StatusWatch User Manual

Contents

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Introduction

Topics:

- *Documentation Goal*
- *Documentation Conventions*
- *Resources for Further Learning*

The following section will cover the goal of this manual as well as the conventions to be used within this document.

Documentation Goal

The goal of this manual is to provide the user with a working understanding of the StatusWatch v1.2 software, and to enable StatusWatch users to effectively monitor their data using customized reports.

Documentation Conventions

Within this document, the following conventions will be followed:

The first instance of a term or concept within a related passage will appear as a hyperlink, followed by a page number declaration. The hyperlink may be used when viewing the document on-screen, while the page number reference is primarily available for those using a printed version of the documentation.

Information that is important to note but is not part of the basic definition or steps being outlined in a particular section will be marked as a "NOTE". Pay special attention to these blocks of text, as they contain special instructions or warnings.

Resources for Further Learning

For additional information, contact SCADAware at 1.309.665.0135 or email at support@SCADAware.com.

Part

II

StatusWatch Installation

Topics:

The StatusWatch Installer allows for two different types of installations. The first is a "Stand Alone" installation, where the data collection and web server are both handled on the same server. The second is a "Distributed" installation, where the data collection and web server are handled by separate servers. The Distributed method is effective at working around firewalls, making it desirable for those locations whose internal network security makes a Stand-Alone installation undesirable. Within this document, the data collectors and web server will often be referred to as "L2" and "L3", respectively.

System Requirements

The requirements for the computer onto which StatusWatch is installed: memory, processing, and operating system. Also supported browsers and databases.

Database Requirements

Required database storage is dependent on the size of the expected install and amount of data to be recorded. FullAndon devices take up considerably less space than OEE devices usually do. A good general estimate would be as follows, ~200-500 MB per Machine, per Year.

- Oracle
    - Oracle 9i
    - Oracle 10g
    - Oracle 11g
- Microsoft SQL Server
    - Microsoft SQL Server 2005
    - Microsoft SQL Server 2008
    - Microsoft SQL Server 2008 R2
    - Microsoft SQL Server 2012
- PostgreSQL
    - PostgreSQL 9

Server Requirements

Servers can be Physical or Virtual Machines.

Requires IIS, Microsoft .Net 3.5 Framework installed.

- Minimum Requirements
    - Web Server (L3)
        - Processor: Dual-core 2.66 GHz or higher
        - Memory: 2 GB or higher (per instance)
        - Disk Space: 10.0 GB available (per instance)
    - Data Collection Server (L2)
        - Processor: 2.0 GHz or higher
        - Memory: 2 GB or higher
        - Disk Space: 6.0 GB available
- Operating Systems
    - Windows Server 2003
    - Windows Server 2003 R2
    - Windows Server 2008
    - Windows Server 2008 R2
    - Windows Server 2012
    - Windows Server 2012 R2

Client Requirements

Requires Adobe Flash

- Supported Browsers
    - Internet Explorer
        - Internet Explorer 8
        - Internet Explorer 9

- Internet Explorer 10
- Internet Explorer 11
- Mozilla Firefox
- Google Chrome

System Authentication Types

The different security options available for StatusWatch.

SW Authentication

Standard user-created login ID and password for StatusWatch. Requires login everytime to access StatusWatch.

NT Authentication

Integrated Windows Authentication for automatic login. Uses windows domain credentials to authenticate and authorize login to StatusWatch automatically.

CWS Authentication

Corporate Web Security for automatic login. Utilizes specific domain credentials to authenticate and authorize login to StatusWatch automatically.

Client Certificate Authentication

Utilizes client certificates to authenticate users for automatic login into StatusWatch.

Variable Authentication

Server Variable authentication for automatic login. Customizable variable name to distinguish and authenticate users for automatic login to StatusWatch.

How To: Create StatusWatch Database

StatusWatch needs an open connection to a database in order to run. SCADAware provides database scripts that create the database tables in the proper form. We can connect to three types of databases Oracle, Microsoft SQL Server, and PostgreSQL.

1. Open your database manager program (Oracle, PostgreSQL, or SQL Server)
2. If using Oracle or Postgres create a database first.

Tip: Make sure to remember the database name and password.

3. Open the file **[STATUSWATCH-INSTALLER-FOLDER]**\Database**[DATABASE-TYPE]**\create.sql in a text editor.

Remember: **STATUSWATCH-INSTALLER-FOLDER** is the path to the installer folder, and **DATABASE-TYPE** is the type of database you're building around

4. For Oracle users: Replace the xxtableTableSpace and xxindexTableSpace with the name of the table space for storing the Statuswatch table data in the create.sql file.
5. Copy and paste the create script as a new query into the database manager.
6. Run the query.
7. Look at the database and verify statuswatch tables have been created.
   Some of the statuswatch tables created are NSITEMS, SCHEMAVER, and LICENSEINFO.

How To: Install StatusWatch

The following steps will guide you through installing StatusWatch. Please make special note of the steps regarding switching between L2 and L3 servers, should your installation be a Distributed one.

1. If your installation is to be set up in Distributed mode, make sure you are logged in to the server that will act as the web server (L3).
2. Enable IIS on the server. See *Appendix B: Enable IIS* for instructions.
3. Copy the StatusWatch Installer folder to the server.
4. Run StatusWatchSetup.exe.
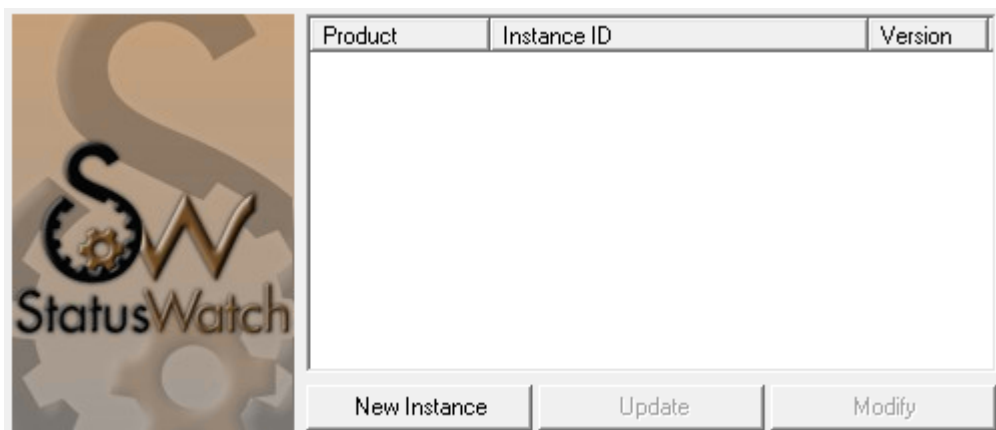
5. Click "New Instance".
6. Select "Server" and click "OK".
7. Click "Next".
8. Review the license agreement, then check "I accept the terms in the license Agreement" and click "Next".
9. Adjust the install destination as desired using the "Browse" button. When satisfied with the install directory,
10. Click "Next".
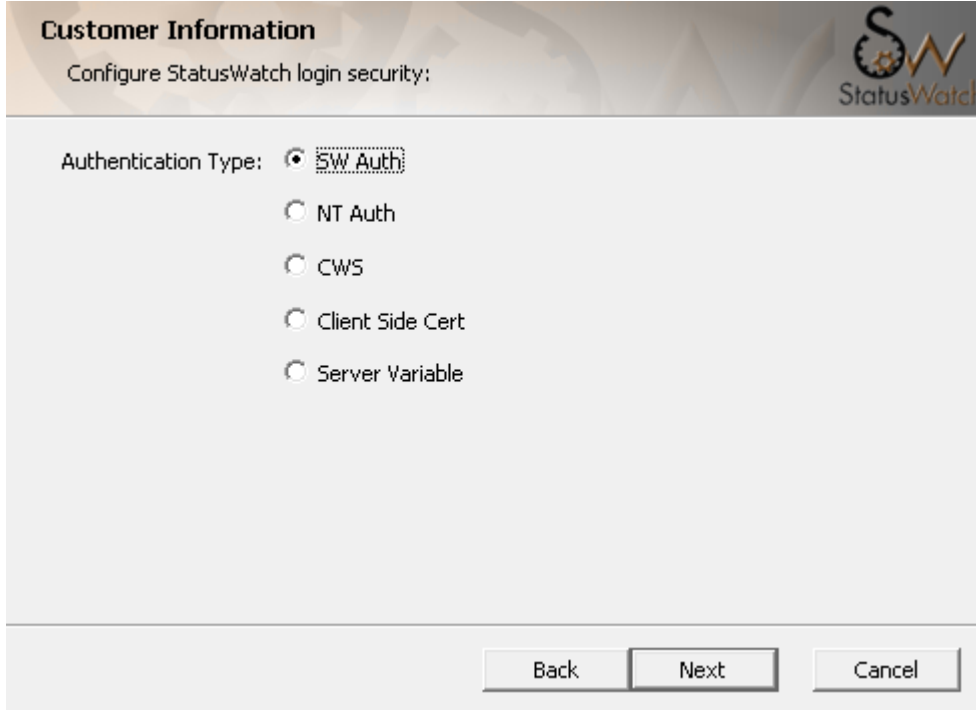
11. Set the "StatusWatch Instance Id" as desired. This id will have the text "StatusWatch_" appended to the front of it and will be used as the display name of the StatusWatch webserver service
12. Set the "Default Locale" as desired. This will determine the default language used within the application. Users may override this default locale at a later time.

13. Set the time zone in which the server will be used.

14. Set the "Database Type" to match that of the database your location will be using.

15. Set the "Connection String" to point to the hostname/username/password of your database.

Go to *Database String Examples* on page 81Database String Examples for information on formatting database connection strings.

16. Use the test button next to the connection string to test if the connection string connect to the database.

17. Set the "Website" field to whatever the name of the web site is that will be serving up the StatusWatch interface.

18. The "Virtual Directory" should be set to match that of the virtual directory used by the web site.

19. Click "Next".

20. Set Authentication. See *Authentication Types*

21. Click "Next".
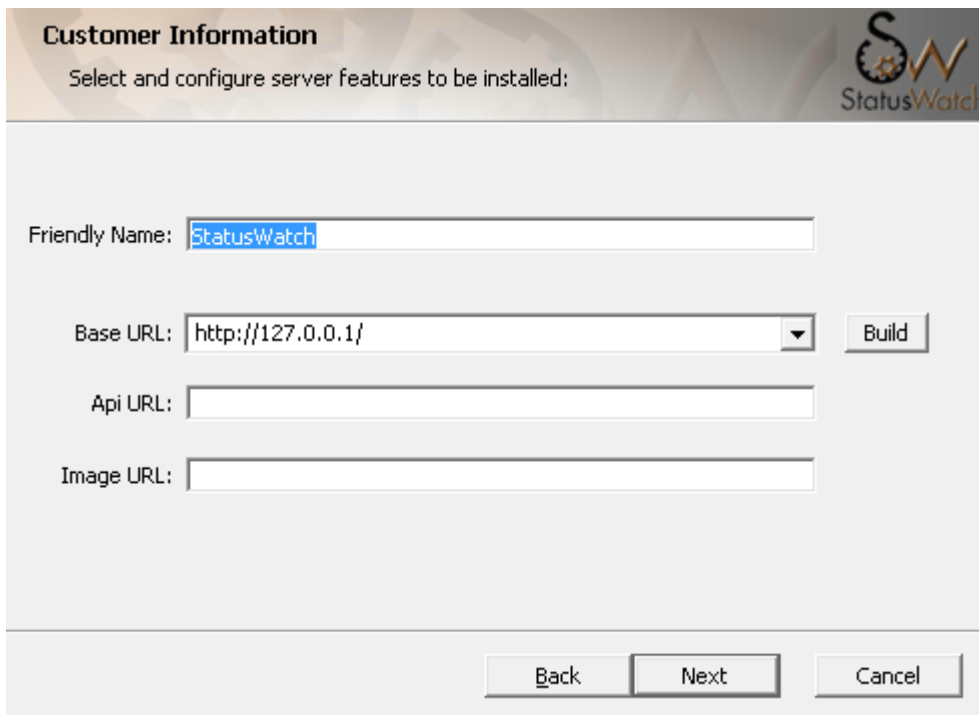
22. The "SMTP Host" value should be populated by the address of the messaging server on your network, should one exist.
23. The "Sender Email Address" is what will display as the "From" address of all messages sent from the StatusWatch application. Set as desired.
24. A test email can be sent to any email address on the network to verify that the SMTP host name is correct.
25. Click "Next".
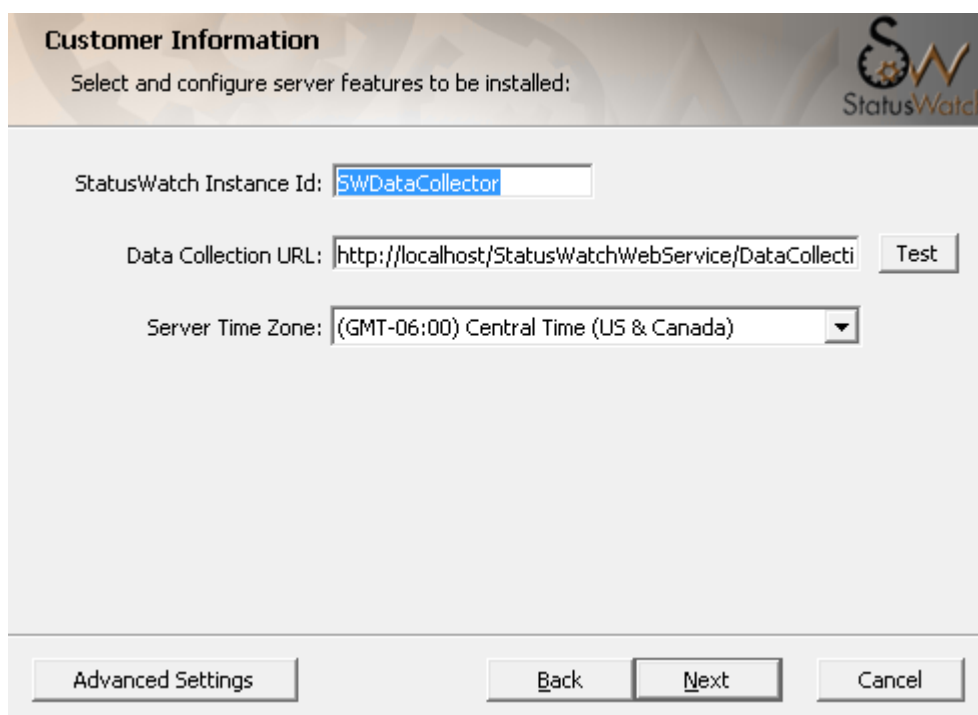
26. The Friendly name should be entered that will be used in the api and image addresses.

27. The IP address or network name of the server should be entered at BaseUrl replacing the 127.0.0.1. Remember to change if using HTTPS.

28. Click on "Build".

29. Click "Next".

30. Click "Install".
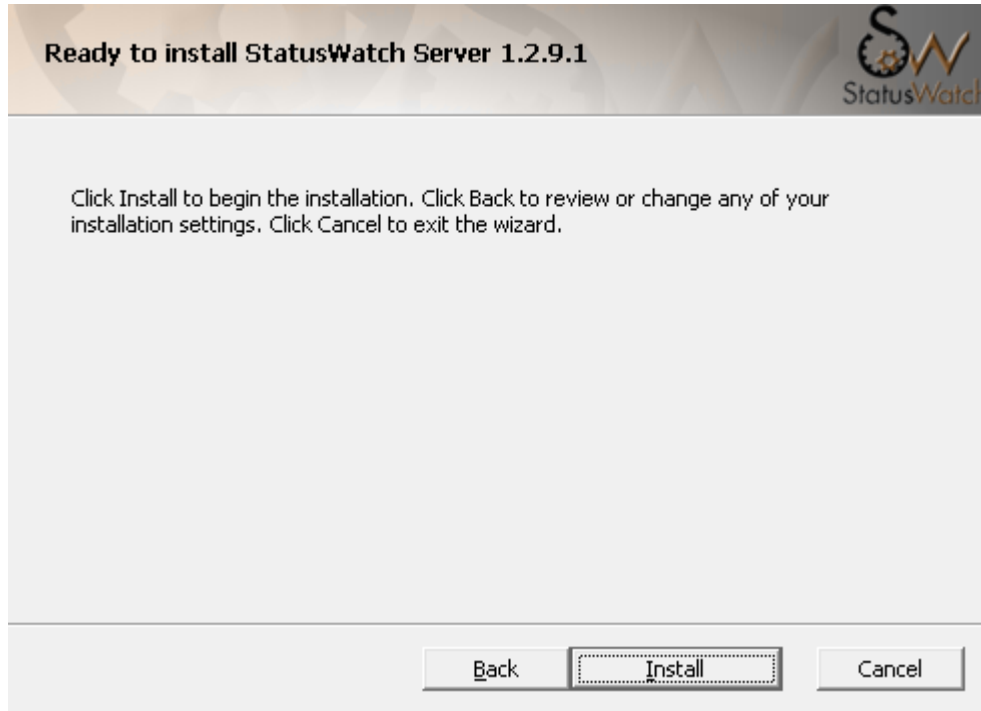
31. The installation will proceed. Upon completion, the installer can be closed. If your installation is to be set up in Stand-Alone mode, leave the Instance Manager open.

32. If your installation is to be set up in Distributed mode, log in to the server that will act as the data collector (L2). Copy the Installer files to the machine and run StatusWatchSetup.exe.

33. In the StatusWatch Instance Manager, click "New Instance".

34. Select "Data Collector" and click "OK".

35. Click "Next".

36. Review the license agreement, then check "I accept the terms in the license Agreement" and click "Next".

37. Adjust the install destination as desired using the "Browse" button. When satisfied with the install directory, click "Next".

38. Set the "StatusWatch Instance Id" as desired. This id will have the text "StatusWatch_" appended to the front of it and will be used as the display name of the StatusWatch data collector service

39. Set the "Data Collection URL" to match that of the L3. This will be found under IIS on the L3 server

40. Set the time zone that the datacollector works in.

41. Click "Next".

42. Click "Install".

43. The installation will proceed. Upon completion, click "Finish" to close the installer window.

The StatusWatch instance will be in the chosen directory. The executable is in the bin folder of the selected directory. Also a StatusWatch service will be added to the service list. Your installation is complete, and you can finish setting up the database.

Install StatusWatch Data Collector

The datacollector passes data from an OPC Server on a remote computer to StatusWatch server through a web connection. These are often used to pass through firewall protections from the factory floor to the server.

A StatusWatch server instance is all ready installed. There is an OPC Server on a different computer that has data the user wants passed to StatusWatch.

