appear when an action is performed.
Id	The name of the global variable that will be available if the <b>Global Data</b> check box is selected.
Label	The label that will appear for elements such as check boxes and drop-down list boxes.
Maximum	The maximum value for an element that contains a range (such as a slider or a gauge).
Minimum	The minimum value for an element that contains a range (such as a slider or a gauge).
Options	Indicates whether the values in the element are hard-coded or displayed dynamically from a query.
Range Limit	The range of values that application users can enter in the element.
Required	Indicates whether it is always required to enter a value in the element that is used as an input to a query. By default, this check box is cleared.
Show <number> rows at a time	The number of rows that can appear at a time in an element of the type grid.
Show on	The devices in which the element should appear. By default, the options Mobile, Tablet, and Desktop are selected.
Source	<p>The source from which data should be retrieved to initialize the element. If you are configuring the settings of an input element, 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 element, 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 element.</li> </ul>
Stacked	Indicates whether the bars displayed in an element of the type graph should be stacked. By default, this check box is cleared.
Step	The step value used for a slider element.
Style	The style of a meter-type gauge element.
Target Data	The query input that is the target for the value of the element.
Tooltips	Indicates whether data in a table cell should contain tooltips displaying the content. By default, this check box is cleared.
True Label	The label of the element that should appear when a toggle or an indicator is set to ON.

Setting	Description
Type	The data type of an input element. If you are configuring the settings of an element of the type graph or gauge, this field contains a list of graph or gauge types.
Validation	The validations to be applied on the value entered in an input element. You can select the following options: <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 element, and then enter the number of minimum characters that application users must enter in the element.</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 element.</li> </ul>
Width	The width of the element of the type toggle.
X-axis Label	The label of the horizontal axis of an element of the type graph.
Y-axis Label	The label of the vertical axis of an element of the type graph.

## 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.
3. 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:mm: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 automatic 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": "va
  ]
}
}]]}

```

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-
    [
      { "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-
  [
    { "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/iqp/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

**i 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" }
  ]
}
```

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`.

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

**i 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/iqp/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	ISO 8601 "YYYY-MM-DDThh:mm: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;
```