1. Run the StatusWatchSetup.exe executable on the target computer.

2. Click New Instance

3. Select "Data Collector" and click "OK".

4. Click Next

5. Review the license agreement, then check "I accept the terms in the License Agreement" and click "Next".

6. Adjust the install destination as desired using the "Browse" button.

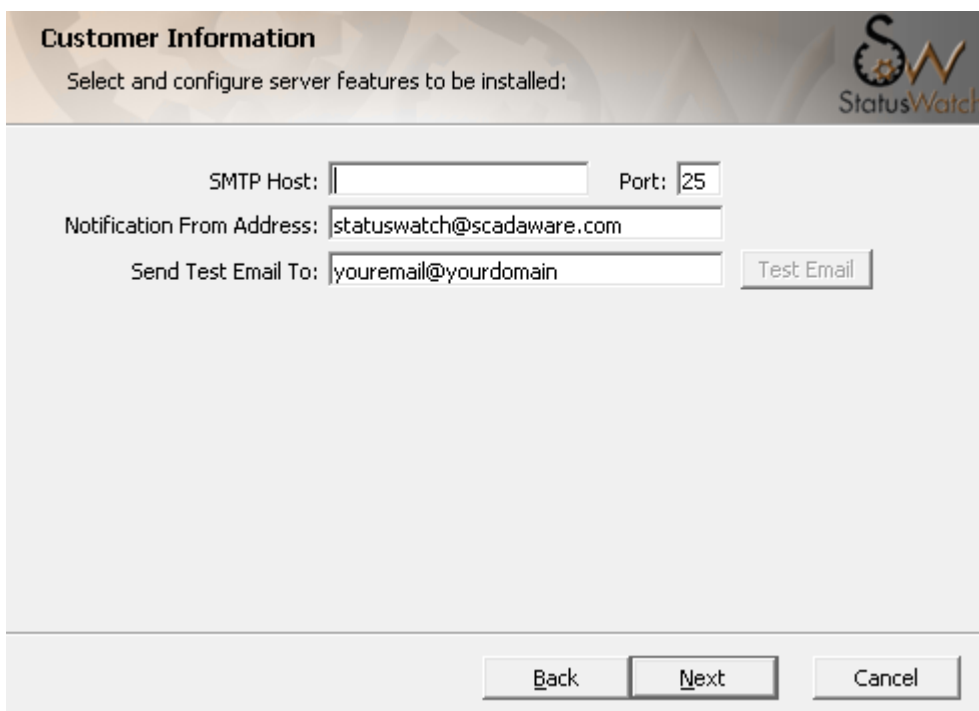7. When satisfied with the install directory, click "Next".

8. Set the "StatusWatch Instance Id" as desired. This id will have the text "StatusWatch_" appended to the front of it and will be used as the display name of the StatusWatch data collector service.

9. Set the "Data Collection URL" to match that of the data collection web service on the web app server. This will be found under IIS on the web app server.

10. Set the time zone to match your location.

11. Click "Advanced Settings".
12. Adjust the "Data Touch Interval" as desired.

    This value determines how long (in seconds) the proxy server will wait for new data to be collected before "checking in" with the web app server to confirm that nothing has changed. Increasing this value will allow for longer spans of silence between the proxy server and web app server, while decreasing this value will increase network traffic slightly.

13. Click "Basic Settings".
14. Click "Next".
15. Click "Install". The installation will proceed. Upon completion, the Installer can be closed, as can the Instance Manager.

The DataCollector is installed. To verify it installed correctly, start the Data Collector service and check if the StatusWatch Server instance is communicating with it.

How To: Populate StatusWatch Database

Steps only required on first setup of database.

The StatusWatch database needs intial users and folders before the StatusWwatch instance will run.

1. Open a cmd window as administrator.
2. Navigate to the "[INSTALL-DIRECTORY]\[SERVER-INSTANCE-ID]\bin".

   The default Statuswatch file path is "C:\Program Files\SCADAware\StatusWatch\SWServer\bin".

   Note: Both the install directory and the server instance id are set in the Statuswatch installer.

3. Run the command "StatusWatch.exe /populatedatabase".
4. Check the log file or the look at the database NSITEMS table to verify the database was populated.

   The NSITEMS table has data in it the database probably populated correctly.

The StatusWatch database is populated default items and the StatusWatch service is able to run although it does not yet have full functionality.

How To: Run Pack Scripts

Steps only required on first setup of database.

A number of preconfigured items and reports are available with the StatusWatch software. Follow these step after StatusWatch is installed and the database is populated to create the extra items and Reports.

1. Open your database manager program (Oracle, PostgreSQL, or SQL Server)
2. Go to the database scripts folder at "[STATUSWATCH-INSTALLER-FOLDER]\Database\[DATABASE-TYPE]\".
3. Open install_base_pack.sql in a text editor.

   The base pack script is a prerequisite for the other scripts.
4. Copy and paste the base pack script as a new query into the database.
5. Run the query
6. Optional: If utilizing Full Andon assets, open install_andon_pack.sql and run it in the same way as the base pack.
7. Optional: If utilizing OEE assets, open install_oee_pack.sql and run it in the same way as the base pack.
8. Verify the packs were installed by looking at the StatusWatch database PACKVERSION table. The table should list each pack that ran.
9. Start the StatusWatch service.

The items from the packs that were installed can be seen by going to the StatusWatch webpage. The calendars and reports pages show the items in the were created in the Everyone folder.

Note: The StatusWatch instance's web address will be the "http://[Statuswatch Server's hostname]/[StatusWatch webname]/statuswatch.aspx".

How To: Apply A License To StatusWatch

- StatusWatch is installed
- Database is populated.
- StatusWatch Service is running

StatusWatch needs to be licensed in order to add and use Assets. License also show if support is purchased or the user can connect to the mobile device app.

1. Go to settings at the top of the StatusWatch page
2. Click on Licensing
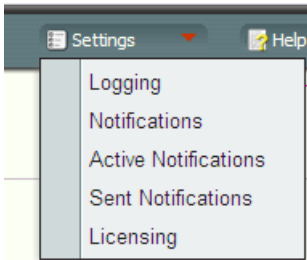
3. Click on Get Fingerprint, Existing. This will trigger a download of the current license file and fingerprint. Please send this to SCADAware support.

4. SCADAware will use the fingerprint to generate any license the user has purchased and send the license file to you.

5. Save the license file on the server where it won't be deleted.

6. Open the licenses window in StatusWatch again and click Upload License File.

7. In the browse window go to the directory where the license file was saved and select it.

When a valid license file is uploaded, a list of all the license that are in the license file will display in the popup window.

Part

III

Setting up StatusWatch

Topics:

The following section covers the steps needed to add Assets to StatusWatch and set up the various points of data to be monitored on each. Once completed, the StatusWatch setup should only need to be revisited when the data being monitored needs to be adjusted or when an entirely new Asset is added to the system.

Asset

Asset is the broad term that refers to any device (machine) about which StatusWatch collects data. Each Asset contains *Data Points*, each of which refers to an individual segment of valuable information pertaining to that particular device.

Asset Licenses

StatusWatch is licensed on a per-Asset basis. In order to offer users the flexibility to pay only for the features they require on each of the machines in their facility, the following types of Asset licenses are available:

- *Full Andon*
- *OEE*

Each Asset in StatusWatch must be tied to a license in order to function properly within the system. Additionally, OEE and Full Andon Assets require a matching server license. Licenses are purchased from SCADAware and can be applied on the StatusWatch web interface.

Full Andon

Full Andons are Assets within StatusWatch that represent a physical Andon device in the facility. Custom reports may be run against Full Andon Assets, and the user can add any number of Data Points. They differ from OEE Assets only in that they may only be tied to physical Andon devices, whereas OEE Assets may be tied to any type of device. Full Andon Assets require a Server license in order to connect to the database and log data.

OEE

OEE Assets are the most fully enabled Assets within the StatusWatch application. Like Full Andon Assets, they allow for custom reporting and unlimited Data Points, but can be tied to any type of device. OEE Assets require a matching OEE server license in order to connect to the database and log data.

Server Licenses

Server Licenses allow Assets in StatusWatch to communicate with the database and log data. They are required for both OEE and Full Andon Assets.

Andon Server License

Andon Server Licenses allow for a set of Andon Assets to communicate with the database and log data. Only Andon Assets can use Andon Server Licenses to connect.

OEE Server License

OEE Server Licenses allow any Asset to connect to the database and log data. While OEE Server Licenses are intended to be used with OEE Assets, they can be used with Full Andon Assets if there are no Andon Server Licenses available.

How To: Create A New Asset

1. Navigate to the Assets section of the application using the **navigation tree.**
2. **Note:** cannot have an Asset selected when trying to click 'Add New Asset'

   Choose **"New Asset"** from the **actions panel.**
3. You will be prompted to name your Asset. Do so.
4. Select the type of asset license you wish to use for this new Asset from the **License type drop-down box** and click **"Okay"**
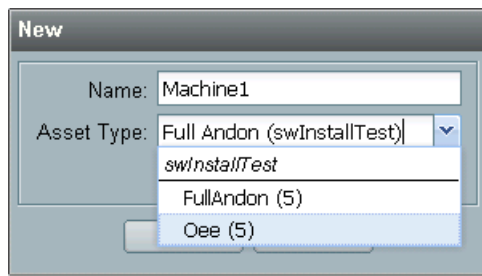
The Asset will be created and will appear in the Assets folder. If the create default objects checkbox is checked then the Asset will be filled with autogenerated Data Points and functions otherwise, double-clicking on the new Asset will display an empty space where *Data Points* can be added.

Asset Group

Asset Groups allow the user to run reports on a set of Assets. Since a single Asset can be included in more than one Asset Group, assets can be grouped by similar machine type and physical location.

How To: Create An Asset Group

1. Navigate to the Assets section of the application.
2. Select "New Asset Group" from the Actions Panel.
3. Name your Asset Group when prompted. Asset Group names must be unique within the system.
4. Click "OK" to create your new Asset Group and close the window.

Your new Asset Group will appear.

Asset Reference

An Asset Reference is a short cut to an existing Asset. A single Asset may be represented by multiple Asset References in different Asset Groups. For example, imagine a factory with ten lathes and two robotic welders. Two of the lathes and one of the welders are grouped, executing different procedures on the same parts. For those times when it is necessary to run a report for all lathes, an Asset Group that contains references to all ten lathes would be useful. For times when the report needs to show information for just the two lathes and one welder that work on the same parts, a different Asset Group (containing references to only those two lathes and the one welder) would be useful. In this example, two of the lathes are referenced in multiple Asset Groups.

How To: Create An Asset Reference

1. Navigate to the Assets section of the application.
2. Double-click on the Asset Group where you will create the Asset Reference.
3. Select "New Asset Reference" from the Actions Panel.
4. Select the Asset to be referenced from the list that appears. Can hold control key to multi-select additions.

Open

- ⚙ Andon Station 1
- ⚙ Andon Station 2
- ⚙ Andon Station 3
- ⚙ Delete Asset Test
- ⚙ Klaege_Asset
- ⚙ Line Sign
- ⚙ Test_Andon_01
- ⚙ Test_Andon_02
- ⚙ Test_Lathe_01
- ⚙ Test_Lathe_02
- ⚙ Test_Lathe_03

OK   Cancel
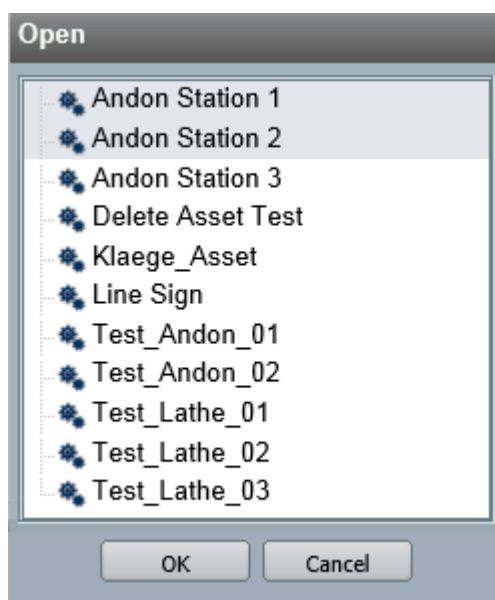
5. Click "OK" to create the Asset Reference and close the window.

The new Asset Reference will appear in the Asset Group.

Data Point

A Data Point is an individual unit of data collected from or for a specific *asset*. Data Points can represent states of a machine, quantities of parts completed, temperature, calculated values, or any other data that can be collected from an asset or derived from the collected data. The different data point types are:

- *OPC*
- *Data Splitter Point*
- *Manual Data Point*
- *MTConnect Point*

Data Types

StatusWatch uses a custom set of data types to record data in the database. They are each defined by one of three prefixes (Continuous, Immediate, Instantaneous) and one of five suffixes (Boolean, Number, Integer, String, Table). Apart from Tables, any suffix can be paired with any prefix. Tables may only be Continuous or Immediate.

Boolean

Booleans have values of TRUE or FALSE.

Number

Numbers have fixed point values (numeric values with decimal places).

Integer

Integers are only whole number values. They can be positive or negative.

String

Strings are a collection of letters or numbers. They may have mixed-character alphanumeric values.

Table

Tables can contain two-dimensional data in the form of columns and rows.

Continuous

Continuous data has a time component and always has a value.

Instantaneous

Instantaneous data has a time component, but does not always have a value.

Immediate

Immediate data has no time component, only a value.

Data Type Examples

The following is a list of examples of data types and possible uses within the StatusWatch application.

Continuous Boolean	A specific state of a machine is represented as a Continuous Boolean. The active state of a lathe, for example, might be called "Cutting" or "Main Spindle Running", and would be a Boolean (True/False) value that always has a value (the lathe is always either in that state or not) and has a time component (it is useful to keep a history of this value). As such, it is represented as a Continuous Boolean.
Instantaneous Integer	The completion of a part or set of parts is represented as an Instantaneous Integer. Instantaneous data points often represent events in StatusWatch. In this example, the data point has no value outside of the instant at which the part or parts were completed, but has a time component. At the moment of part completion, it has a value indicative of the number of parts completed in that instant. The next moment, the data point has no value.
Immediate Number	Often, the result of a Global Function is represented as an Immediate Number. Immediate data points have a value, but do not have a time component. No history is kept for the value. As a simple example, if you had a Global Function that added 2 and 3 together, the result would be 5 each time, but StatusWatch would re-evaluate that formula each time the value was requested. The result of the formula would not be stored, and no history would be observable for the result.

OPC Data Point

Data collected directly from the asset itself via an OPC Server (such as Kepware) appears as an OPC Data Point in the StatusWatch application. When possible, automatically collected data is preferred to manually collected data, as it increases data accuracy.

How To: Create An OPC Data Point

1. Navigate to the Assets section of the application using the **navigation tree.**
2. **Double-click** on the asset under which you wish to create the data point
3. Choose **"New Data Point"** then **OPC Data Point** from the **actions panel.** The following window will display:

4. Name your data point using the **text field** labeled "Name". Data point names must be unique within each asset.

5. Specify what *data type* should be associated with the new data point by using the **drop-down menu** labeled "Data Type". The data type cannot be changed after the data point has been created.

6. Use the **drop-down menu** labeled "Collector ID" to specify which remote collector will transmit this data point's value.

7. Use the **drop-down menu** labeled "OPC Server" to specify which server within the collector should be used.

8. Use the **drop-down menu** labeled "OPC Item" to specify which exact tag within the OPC server represents this data point's source.

9. Click the **button** labeled "Save" to finalize the data point and close the window.

The data point will be created and will begin logging data immediately.

Data Splitter

A Data Splitter is an interface that interprets a Continuous String or Continuous Integer as an array of Continuous Boolean data points. For example, some machines communicate their current state using an integer (a value of 1 might mean Cutting, 2 could be Tool Change, etc). In StatusWatch, that integer would be represented as a single Continuous Integer data point. In order to build some reports, it is necessary to break up that single Continuous datapoint into a series of Continuous Booleans. The Data Splitter serves as an interpretation layer between the source data point and the rest of the StatusWatch application. The Data Splitter itself can also be used as a Continuous String datapoint, and using it in a report will show all the states the reference data point matched in the given period of time.

How To: Create A Data Splitter

1. Navigate to the Assets section of the application using the **navigation tree.**

2. **Double-click** on the asset under which you wish to create the Data Splitter.

3. Choose **"New Data Point"** then **Data Splitter** from the **actions panel.** The following window will display:
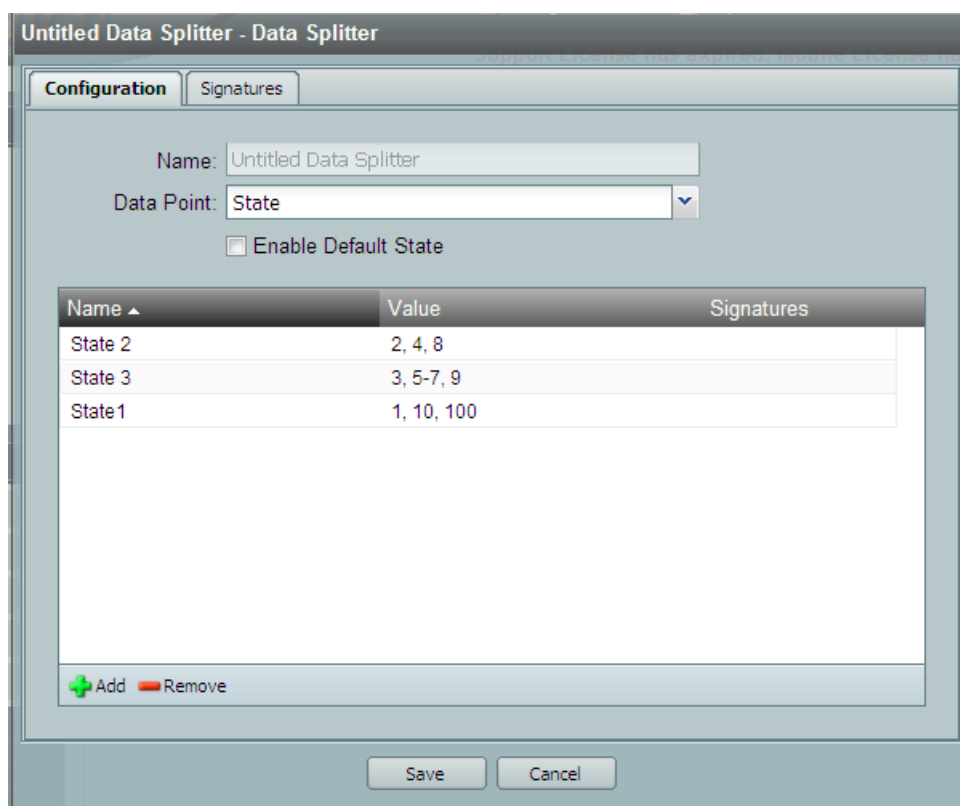
4. Name your Data Splitter using the text field labeled "Name".
5. Using the drop-down menu labeled "Data Point", choose the data point that this splitter will interpret. Only continuous integers or strings may be selected.
6. Use the button labeled "Add" to add a new split data point to the window.
7. Name your new split data point, specify which value in the source data point will cause it to become true, and add signatures as desired.
8. Continue adding and configuring split data points as desired.
9. Optional: Check enable Default state and name the state that occurs if none of the manually entered values are true.
10. Click "Save" to save your Data Splitter and close the window.

Your new split data points can now be used in nearly all the ways that a standard OPC or Manual Data point can be used. The Data Spliter itself can also be used as a continuous string that returns all the states for a given time period. The datasplitter can also have its value changed in the Raw Data Editor if it references a manual datapoint because the change is reflected back to the referenced datapoint.

Manual Data Point

Some data cannot or should not be collected automatically from a machine. For example, your target uptime for a machine might be 80%, but it is unlikely that such a percentage could be collected from the machine itself. In such a scenario, a Manual Data Point may be useful. A Manual Data Point is a data point whose value can be updated only through user input.

How To: Create A Manual Data Point
1. Navigate to the Assets section of the application using the **navigation tree.**
2. **Double-click** on the asset under which you wish to create the Manual Data Point.
3. Choose **"New Data Point"** then **Manual Data Point** from the **actions panel.**
4. Name your data point using the **text field** labeled "Name". Data point names must be unique within each asset.
5. Specify what *data type* should be associated with the new data point by using the **drop-down menu** labeled "Data Type". The data type cannot be changed after the data point has been created.
6. Click the **button** labeled "Save" to finalize the data point and close the window.

Your Manual Data Point will appear in the Asset and can have its value changed using the Raw Data Editor.

MTConnect Data Point

MTConnect allows for a different way of acquiring automatic data from a machine. Like an OPC Data Point, data is automatically logged to the StatusWatch database, but configuration of the data points currently happens outside of StatusWatch. The MTConnect Bridge application is used to set up the configuration of these data points.

How To: Create An MTConnect Data Point

1. Navigate to the Assets section of the application using the **navigation tree.**
2. **Double-click** on the asset under which you wish to create the MTConnect Data Point.
3. Choose **"New Data Point"** then **MTConnect Data Point** from the **actions panel.**
4. Name your data point using the **text field** labeled "Name". Data point names must be unique within each asset.
5. Specify what *data type* should be associated with the new data point by using the **drop-down menu** labeled "Data Type". The data type cannot be changed after the data point has been created.
6. Click the **button** labeled "Save" to finalize the data point and close the window.

Your MTConnect Data Point will need to be configured through the MTConnect bridge, which is beyond the scope of this manual.

Other Asset Items

In addition to Data Points there a are a few other items that manipulate and group data that can be created inside a given *asset*. The different items are:

- *Global Function Instance*
- *Data Point Group*
- *Immediate Table*
- *Continuous Table*
- *Actions*

Global Function Instance

A Global Function Instance is an implementation of a Global Function on an Asset using data from the Asset as input. Global Functions and Global Function Instances allow for easy re-use of common, useful formulas within the StatusWatch application.

How To: Create A Global Function Instance

1. Navigate to the Assets section of the application using the **navigation tree.**
2. **Double-click** on the asset under which you wish to create the function instance.
3. Choose **"New Data Point"** then **Global Function Instance** from the **actions panel.** The following window will display:
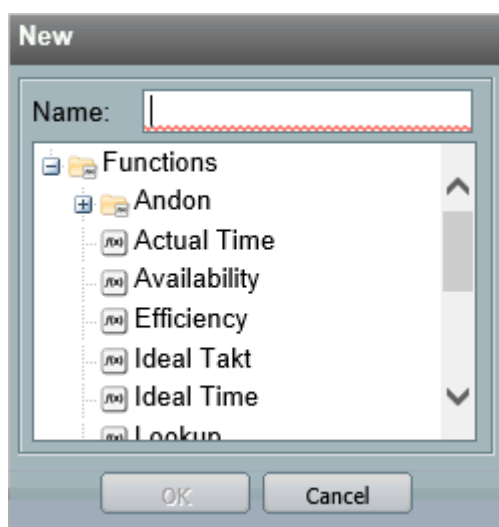
4. Navigate to the Global Function that is to be instantiated on this asset.
5. Optional: You may rename the Global Function Instance at this point (the default name will be the same as the referenced Global Function).
6. Click the **button** labeled "OK".
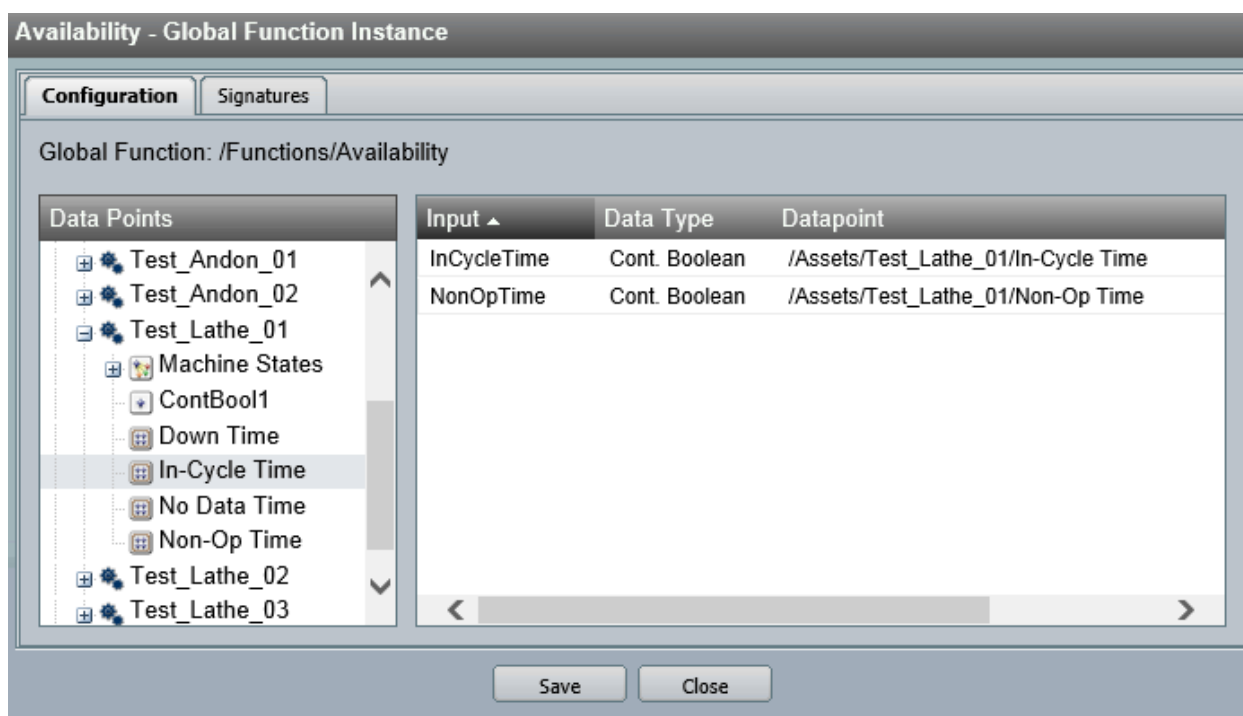
7. In the right pane is a list of the inputs needed to populate the function, as well as the data type required for each input. In the left pane, a list of all data points on the asset is shown. Drag-and-drop each appropriate data point onto its input variable to populate the function. A Global Function Instance editor is shown above.
8. Click the **button** labeled "Save" to finish creating the function instance and close the window.

The new function instance will be available for use immediately.

Data Point Group

A Data Point Group is a representation of any number of continuous boolean data points as a single continuous boolean data point. When any of the contained Data Point References are True, the Data Point Group is True. This

is useful when several data points each are representative of one greater condition. For example, a machine may have many states, each of which is represented as a continuous boolean data point. Perhaps the states "Cutting", "Repositioning Tool", and "Tool Change" should all be considered "In-Cycle Time" states for the machine. By creating a Data Point Group called "In Cycle Time" and adding references to the three Data Points, each of the Data Points can contribute to the result of a report without being explicitly added to the report.

How To: Create A Data Point Group

1. Navigate to the Assets section of the application.
2. Double-click on the Asset under which you wish to create a Data Point Group.
3. Select "New Data Point Group" from the Actions Panel. The following window will display:

New

Name: Untitled Data Point Group

OK   Cancel
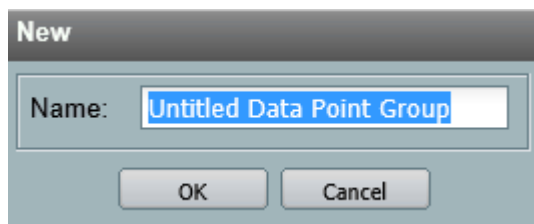
4. Name your Data Point Group and click "OK". Data Point names and Data Point Group names must be unique within the asset. The following window will display:

Untitled Data Point Group - Data Point Group

| **General** | Signatures |

Description:

Save   Close
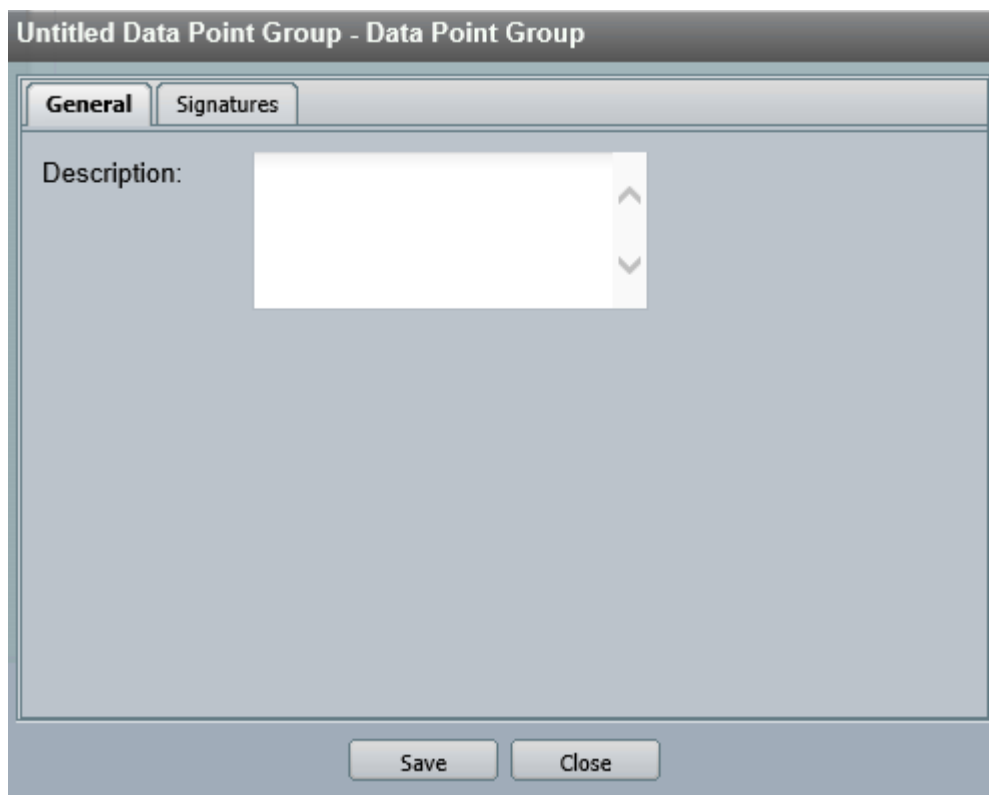
5. Add a description if desired, and adjust signatures for this data point as desired on the "Signatures" tab.
6. Click "Save" to save your Data Point Group and close the window.

Your Data Point Group will be usable immediately.

Data Point Reference

A Data Point Reference is a shortcut to a Data Point within a Data Point Group. It collects no data and has no value itself, but only "points to" the an existing Data Point. A single Data Point may be referenced in multiple Data Point Groups.

How To: Create A Data Point Reference

1. Navigate to the Assets section of the application.
2. Double-click on the Asset under which you wish to create a Data Point Reference.
3. Double-click on the Data Point Group to which you wish to add a Data Point Reference. A blank space will appear where Data Point References can be added.
4. Click "New Data Point Reference" in the Actions Panel. A window containing a list of all Data Points on the Asset is displayed.
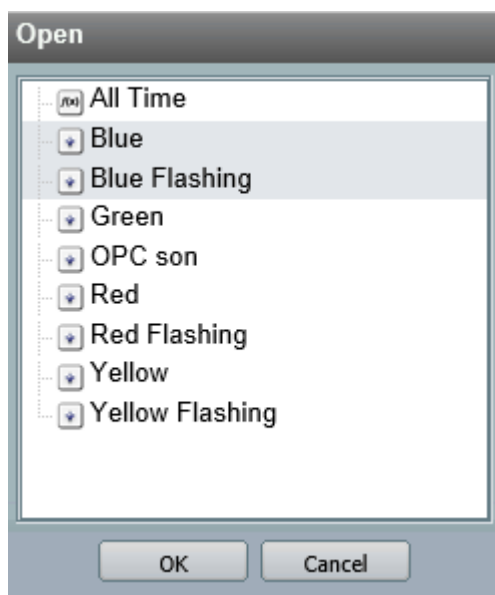
5. Select the Data Point that is to be referenced and click "OK". Can hold control key to multi-select additions.

The Data Point Reference will be added to the Data Point Group.

Immediate Table

An Immediate Table is a set of tabular data with no time component. That means that the data in the table is overwritten if a value is changed, and historical values are discarded. While this means that Immediate Tables take up very little space in the database, they are not as flexible as Continuous Tables.

How To: Create An Immediate Table

1. Navigate to the Assets section of the application using the **navigation tree.**
2. **Double-click** on the asset under which you wish to create the table.
3. Choose **"New Data Point"** then **Immediate Table** from the **actions panel.** The following window will display:
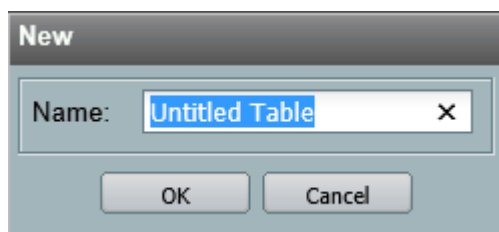
4. Name your new Table and click the button labeled "OK". Data Points must be named uniquely within the asset. The following window will display:

5. On the "Lookup Table Setup" tab, click the button labeled "Add" to add a new column to the table.

6. Adjust the Column Name and Data Type as needed, and specify whether the column is the lookup column for the table.

7. If desired, add rows using the "Add" button on the "Data" tab and adjust values.

8. On the "Signatures" tab, add signatures as desired.

9. Click the "Save" button to save your table and close the window.

The table will be added to the asset and its values can be looked up using a global function as needed.

Continuous Table

Continuous tables contain tabular data tied to a time component. As such, value changes do not cause historical values to be lost. Continuous tables are the only method for storing any tabular data that maintains a history of changed values.

How To: Create A Continuous Table

1. Navigate to the Assets section of the application using the **navigation tree.**

2. **Double-click** on the asset under which you wish to create the table.

3. Choose **"New Data Point"** then **Continuous Table** from the **actions panel.** The following window will display:
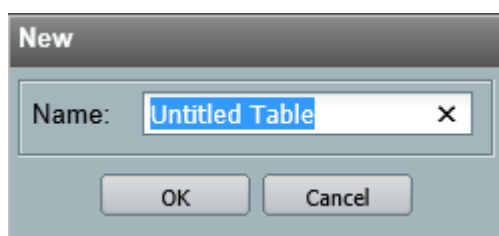
4. Name your new Table and click the button labeled "OK". Data Points must be named uniquely within the asset. The following window will display:

5. On the "Lookup Table Setup" tab, click the button labeled "Add" to add a new column to the table.
6. Adjust the Column Name and Data Type as needed, and specify whether the column is the lookup column for the table.
7. If desired, add rows using the "Add" button on the "Data" tab and adjust values.
8. On the "Signatures" tab, add signatures as desired.
9. Click the "Save" button to save your table and close the window.

The table will be added to the asset and its values can be looked up using a global function as needed.

Action

An Action is a triggered response to an event in the StatusWatch application. Actions allow StatusWatch to react to events without the user entering data manually. Every action has an associated trigger, a *Continuous Boolean* data point that must become true for the trigger to fire and initiate its Action. An Integer or String can trigger an action when it hits a certain value or if it is any non-null value.

Table Row Update

The Table Row Update Action adds a row to its referenced Table or updates an existing row. The Table Row Update has the option of selecting what type of change will happen to the table: an Add, an Update, or an Add and Update. For example, perhaps a Table of Ideal Cycle Times exists on an Asset, displaying the part string and goal completion time for a variety of parts that the machine manipulates. A Table Row Update would allow that table to be updated every time a new part string and its ideal time are added to the database.

How To: Create A Table Row Update Action

1. Navigate to the Assets section of the application using the navigation tree.
2. Double-click on the Asset under which you wish to create a Data Point Reference.
3. Select "New Action" then "Table Row Update" from the Actions Panel.
4. Name your Action in the window that appears, then click "OK".
5. In the next window, on the "Trigger" tab, indicate which Continuous Boolean data point(s) will fire the trigger.
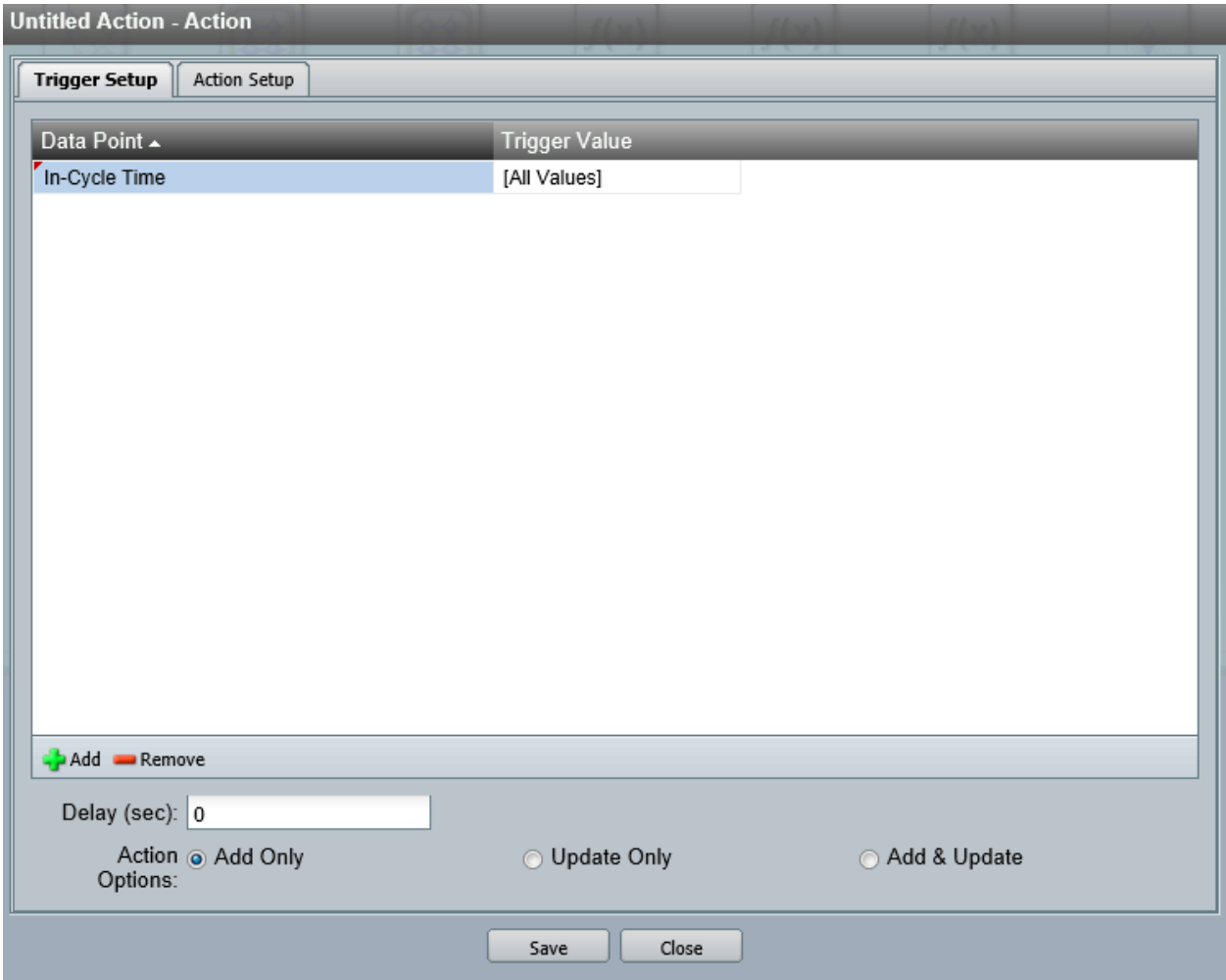
6. Optionally, you may indicate a stabilization delay, which is a number of seconds that the trigger will refrain from firing, in order to allow for multiple trigger data points to be updated in the database.
7. On the "Action Setup" tab, indicate which table should be updated by selecting the table from the drop-down menu labeled "Select Table".
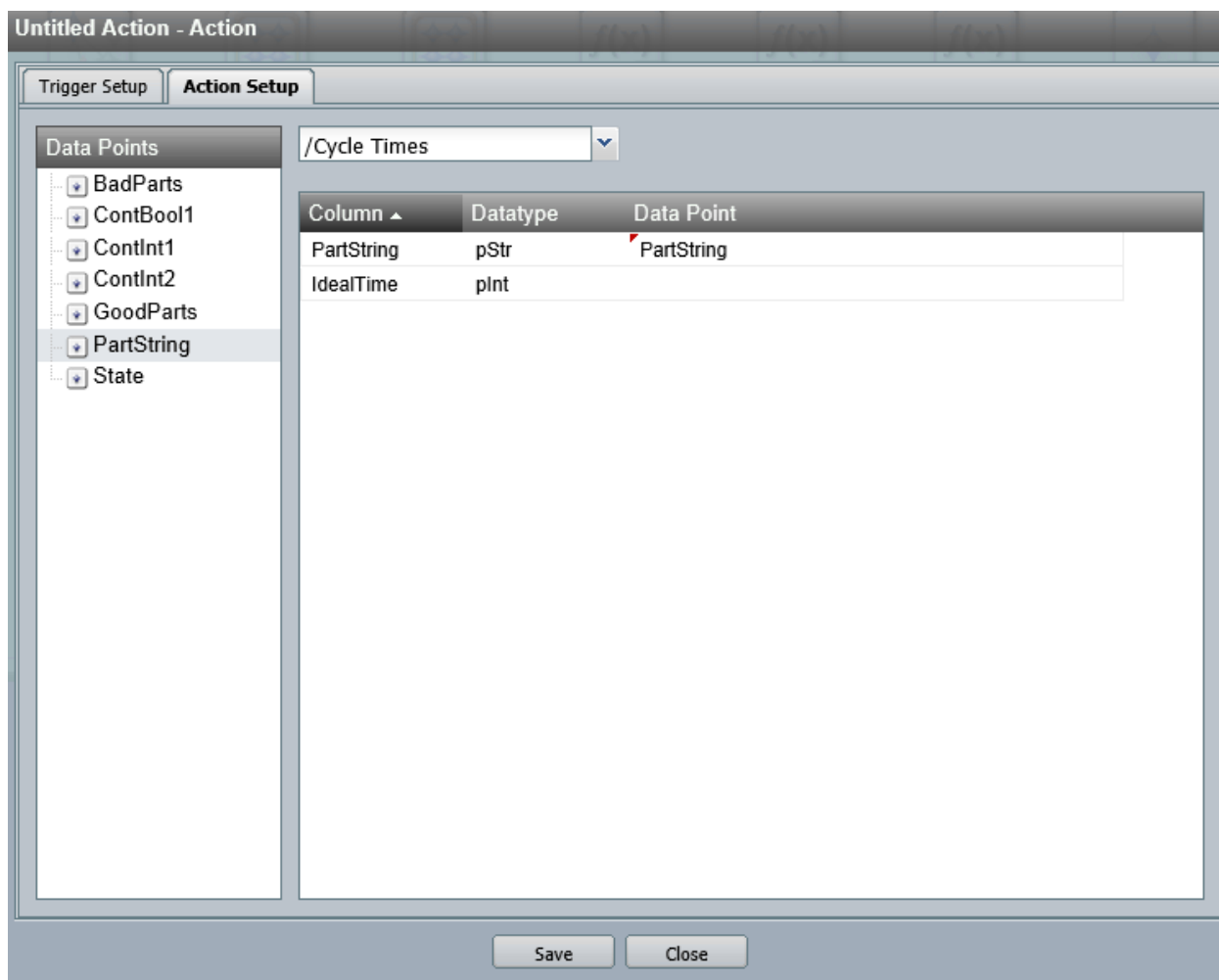
8. Drag the data point that will provide the new/updated value from the pane on the left onto the "Data Point" field for the desired column listed on the right

9. Click "Save" to close the window and save the Action.

The new action will fire the next time the trigger data point(s) become true.

Datapoint Value Change Action

The Datapoint Value Change Action adds a value to the selected datapoint timestamped to when the action is triggered. For example, when the power variable turns false turns another variable 'State' could be set to '5'. A Datapoint Set Value would allow that datapoint to be updated every time the power datapoint changes. A more advanced option for the datapoint value change action is you can reference another datapoint and enter its value into the target datapoint. For example the user might want to enter the temperature as an instantateous value one every cycle the set action could reference the temperature continuous datapoint.

How To: Create A Datapoint Set Value Action

1. Navigate to the Assets section of the application using the navigation tree.

2. Double-click on the Asset under which you wish to create a Set Value action.

3. Select "New Action" then "Data Point Set Value" from the Actions Panel.

4. Name your Action in the window that appears, then click "OK".

5. In the next window, on the "Trigger" tab, indicate which data point(s) will fire the trigger.

6. Option: you may indicate a stabilization delay, which is a number of seconds that the trigger will refrain from firing, in order to allow for multiple trigger data points to be updated in the database.

7. Click on the "Action Setup" tab.
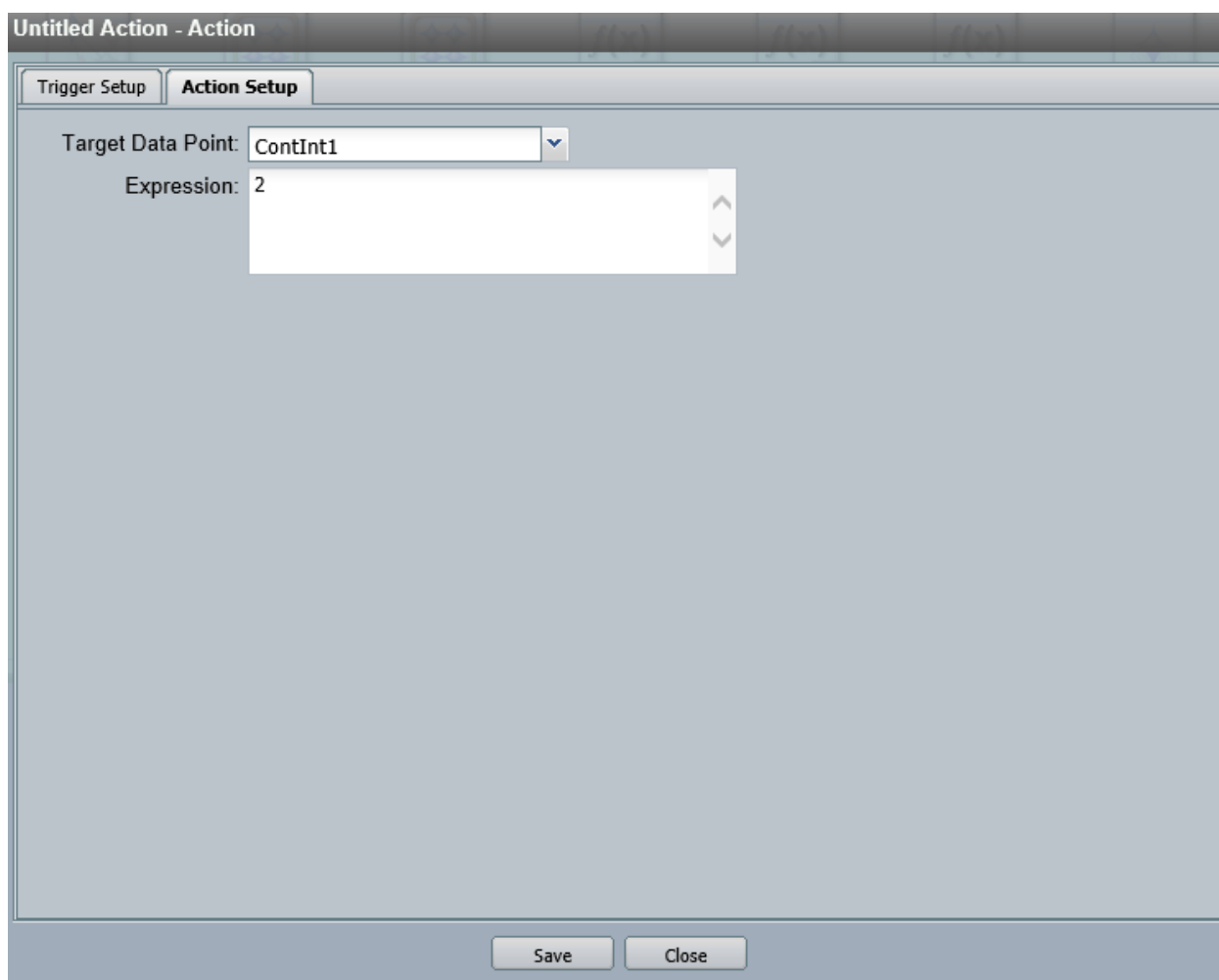
8. Select the Data Point to modify in the drop down menu.
9. Type the value that you want entered into the datapoint into the expression field.
10. Click "Save" to close the window and save the Action.

The new action will fire the next time the trigger data point(s) become true, and the datapoint will get a new value.

Global Function

A Global Function is a powerful method of defining a formula at a application-wide(global) level, allowing you to implement (instantiate) the formula on any asset using Asset-specific inputs. For example, perhaps you have a formula you would like to use that adds together the total time spent in "Tool Change" and the total time spent in "Repositioning Tool". Using a Global Function, you could write up a formula (in this example, it might look like "SumOverTime(toolChange) + SumOverTime(repositioningTool)") and instantiate it on any Asset in the system by simply plugging in the values for "toolChange" and "repositioningTool" using Data Points in the Asset.

How To: Create A Global Function

1. Navigate to the "Functions" section of the application using the navigation panel.
2. Select "New Global Function" from the actions panel.
3. Name your new function when prompted. Click "OK"
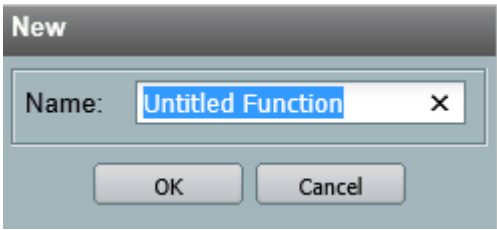
4. In the window that appears, choose a return type for your function. This is the data type that will be specified as the calculated result of your function to the rest of the StatusWatch system.
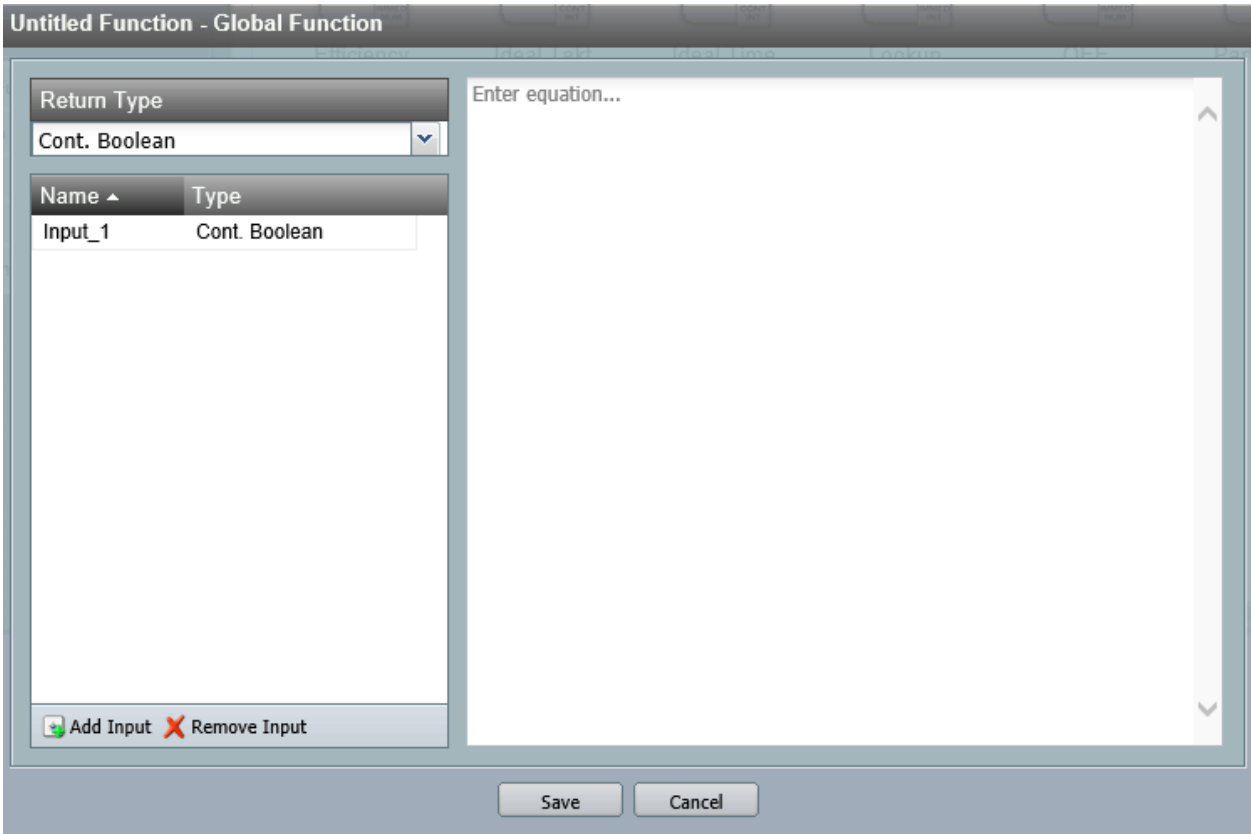
5. Define your function inputs as needed. These are the named variables that can be populated with values from a specific asset. Use the "Add Input" and "Remove Input" buttons to add and remove inputs. Name them and assign them data types using the form controls on each line.
6. Define the structure of your formula. The following operands may be used: +, -, *, /. There are also a variety of operators for boolean evaluations: =,<> , >, >=, <. <=. Additionally, the many *Built-In Functions* may be used inline: One built in formula is SumOverTime(value), where "value" is a Continuous or Instantaneous data point and its value is to be summarized across the time span of the report; ts, which represents the time span of the report.
7. Click "Save" when you are finished defining your formula.

Your formula will show in the Functions section of the application and will be available to be instantiated on any asset immediately.

Signatures

A Signature represents similar data across disparate assets. For example "Cutting" on a lathe and "Drilling" on a drill are both the active states of the machines, but have different names. If both of those Data Points are tied to a

common Signature (perhaps called "Cutting" or "Active"), then a report could be made to report on the Signature, and it could be run for either machine. Using Signatures, you can make your reports collate data from many all machines. A number of default signatures exist for Andon and Machine default items.

How To: Create A Signature

1. Navigate to the Signatures section of the application using the navigation panel.
2. Select "New Signature" from the actions panel.
3. Name your new Signature and assign it a type when prompted.
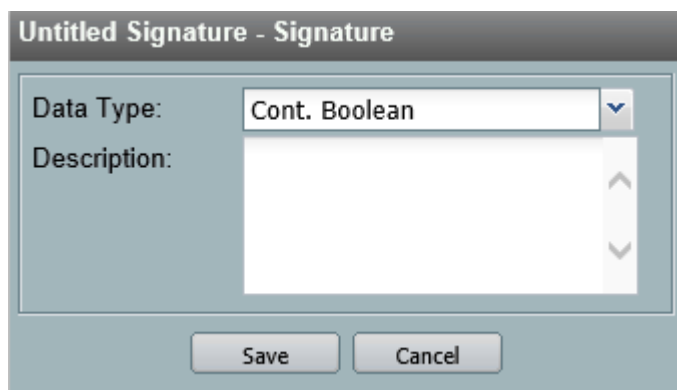
4. Click "OK" when complete.

Your new signature will be available immediately and can be tied to any Data Point in the system.

How To: Add Signature to Datapoint

1. Navigate to the Data Point you want to have a new signature.
2. Choose to modify the Data Point
3. Select the Signature tab at the top of the modify window. The signature selector is shown below:
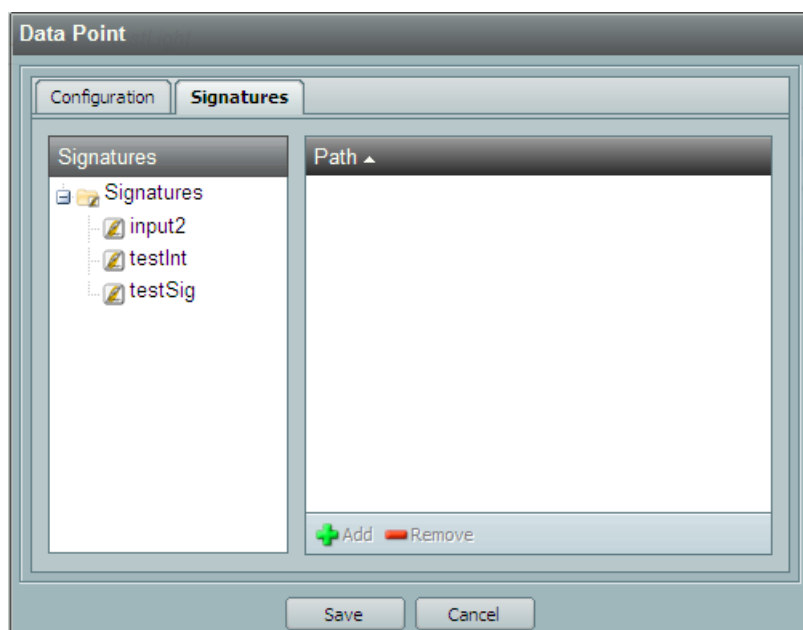
4. Drag-and-drop the Signature from the tree on the left to the list on the right

5. Click save to close the window

Now any report run on the added Signature will include the data from the Data Point to which you added the Signature.

Why Use Signatures?

Understanding and using Signatures are critical to getting the most out of Statuswatch Reporting software. Signatures can simplify and reduce editing of reports. For example, if a Data Point from a report is deleted or if a new Function is added that you want to use instead of an existing Data Point in a report. Without Signatures the user needs to go into the report and delete the old reference and add a reference to the new item. If a report uses Signature references you may not need to edit the report at all. If the deleted Data Point is referenced through a Signature in the report then it will simply return to null data. And if you want to replace an existing Data Point with a Global Function Instance you can remove the signature from the Data Point and add it to the Function Instance instead. Another case where Signatures decrease editing of reports is if the user adds a new Asset. Without signatures, each Data Point in the new Asset would need to be referenced in the report. By adding the existing referenced Signatures to the new Data Points in the Asset, the data from the new Asset will be added to the report without further editing.

A few other report design features that helpfully use signatures are *Filters* and *Divisions*. Filters block Data Points from some Assets or Asset Groups from being used in a report even if those Assets' Data Points have Signatures that are referenced in the report. Divisions can breakup a report so there is a different section for each Asset or Asset Group even if all the Assets are referenced through the same Signatures.

Part

IV

StatusWatch Administration

Topics:

The following section will cover the various duties of a StatusWatch system administrator, including how to manage Users, Groups, and Permissions.

Notification

A notification is a triggered message that fires when a specific set of conditions is met. The message can be sent via e-mail, Telalert, or Clickatell to any subscribed users. A notification is made up of four elements; a Data Point, a Duration, an Interval, and a Description. The "Data Point" field refers to the continuous boolean data point (or Data Point Group) that must be True in order for the notification to fire. The "Duration" field indicates how long (in hours, minutes and seconds) the Data Point must be True before the notification will fire. A value of zero in this field will cause the notification to fire immediately. The "Interval" field refers to the number of hours, minutes and seconds that the Data Point must remain True beyond the original Duration before the notification will re-send. For example, a Notification with a Duration of 00:05:00 and an Interval of 00:10:00 will fire when the associated Data Point has been True for 5 minutes, and again every 10 minutes thereafter, so long as the Data Point remains True. Finally, the "Description" field represents the text of the message itself. A list of possible substitution tokens are provided at the bottom of the notifications panel to allow for more dynamic text.

How To: Create A Notification

1. Using the drop-down menu labeled "Settings" at the top of the interface, select "Notifications". You will be directed to the notifications administration section of the application.
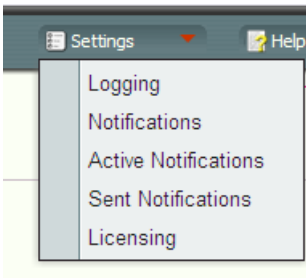
2. Click the "Add" button at the bottom of the panel to add a new notification with default text in the description field.
3. Click on the new notification to move it to edit mode. The notification will appear in the space above the grid.
4. Using the edit fields above the grid, adjust the Data Point, Duration, Interval and Description for your notification as desired.
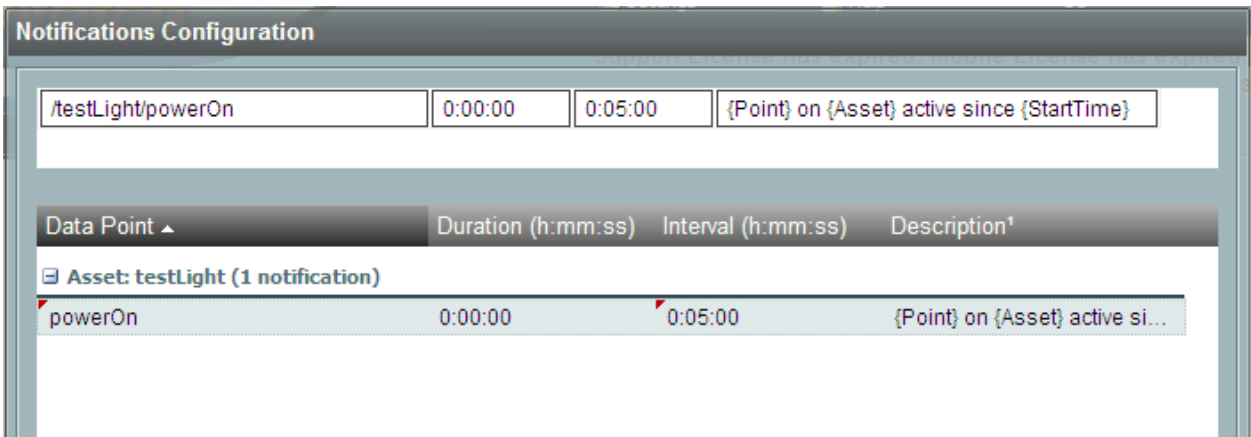
5. Repeat the above three steps for as many notification as you wish to add.
6. When satisfied with your changes, click "Save and Return" in the Actions Panel to save your notifications and return to the gallery.

Your notifications can now be subscribed to by any Users or User Groups.

See the *replacement tokens appendix* for descriptions of notification tokens.

How To: Open Active Notifications Window

1. Using the drop-down menu labeled "Settings" at the top of the interface, select "Active Notifications". You will be directed to the active notifications view.
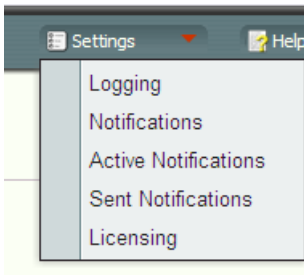
2. Using the column fields above the grid to sort or group the currently active notifications as desired.

3. When done with the window, click "Close" to return to the gallery.

Your currently active notifications are now viewable whenever needed.

How To: Open Sent Notifications Window

1. Using the drop-down menu labeled "Settings" at the top of the interface, select "Sent Notifications". You will be directed to the active notifications view.
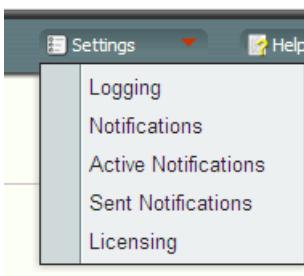
2. Using the column fields above the grid to sort or group the sent notifications as desired.

3. When done with the window, click "Close" to return to the gallery.

Your most recently sent notifications are now viewable whenever needed.

User

A User is a unique person as represented within the StatusWatch application. Each User can be made a member of multiple Groups, can have explicit user permissions set within the system, and can subscribe or be subscribed to multiple notifications.

How To: Create A User

1. Navigate to the "Security" section of the application using the **navigation tree.**
2. Select "New User" from the **Actions Panel.** The following window will display:

3. Specify the Display Name in the appropriately labeled field.
4. Specify the Login Id in the appropriately labeled field. Logins are case-sensitive. If a login requires a domain such as CORP\doe, the Login Id will need to be CORP_doe.
5. In the Password field, type in the password this User will use when logging into the system. If using a corporate login (CWS, NT, etc), this field must still be populated at the point of user creation, but will be ignored in favor of the corporate login.
6. Click the "Add" button. The User will be created and the following window will display:

7. Modify the fields on the *User Details*, *Devices*, *Permissions*, *Group Membership*, and *Notifications* tabs as desired.
8. Click the "Save" button to save your changes and dismiss the window.

Your User will be saved and can log into the system immediately. Any subscribed notifications will begin firing at the appropriate times.

User Details

On the User Details tab, The following options can be set:
1. Display Name: Sets the name that will be displayed for the User throughout the rest of StatusWatch.
2. Email: Sets the e-mail address at which the User will receive notifications, as well as password resets. Also the place to enter a Telalert or Clickatell address.
3. Locale: Sets the display language for the application for this User.
4. System Admin: Toggles whether this User is a system administrator, allowing them full access to every item and setting within the application.
5. Startup Report: Selects a report that displays when User first logs in.

User Devices

On the Devices tab, Users can setup mobile device connections to StatusWatch. Each device represents an individual mobile device associated with that User. The device shares all permissions and visibility associated with the User. Currently the only devices connections are through iPads using the iStatusWatch app.

How To: Add User Device
1. Navigate to the "Security" section of the application using the **navigation tree.**
2. Double-click on the icon of the User of which you wish to add a device to.
3. Click on the "Devices" tab.

4. Click the "Add" button. A popup should be shown for the name of the device.
5. After the clicking "OK", a new popup will show the mobile device invitation.
6. Use the generated QR code with a scanner or use the sent email on the mobile device to complete the connection.
7. When done, click "Save" to save your changes and close the window.

The device invitation will be sent immediately. If connection is completed, the status will reflect it.

User Permissions

On the Permissions tab, explicit permissions can be set for the specified User. While this method gives more granular control over the permissions granted, it is often more efficient to make use of *Groups* instead, as they allow for management of permissions using more general controls. The four permission levels that can be assigned for any item in the system are as follows:

- Inherited: This is the equivalent of specifying no permissions for the item. The permissions for the User will be set to that of its Groups.
- Denied: The User is explicitly denied access to the item. This setting will override any other permissions set by Group membership.
- Allowed: The User is explicitly allowed access to the item. This setting will be overridden by any "Denied" permissions set by Group membership.
- Grant: The User is explicitly allowed access to the item, and may grant access to the item to other Users. This is the default permission for any items created by the User. This setting will be overridden by any "Denied" permissions set by Group membership.

How To: Edit User Permissions

1. Navigate to the "Security" section of the application using the **navigation tree.**
2. Double-click on the icon of the User of which you wish to edit permissions.
3. Click on the "Permissions" tab.
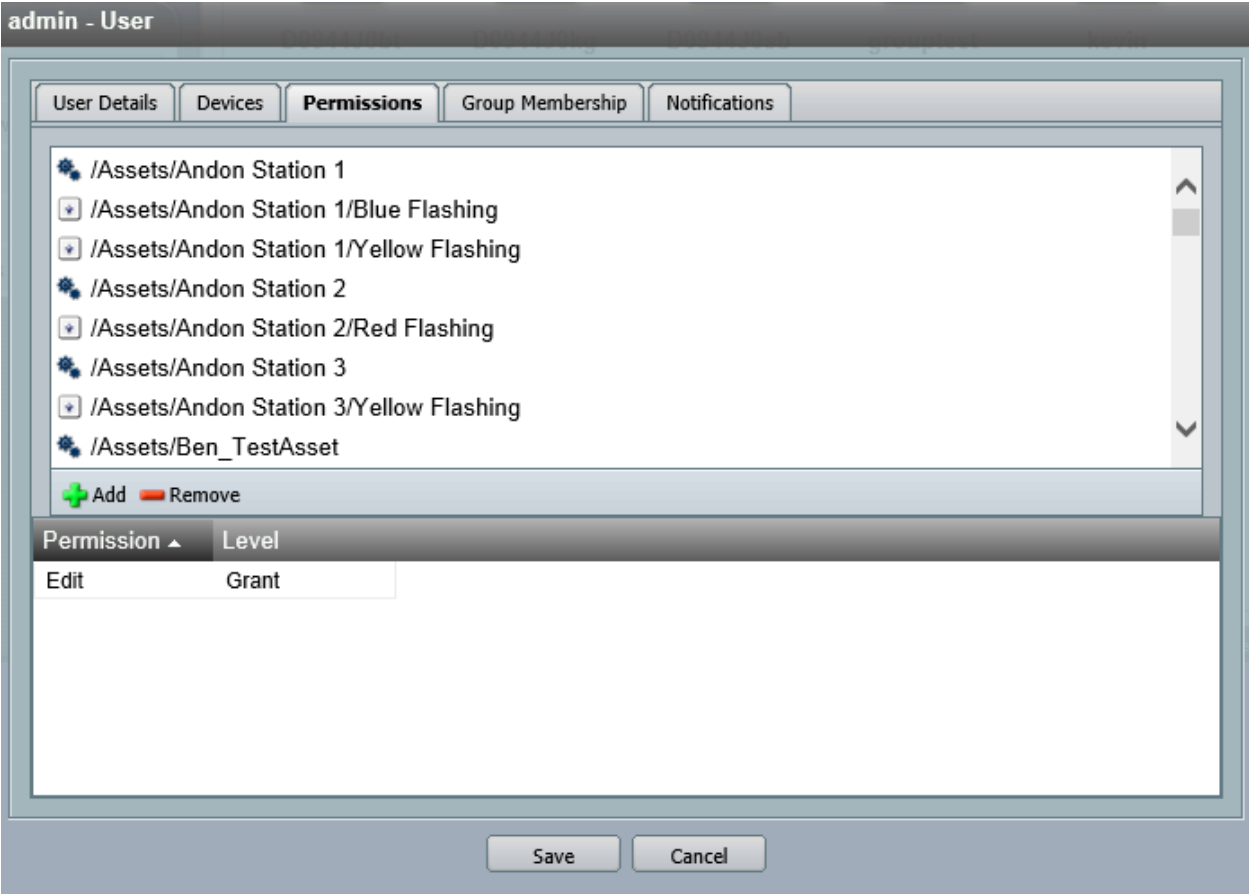
4. Click the "Add" button. A list of all items in the system will be displayed.
5. Navigate to the item on which you wish to set this User's permissions.
6. Once the desired item is selected, click "OK". The selected item will display in the upper pane of the Permissions tab.
7. In the bottom pane of the Permissions tab, the current permission levels for the item will be displayed.
8. Adjust the permission as desired using the drop-down menu under the "Level" column.
9. When done, click "Save" to save your permissions and close the window.

The permissions will be set immediately.

Group Membership

Users can be made members of as many Groups as desired. Group membership can be used to efficiently manage permissions for large numbers of Users. For example, a factory may have fifty machinists that need access to a newly created report. If all the machinists are members of a Group called "Machinists", they can be given access to the report at the Group level, rather than having to be granted access one at a time.

How To: Edit User Group Membership

1. Navigate to the "Security" section of the application using the **navigation tree.**
2. Double-click on the icon of the User of which you wish to edit Group membership.
3. Click on the "Group Membership" tab. A list of all Groups in the system is displayed.
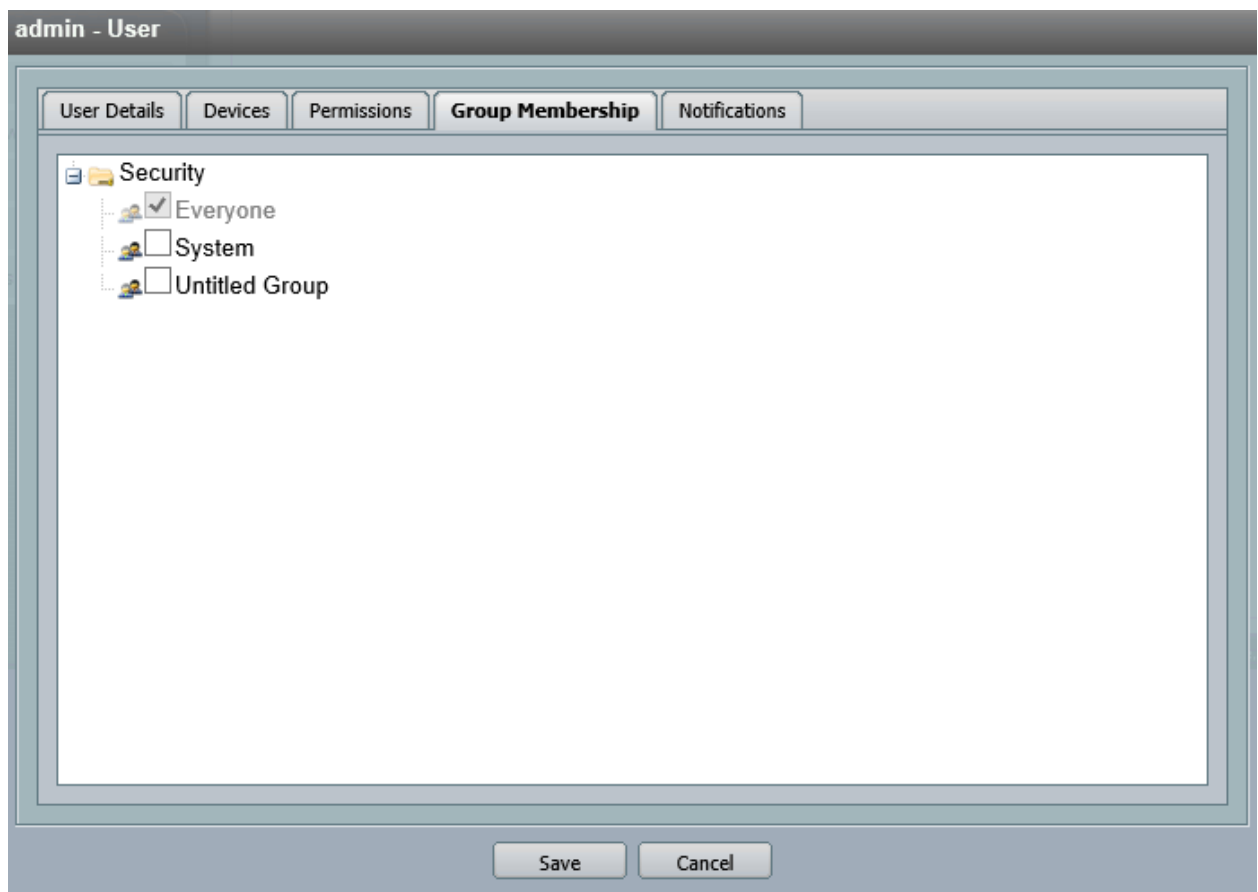
4. Toggle the boxes next to the Group names as desired to adjust this User's membership..
5. When done, click "Save" to save your changes and close the window.

The User's Group membership will be set immediately, and any Group-level permissions will be applied.

Notifications

On the Notifications tab, Users can subscribe (or administrators can subscribe Users) to any notification previously set up in the Notifications Administration section of the application (see *How To: Create A Notification*). Additionally, the User may optionally specify that they wish only to receive a notification within the bounds of a predefined *Calendar*. In doing so, a User can limit the hours during which the notifications are sent.

How To: Edit User Notifications

1. Navigate to the "Security" section of the application using the **navigation tree.**
2. Double-click on the icon of the User of which you wish to edit notifications.
3. Click on the "Notifications" tab. A list of all notifications in the system is displayed.

Data Point ▲	Duration (h:mm:...	Interval (h:mm:ss)	Active Times
/Andon Station 1/Blue Flashing	0:00:00	0:01:00	
/Andon Station 1/Yellow Flashi...	0:00:00	0:05:00	
/Andon Station 2/Red Flashing	0:00:00	0:00:30	
/Andon Station 3/Yellow Flashi...	0:00:00	0:03:00	
/Test_Andon_01/Yellow	0:14:00	0:00:00	
/Test_Andon_02/Blue Flashing	0:01:00	0:01:00	
/Test_Andon_02/Red Flashing	0:01:00	0:01:00	

✚ Check All

Save   Cancel

4. Adjust the checkboxes as desired to toggle subscription to the notifications.
5. Optionally, use the drop-down menu in the column labeled "Active Times" to specify which calendar must be active for the notification to be sent.
6. When done, click "Save" to save your changes and close the window.

The notifications will be sent the next time the specified conditions are met.

User Group

A User Group is simply a list of member Users, and is useful for managing permissions within the application without the need to micromanage each User in a facility.

The *Permissions* and *Notification* tabs of the User Group work the same as the User except they will apply to any User in the group.

Members

Each User that is a part of a Group is called a member. A User may be a member of as many Groups as is necessary, but it is important to note that permissions always defer to the most conservative explicitly declared setting. That is, if a User is a member of Group A, and Group A is allowed edit access on a particular item, and the same User is a member of Group B, and Group B is explicitly denied edit access on that same item, the User will be denied access.

Permissions (Group)

Group-level permissions allow for easier management of permissions for large sets of Users. For example, if there are fifty machine operators in the facility, and no "machine operators" group containing all of those Users exists, granting them each access to the new report you just made could require editing the permissions on each of the fifty Users. In contrast, by placing all of those Users in a Group, only a single adjustment would need to be made in order to grant all fifty Users access.

See the *User Permissions* page for a detailed description of how to use and add permissions.

How To: Create A User Group

1. Navigate to the "Security" section of the application using the navigation panel.
2. Select "New Group" from the actions panel.
3. Name your new Group when prompted. Click "OK"
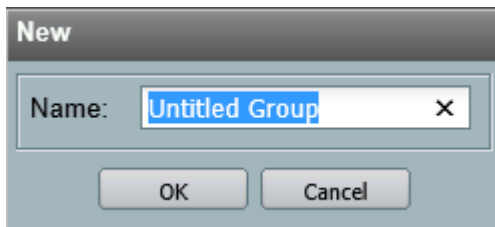
4. Your new Group is created, and a window appears containing several tabs.
5. On the "Members" tab, check the box next to the name of each member you wish to add to this Group.
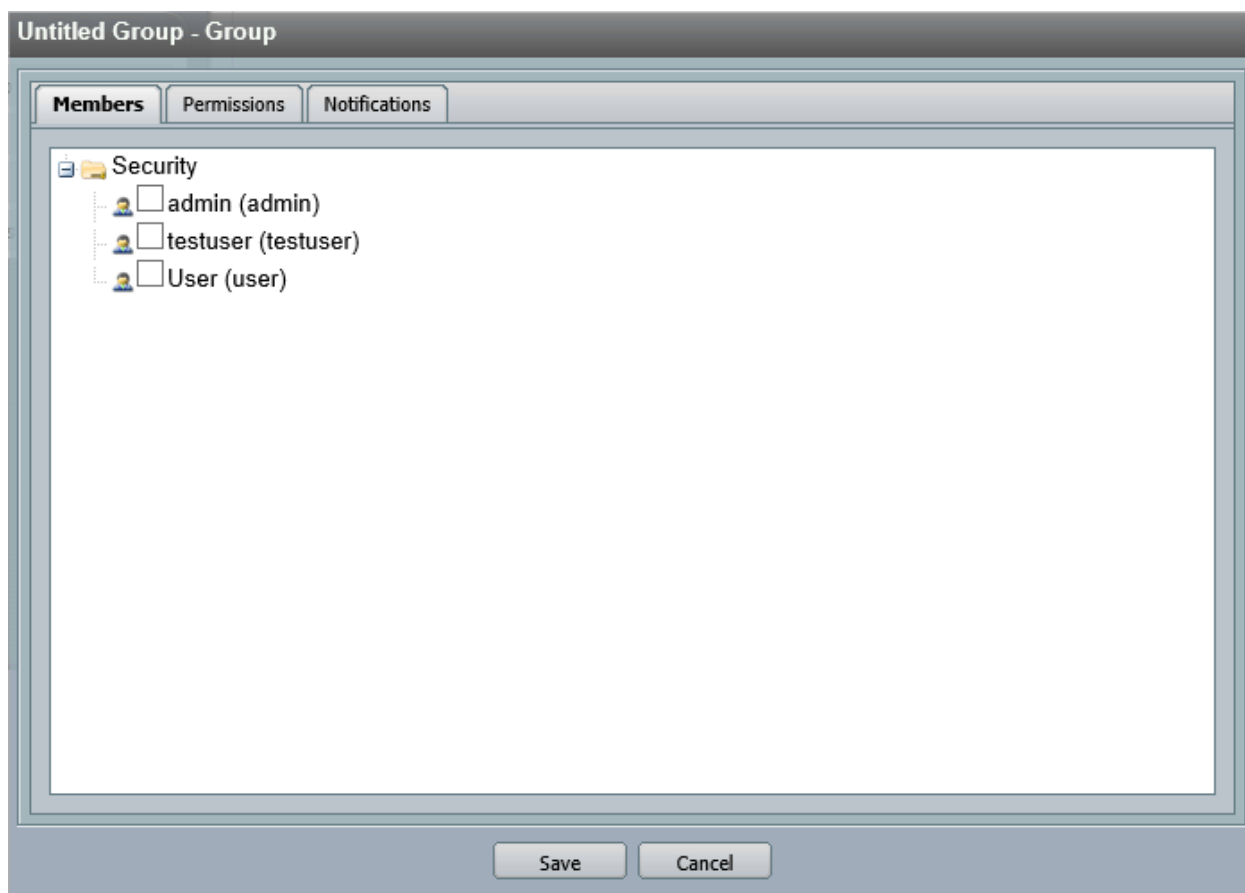
6. Adjust the permissions as desired on the "Permissions" tab.
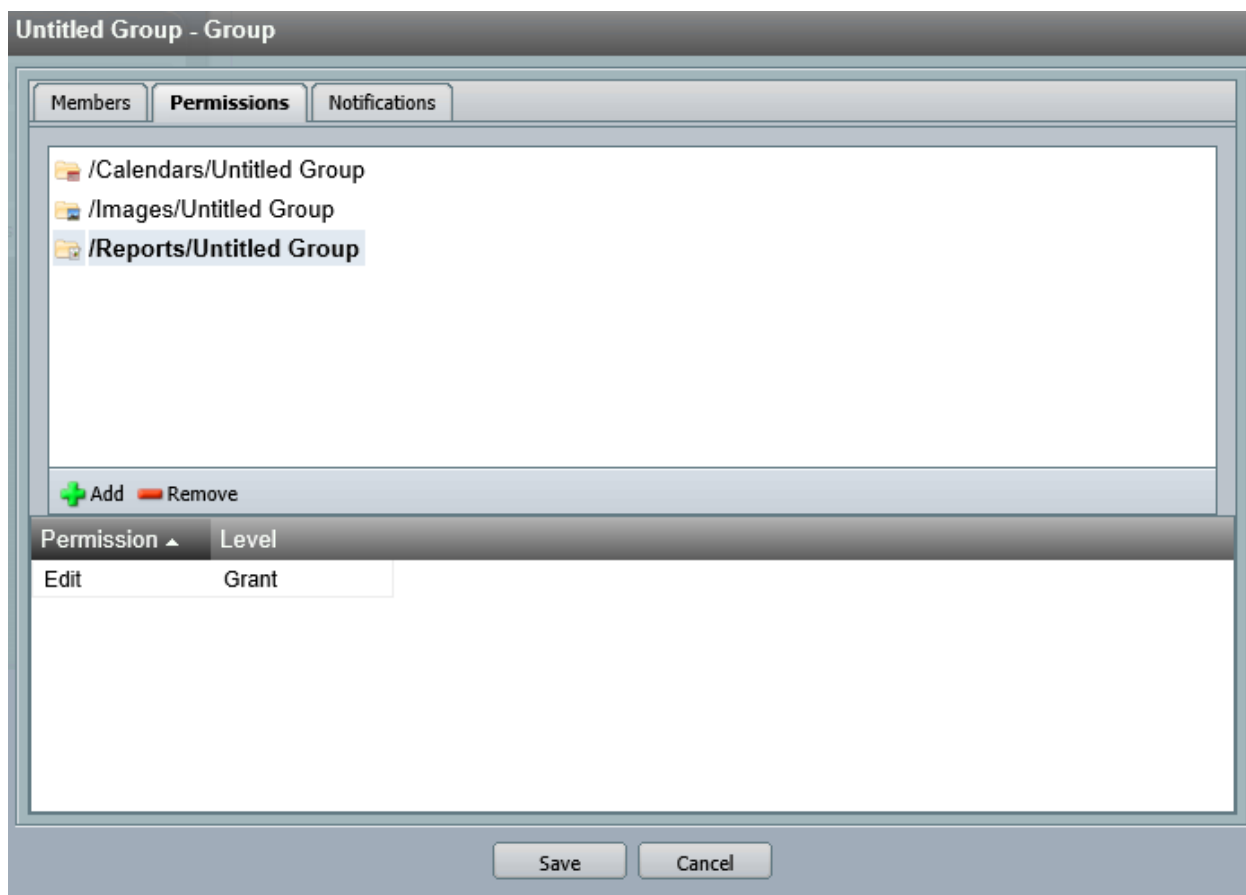
7. Click "Save" when done.

Your new Group will display in the Security section of the application.

Report, Calendar, Asset, and Signature Permissions

In addition to setting a particular User or Group's permissions via the User or Group windows, permissions may be set for an object at the object level. For example, if you are looking over your reports and decide that the permissions for a particular report need to be adjusted, you need not navigate to the Security section of the application to adjust them.

How To: Set Permissions

1. Select any item in the application on which you have full access.

2. Select "Set Permissions" from the actions panel.

3. The permissions window will display. If the User or Group whose permissions are to be adjusted already appears in the window, click on it. If not, click the "Add" button, then specify which User or Group is to have its permissions adjusted for this item.

4. Adjust the permission level as desired. Remember that it is impossible to remove the only Grant-level permission for any item, as it would leave the item orphaned in the system.

5. Click "Save" when done.

The permissions will take effect immediately. If an affected User is logged in and in the middle of a transaction that has had its permission levels adjusted, he or she may experience errors upon saving.

Copy Permissions

When an area of responsibility is transfered to from one user to another, it copying the old users permissions to the new user enables quick turn over.

1. Go to the security page.

2. Select the User or User Group with the desired permissions.
3. Click "Copy Permissions" action button.
4. Select the User to which to copy permissions on the popup.
5. Click OK.
6. To verify the permissions transfered. Open the modify window on the user and look at the permissions tab.

The permissions are transfered from one User to another. Now the new User can use all the reports and other items to which the first User had permissions.

Creating Reports

The report editor is made up of three main areas, similar to the gallery. The large area in the center of the editor contains the report itself presented in a layout view. The report is laid out as a grid that acts as a container for charts, tables, and other content. The Actions panel at the left, contains actions that can be taken on contents of the report and the Report Actions panel contains actions that apply to the report as a whole.

How To: Create A Report

1. Navigate to the Reports section of the application.
2. Click on the user tab under which you wish to create the report (i.e. "My Reports", "Everyone", etc).
3. Select "New Report" from the Actions Panel
4. Name your new report in the dialog that appears.
5. The report grid will display. Insert report elements as desired and set report options as desired.
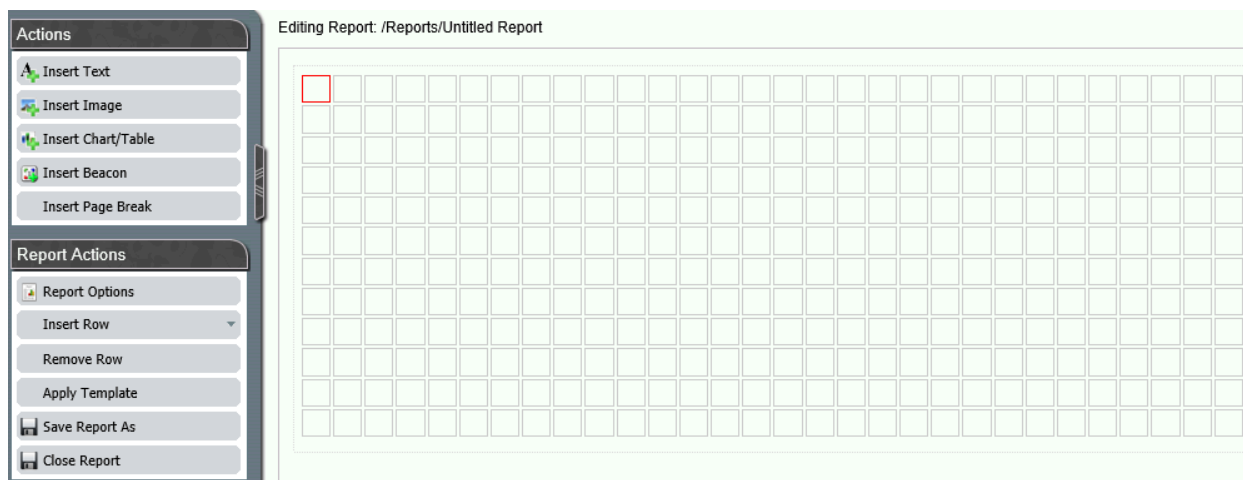
6. Click "Close Report" in the Actions Panel to save and close your report.
You will be returned to the Reports section of the application and your report will appear.

Report Options

The Report Options window displays a list of options that apply to the report as a whole. Many of these options are also available at the chart level, but it is important to understand that those set in the Report Options window will be applied to the entire report. That said, the chart-level versions of these options can be made to override those of the containing report.

General

On the General tab, several options may be set that affect the entire report. The "Auto Refresh Rate" option allows you to set a countdown timer for the report, after which the report will automatically re-run itself. This is useful for reports that are intended to display real-time data. The "Paper Size" option allows you to adjust the intended print size to match several widely used print formats. The "Page Orientation" option allows you to toggle between Portrait and Landscape orientation for the report. The "Show Page Header" and "Show Page Footer" options toggle the display of

headers and footers, which are special rows of cells that will appear once each on a report when viewed on-screen, but will appear at the top/bottom of every single page when printed.

Timespan Options

Timespan tab allows you to set the span(s) of time to be included in the Report. In the Timespan Type drop-down box, you may select one of three timespan types. They are Preset, Explicit, and Calendar Occurrence. The Preset option allows you to select one of the default timespans, such as Today or Yesterday. The Explicit option allows the User to choose a specific start and end time for the Report. The Calendar Occurrence option allows the user to select a Calendar that represents the desired timespan for the Report as well as the option of how many times ago for the Calendar to start.

The Calendar timespan option sets the Report to display only data that appears within a set of Calendar rules *(see Creating Calendars)*. The second option required of Calendar timespan is the 'ago' number. Choose how long ago in the past the Report should start for the selected calendar timespan. The 'ago' option is the number of how many times the selected Calendar's timespan has repeated between the present and the desired start time for the reports. Setting 0 ago chooses timespan that includes the present or is just before the present. Setting 1 ago is the last time the Calendar ran from beginning to end without being chopped off by the present.

Note: The report time span can also be set when the Report is viewed. See *'Report Timespan'*

Filters

Through applying filters the User can choose to view only a portion of the total data referenced in a Report. A specific time or only a few of the Assets may be of interest. By using filters the User will be able to more quickly find and analyze the data that is of interest to them.

On the "Data Filters" tab, you may choose to limit your Report or chart to show only data for a specific Asset or Asset Group. The total report timespan can also be modified and divided by filtering the Report through a Calendar or Calendars. To add an Asset or Calendar filter, drag-and-drop it from the panel on the left onto the table in the center(or double-click the item in the left panel). To remove a filter, highlight it and click the "remove" button on the toolbar below (or double-click the filter).

There are the following options to set after selecting your desired filters:

1. The "Use Members" option - this applies only to Asset Groups, and determines whether or not the chart or report will display the members of the Group rather than the Group as a whole. For example, if you had previously set up an Asset Group that contained all of the lathes represented in the system, dragging over the Asset Group and setting "Use Members" to YES would cause the chart or report to display data for each of the lathes individually as if each lathe Asset had been added to the filter list, rather than the Asset Group of lathes as a whole.
2. The "Include" option - this applies only to calendars, and determines whether or not the calendar being used as a filter will be inclusive or exclusive. For example, if you had created a calendar that accounted for all of first shift, you would set "Include" to YES to include only the time defined in the calendar. Conversely, you could set "Include" to NO to exclude that same segment of time.

Note: If no filters are selected, then the Report will run based on all assets across the entire report timespan. As such, if you want the report to run against all machines, you do not need to select every Asset in the system, nor do you need to create and apply a Calendar that accounts for all time in the timespan. The Assets and the Report

timespan are handled automatically by the reporting engine if no filters are added.

Report Filters can also be set at run time as can be seen in the *'Data Filters'* section under *'Viewing Reports'*.
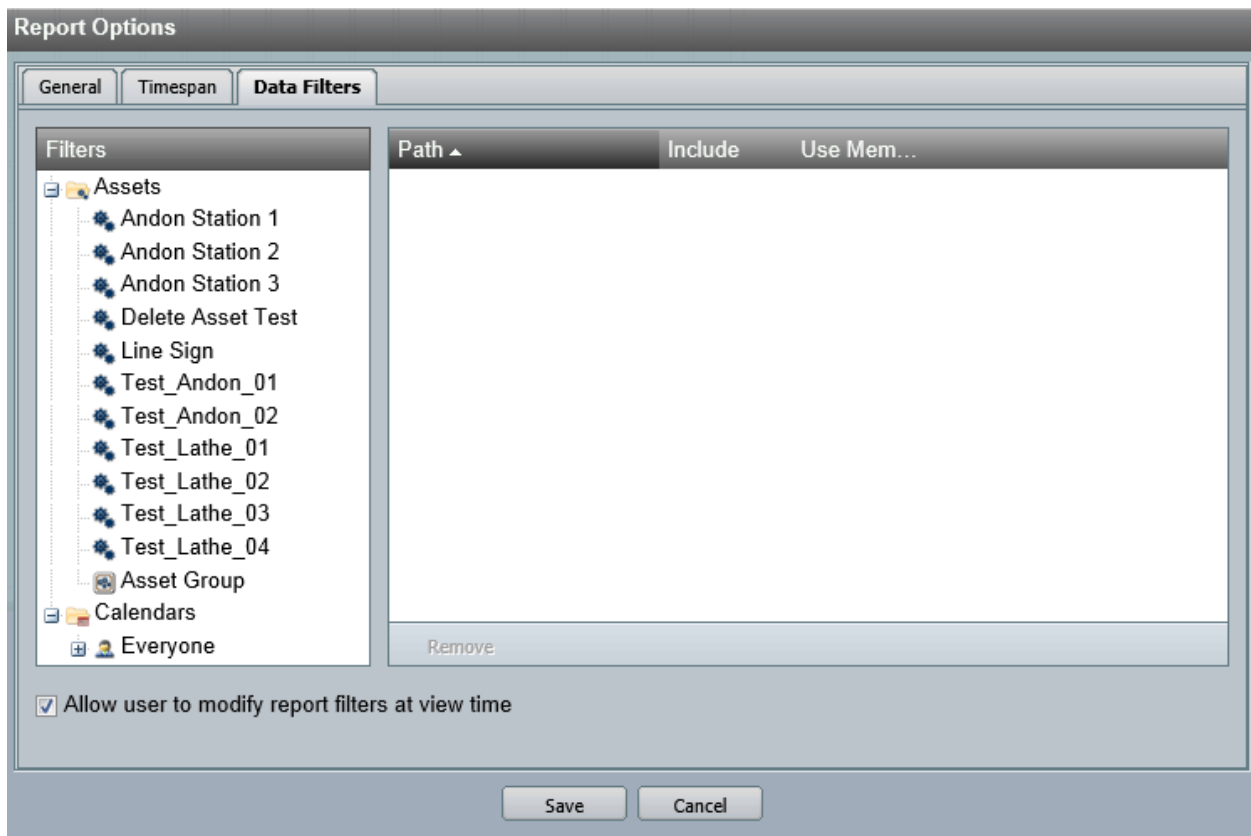
Report Grid

The report grid is a grid layout of report cells that can contain various report elements. Rows can be added using the "Insert Row" command in the Actions Panel, and Rows can be removed using the "Remove Row" command. The number of columns and rows that appear by default is determined by the Report's Paper Size and Page Orientation options, both found on the General tab of the Report Options window.

Report Cell Copy and Paste

Once a cell has been created on a Report the User may want to change its location on the grid or make another chart with slightly different format. The copy and paste actions allow you to duplicate cells on the report editor grid and place them in an open section of the report grid. When a cell is selected the copy action appears in the action list. Then after selecting a section of the grid the paste action appears allowing you to add the cell from the clipboard to the Report. Once the cell is pasted it is remains on the clip board until StatusWatch is refreshed or another cell is copied.

One useful aspect of the copy action is that it allow you to transport cells from one Report to another. If a cell is copied from one Report, then the Report can be closed and the User can open another Report and paste. This allows work in chart and table formating to be duplicated across many Reports without having to recreate a given cell.

Report Cell

A Report Cell is the smallest unit of usable space in the Report Grid. It is often useful to create report elements that span multiple cells. To do this, click-and-drag across multiple cells before adding your report element.

Text Cell

Text cells allow you to enter simple text into a report cell and apply basic formatting to that text. This is useful for creating labels, titles, and other static text indicators within your Report.

If you want more dynamic information included in your text cells visit the *replacement tokens appendix* to learn what to type to insert values into the text cell that will be calculated at Report runtime.

How To: Insert a Text Cell

1. While viewing the report grid, select the desired cells and select "Insert Text" from the Actions Panel. The following window will appear:
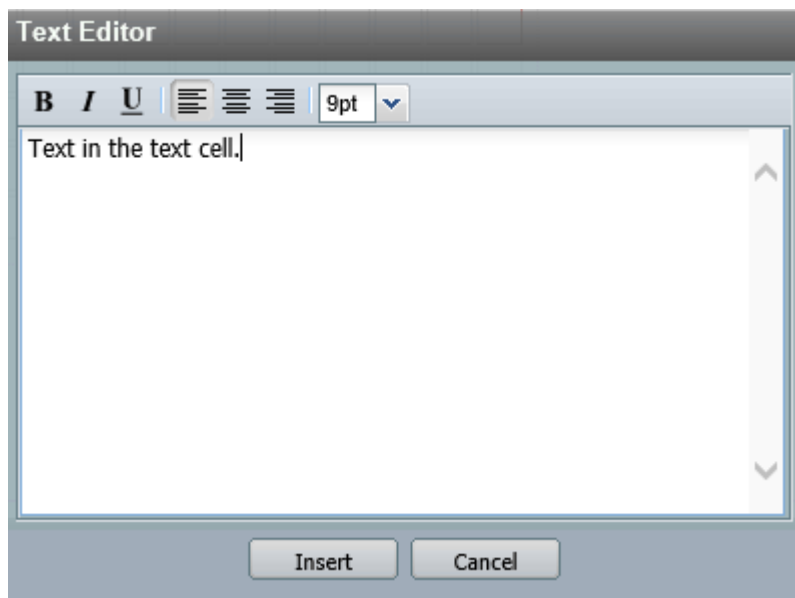
2. Enter your text in the given text area and apply any desired styles to the text. You can choose to make your text bold, italic, or underlined, and can align the text to the left, center, or right. To insert values and timestamps use a token - see the *Text Token Collection*.
3. When satisfied with your text, click "Insert" to save your text and dismiss the window.

The text will appear in the previously selected cell or cells.

Image Cell

Static images can be added to a Report. These may be useful for displaying company logos, department letterhead, etc. When inserting an image, be aware of its dimensions. StatusWatch does not include any image editing tools, and inserting an exceptionally large image may disrupt the formatting of your Report.

How To: Insert An Image Cell

1. While viewing the report grid, select the desired cells and select "Insert Image" from the Actions Panel. The following window will appear:
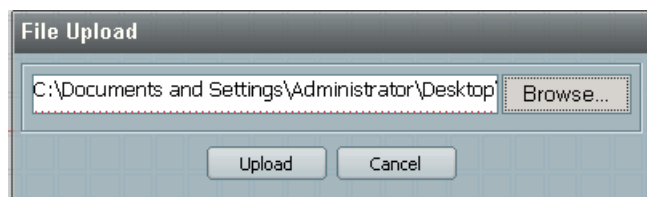
2. Click on the button labeled "Browse" and navigate to the location of the image on your machine or network.

3. After selecting the desired image, click the button labeled "Upload" to insert the image and close the window.

Your image will display in the previously selected cells.

Chart/Table Cell

Charts and Tables can be used to display your data in a number of useful ways, and are the core of most Reports.

How To: Create A New Chart/Table
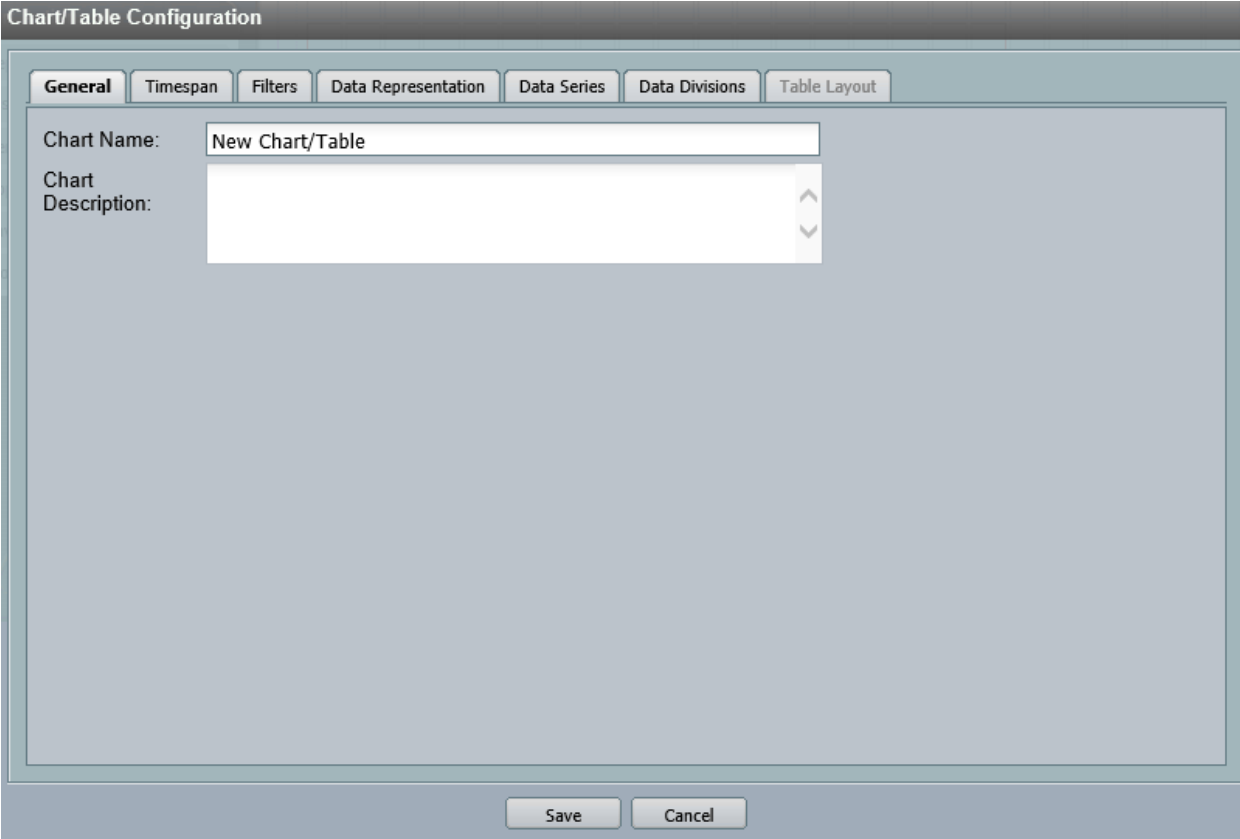
1. While viewing the report grid, select the desired cells and select "Insert Chart/Table" from the Actions Panel. The following window will appear:

2. Optional: If desired, name your chart and add a brief description using the fields on the *General* tab.

3. Optional: Set the timespan for the chart using the fields on the Timespan tab. If the chart should inherit its timespan from its containing Report, indicate so using the checkbox labeled "Inherit chart time span from report" (enabled by default). See *Timespan* tab.

4. Optional: Set the Assets and Calendars that should be applied as filter for the chart. Do so using the fields on the Filters tab. If the chart should inherit its filters from its containing Report, indicate so using the checkbox labeled "Inherit chart filters from report" (enabled by default). See *Filters* tab.

5. Specify how the chart should display using the fields on the *Data Representation* tab.

6. Specify which segments of data should be displayed on the Report by defining them on the *Data Series* tab.

7. Optional: If desired, apply Data Divisions on the tab of the same name, so as to break up the data on the chart into more useful segments. See *Division* tab.

8. Optional: If a chart type of "Summary Table" or "Detail Table" was selected on the Data Representation tab, the Table Layout tab will be enabled, and should be used to define the structure of the table. See *Table Layout* tab.

9. Click the button labeled "Save" to save your chart and close the editor.

Your chart will appear as an icon in the report grid.

General

This tab contains two simple text fields that allow you to give your chart a name and a description. These are not required fields, but can be very useful for keeping things organized when building a Report that contains many charts.

Timespan

On the Timespan tab, you may set the span of time to be covered by the chart. In the Timespan Type drop-down box, you may select one of three timespan types. They are Preset, Explicit, and Calendar Occurrence. By default the timespan panel is disabled and the timespan is set inside report options. To toggle this option, use the checkbox labeled Inherit chart time span from report. If it remains disabled the report cell will inherit its timespan fromt the report options. It is common for a Report to contain several charts that all display data for the same timespan.

The Preset option allows you to select one of several useful hard-coded timespans, such as Today or Yesterday. The Explicit option allows you to set a specific start and end time for the span. The Calendar Occurrence option allows you to limit the report to display only data that appears within a set of Calendar rules (see Creating Calendars), and allows you to set the number of occurrences prior to runtime that should be used.

Finally, you may choose to allow or disallow users from modifying the timespan of the chart immediately prior to running the Report. This option is disabled by default. To toggle this option, use the checkbox labeled Allow users to modify chart time span at view time.

Filters
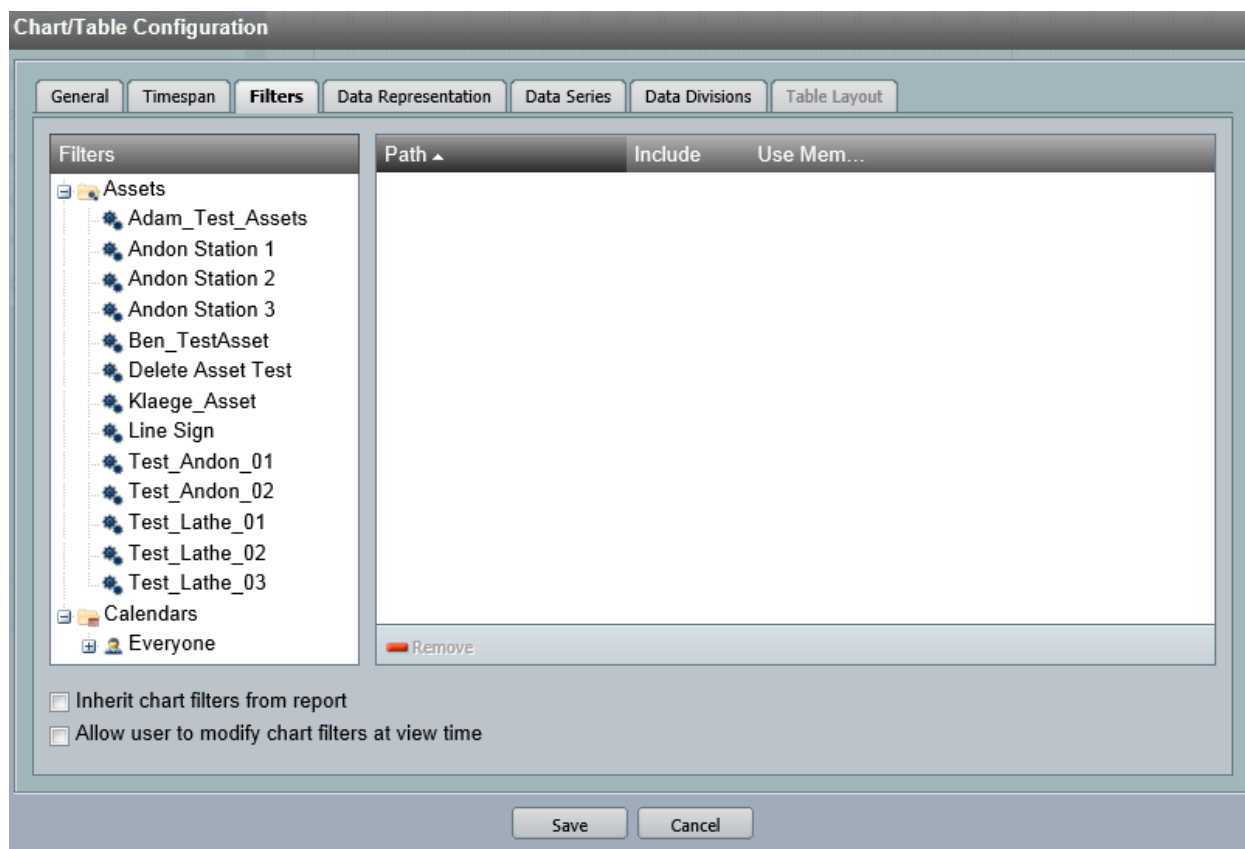
The Filters tab is the section where you will limit the data that is included in the chart. To the left there is a tree containing a list of all Assets in the system, as well as all Calendars. To add an Asset or Calendar to your Report, double-click on its name or click and drag it into the box to the right. To remove an Asset or Calendar, highlight it and click the Remove button near the bottom of the window. If no Assets are selected, the chart will report on all available Assets, as a chart that contains no data would be invalid.

As on the Timespan tab, you may also choose to inherit the chart filters from the Report in which it is included. This option is enabled by default, and will prevent you from selecting any filters in the above boxes while enabled. To toggle this option, use the checkbox labeled Inherit chart filters from report.

For any Calendars that are added to the list of filters, an additional option is available. You may either include or exclude the Calendar from the Report. For example, you might have a Calendar that represents the weekend. To exclude weekend data from this chart, you would add the weekend calendar to the chart filters list and set it to Exclude in the drop-down box to the right of the Calendar's displayed path (see Creating Calendars).

Also as on the Timespan tab, you may choose to allow or disallow users from modifying the filters for the chart immediately prior to running the Report. This option is disabled by default. To toggle this option, use the checkbox labeled Allow users to modify chart filters at view time.

Data Representation
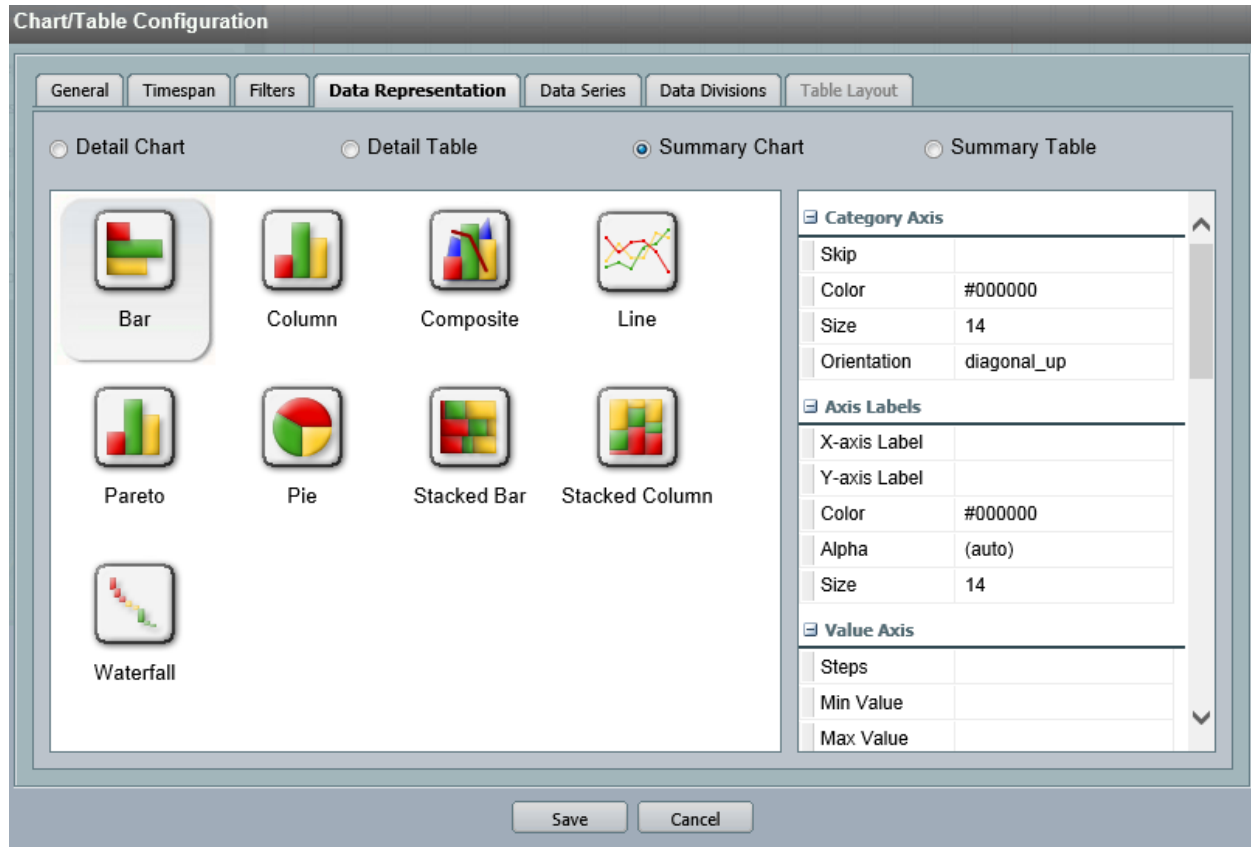
To customize the way your chart will look on the screen, you will use the options contained in the Data Representation tab. The chart and table types are divided into three categories, selectable using the radio buttons found near the top of the window.

To change the chart type, select the appropriate category (Detail Chart, Detail Table, Summary Chart, or Summary Table) and then select your desired chart type from the box below.
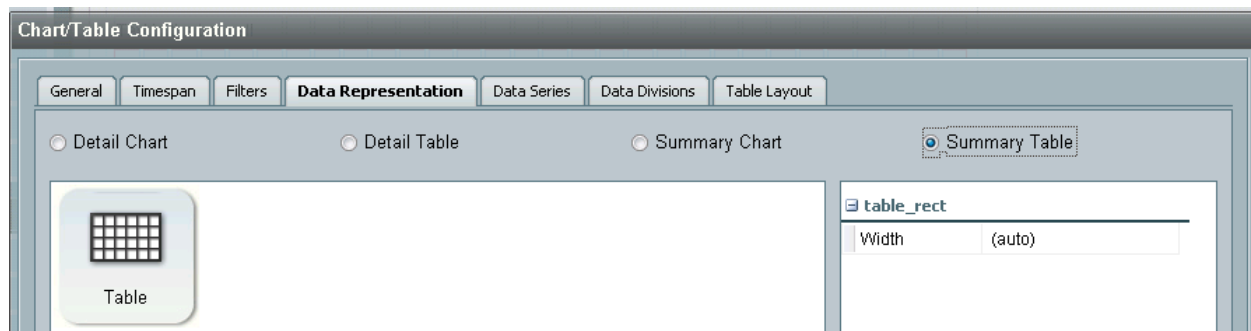
To the right sits a box containing a list of display options. These can be used to fine-tune the look of your chart. Different chart types may have different defaults, but with the exception of the Table type found under the Summary Table category, all charts can be visually tweaked to match your personal preferences.

The Table type found under the Summary Table and Detail Table category is formatted in the Table Layout section of the manual. The table layout details are not available from the data representation tab.

Data Series
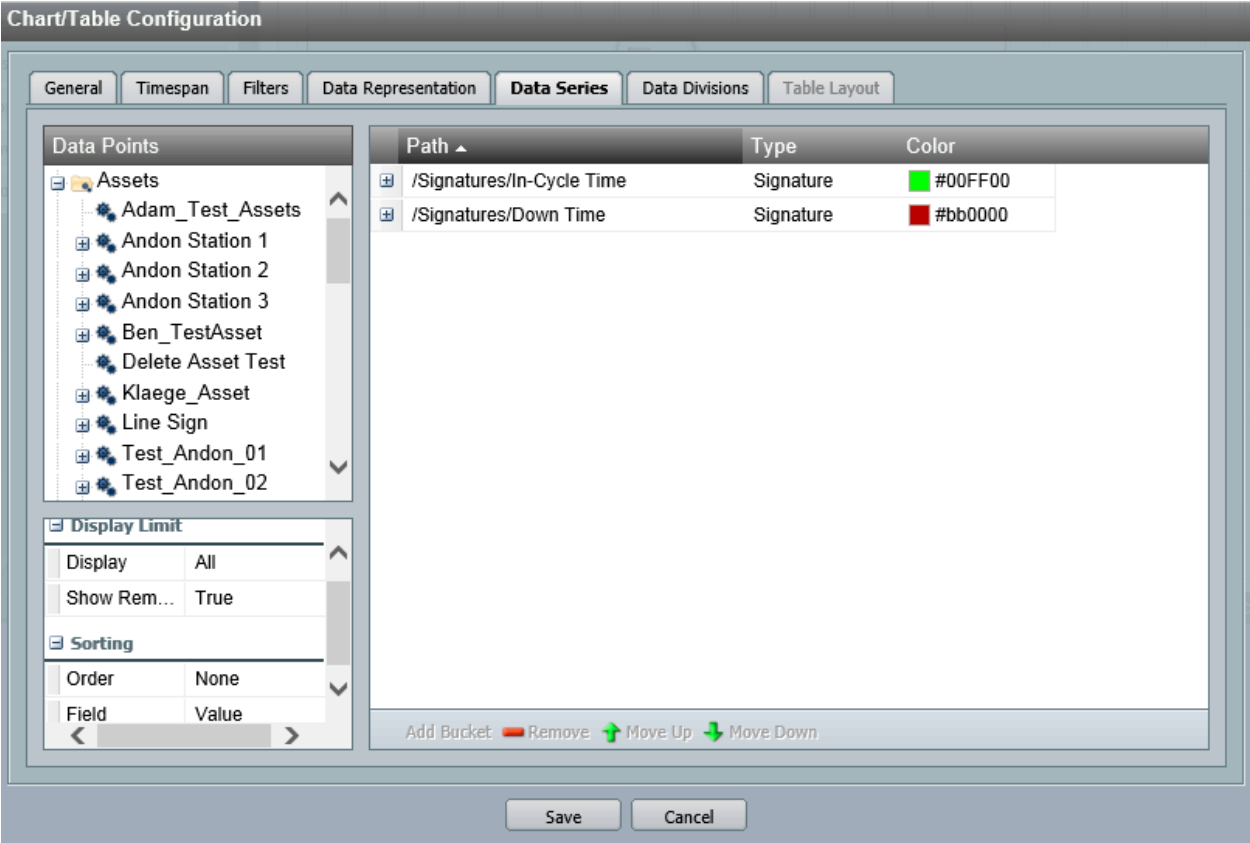
Each Asset likely contains many Data Points, and it is often useful to further limit a chart so that only certain data points are included. This is done on the Data Series tab, where a list of all available Assets and Signatures is found on the left. To add a Data Point or Signature to the chart, double-click on its name or click and drag its name into the box on the right. To remove a Data Point or Signature, highlight it and click the Remove button near the bottom of the window.

Signatures are often more useful than specific Data Points when defining the Data Series for a chart. Using Signatures allows your Report to be more flexible and encompass more data *(see Signatures)*.

Four additional options are available for each series that is added to the chart. The Use Members option allows you to specify whether or not a Data Point Group should be displayed as a single item or a group of individual items. The Color option allows you to set the display color of each series. The Show Zero option allows you to suppress and hide the series if it returns no data when run. The Display Asset Name option will add the Asset's name associated with that series if it includes only one Asset.

Finally, the order of the series can be adjusted by highlighting a series and clicking the Move Up or Move Down buttons. The order of the series list on this tab will influence the order in which the series appear in some chart types.

Data Divisions

It may be useful for your data to be visually divided up into meaningful segments. This can be accomplished using the options on the Data Divisions tab. You can divide your data on each Asset, Asset Group, Signature, Calendar, or Data Point Value Change.

Chart/Table Configuration

| General | Timespan | Filters | Data Representation | Data Series | **Data Divisions** | Table Layout |

Divisions

No division selected

📃 Calendar Division

➕ Add ➖ Remove ⬆ Up ⬇ Down

Save   Cancel
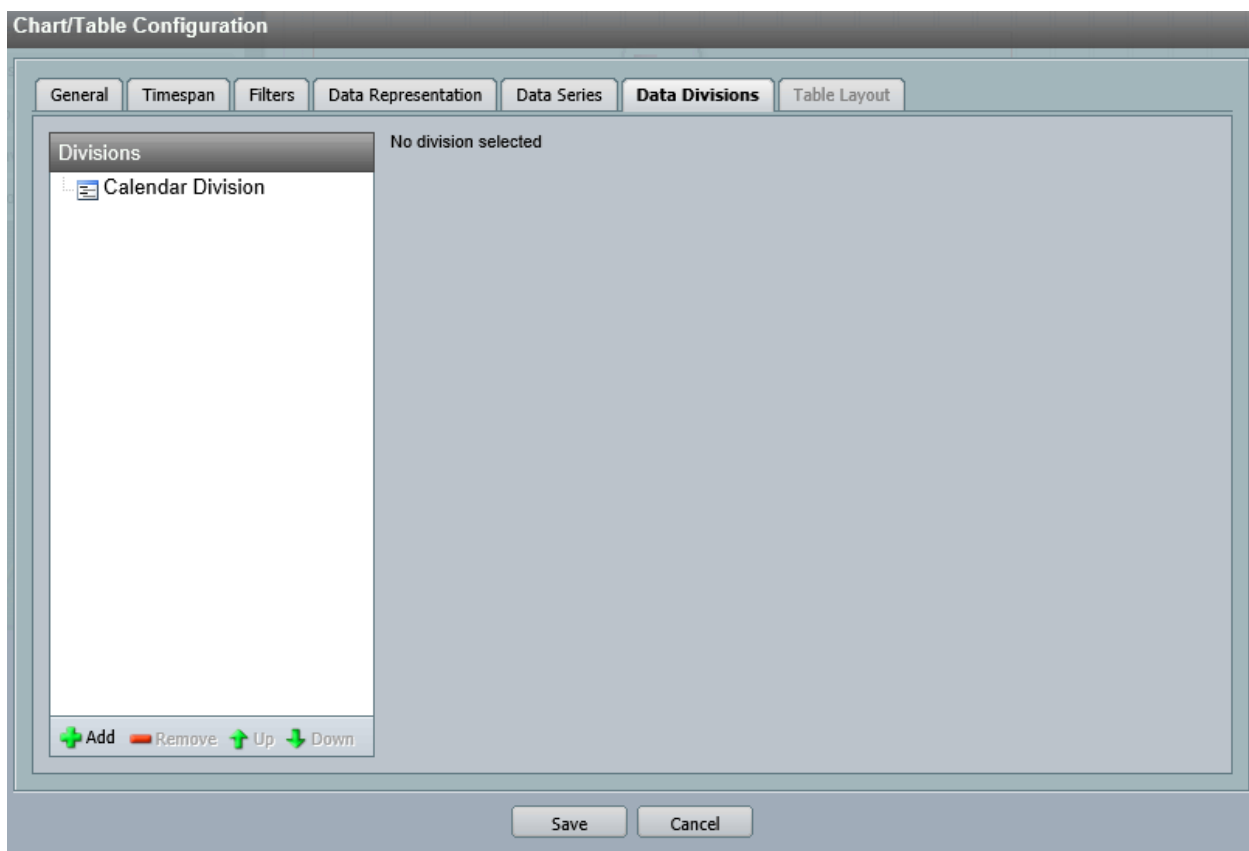
For example, you may want a column chart that displays a column that represents the total time spend in two unique states, but you want those columns to appear once for each day of the week. In such a scenario, you would divide on a Calendar that defines a day (see Creating Calendars).

To add a division, click the Add button and select the desired division type from the menu that appears. To remove a division, highlight it and click the Remove Division button near the bottom of the window.

Some division types have additional options that must be set. When dividing on Signature, a list of available Signatures appears to the left. You may toggle the checkbox next to each Signature on which you wish to divide.

When using a Calendar division, you should similarly select which Calendars should be used in the division. If multiple Calendars are checked, the Summary and Occurrence options can be used to specify whether all instances of the Calendar for the duration of the Timespan should be summarized (select Summary) or listed independently (select Occurrence).

A division on Data Point Value Change requires that you specify which Data Point or Signature should be used in the division. The Summarize unique values checkbox allows you to summarize all occurrences of each unique value for the Data Point or Signature selected, and the Change happens at end of timespan checkbox allows you to specify that a value change for the selected Data Point or Signature indicates the end of the previous value rather than the start of the next value.

To add more depth to your report any division can be sorted according to the data series in the report. Divisions are by default sorted into chronological or alphabetical order. The following are the steps to activating a division sort.

1. Start by adding a division.
2. The grid on the right side of the divisions panel shows a list of series.
3. Move the series above the dividing line to enable sorting based on that series. The first series takes precedence over the rest.
4. Choose ascending or descending order for the series.

Any division can be sorted according to one or more of the series under it. For example a Report divided into weeks can be sorted according to which week had the highest productivity. Or a report divided by Asset can be sorted by

which Asset had the most downtime. This arrangement of data will hopefully make the Report quicker to read and easier to interpret.

One final option on each division is the division display limit. This way if there are a large number of some particular division like hours or weeks you can choose to only display the top few instead of all of them. Any positive number can be typed into the division display limit field. One use could be to only display the Assets with the top three OEE values instead of all Assets sorted by OEE.

The image below is of a calendar division with all options set.

Divisions Types

This is a more detailed look at how each available division functions.

- Calendar Divisions

  - An existing Calendar or Calendars are selected and the Report data is divided based on time.
    - Summary Calendar Division - The Report creates a division for each Calendar selected and summarizes the data within the selected Calendar's timespan for the Report with this division.
    - Occurance Calendar Division - The Report creates a division for each time the selected Calendar's timespan is able to occur within the Report's timespan.
- Asset Divisions

  - Divides the Report with a separate section for each Asset's data processed in the Report.
- Asset Group Divisions

  - Divides the Report with a separate section for each Asset Group's data processed in the Report.
- Value Change Divisions

  - For this division to run there needs to be an Asset division on the report cell before the value change division(VCD). In each value change division one Data Point or Signature needs to be selected. There are a number of options on this division explained below.

- Regular VCD - This creates a division for each time the selected data reference's value changes.
- Summarized Unique Occurances - This creates a division for each new value the selected data reference's turns to. Repeated values are collated into the same division.

- Value Label - The name of the division will be the value of the data reference.
- Timespan Label - The name of the division will be the timespan the data reference was a specific value.

- The change happens at end of timespan checkbox is only of interest if a instantaneous datapoint has been selected for the value change divison.

- Change happens at beginning of timespan - The division of an instantaneous value will cover the time from the timestamp of the value change to the end of the report timespan.
- Change happens at end of timespan - The division of an instantaneous value will cover the time from the beginning of the report timespan to the timestamp of the value change.

- Skip if Null/Zero - No division will be created during the period the data reference is null or zero.
- Signatures Divisions

- This division only allows Data Points or Signatures selected in the division to be shown where all other Signatures or Data Points are filtered out.

Table Layout
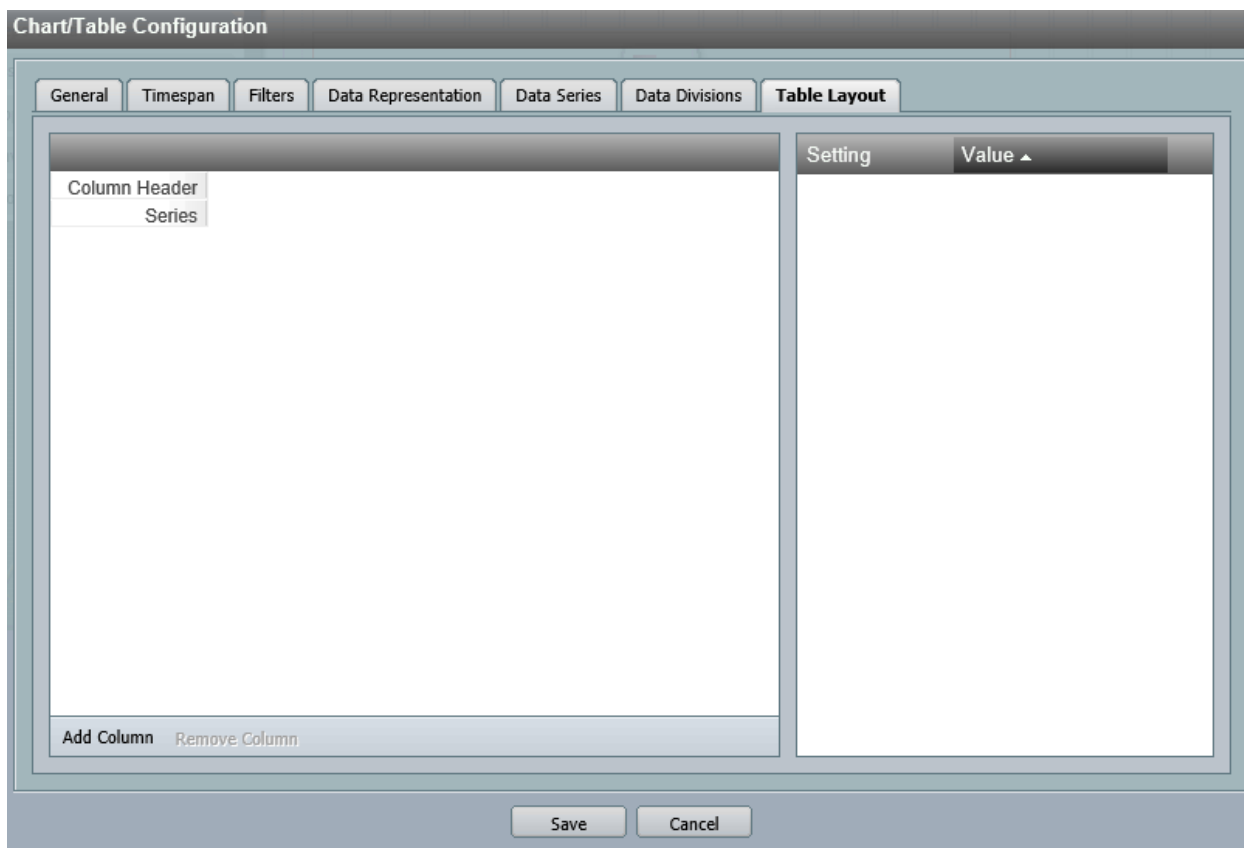
This tab is disabled unless the Table type under the Summary Table or Detail Table category is selected on the Data Representation tab. On this tab, you can both specify the number of columns that will appear in your table and apply some simple formatting to each column. Noteworthy on the list of formatting options is the Show option which, if set to false, will hide the cell entirely. Additionally, table headers can be defined for each series on the table.

Beacon Cell

A Beacon is a type of chart that is specialized enough to warrant its own interface. Beacons are cells on the Report that display dynamic text, colors, and borders based on user-defined, real-time evaluation of an expression.

As a very simple example, you may want to create a Report that displays the state of a machine in real-time and in an easily readable fashion. To do this you could set up a beacon cell that displays the word "OK" in a green box when the machine is actively being used, changes to the word "WAIT" in a yellow box when the machine is having a part changed, and changes to the word "DOWN" in a red box when the machine is broken.

How To: Insert A Beacon Cell

How to add a new Beacon Cell.

1. While viewing the report grid, select the desired cells and select "Insert Beacon" from the Actions Panel. The following window will appear:

2. Optional: The Beacon Name and Description are similar to that of the Chart/Table. They may be useful when building a Report that displays many beacons, but are not required. Fill in these fields if desired.
3. Optional: Make note of the panel on the left that initially shows only one state, the default state. This state cannot be removed, but you can adjust the look of it. When no other states contain expressions that return True, the default state is displayed. It is pre-configured to display as a gray box containing the words "Default State" in black. Also notice the buttons near the bottom of this panel labeled Add, Remove, Move Up, and Move Down. All of these commands apply to states of the beacon. As mentioned previously, the default state cannot be removed.

4. Click the "Add" button to add a new state to the beacon.

5. Click on the new state and adjust the state options in the grid to the right of the window. Most important among these settings are the Expression and Value options. Expression refers to the Data Point, Split Data Point to be evaluated. Value refers to the alphanumeric string that must match the current value of the Expression in order for the state to activate. Put simply, "while Expression equals Value, state is active". In addition to setting the Expression and Value for a state, you can adjust the text, text color, background color, font style, font weight, text alignment, and text decoration for each state. Using these parameters, you can ensure that each defined state for your Beacon is unique and easily identifiable.

6. Add more states and configure their settings as desired.

7. Click the "Save" button to save your Beacon and close the editor.

Your new beacon will appear as an icon in the report grid.

Note: Beacon states are evaluated in a top-down order, and the beacon assumes the first state that returns true. As such, if you create two states on a Beacon and both are simultaneously true, only the one listed first in the state list will be applied to be Beacon. The states can be re-ordered using the Move Up and Move Down buttons.

Page Break

Page breaks can be added to a Report. These are useful for spacing and separating a Report into a multiple page Report. The Page Break cell forces a page to break after it. Page breaks tend to work best with browsers like Internet Explorer when printing.

How To: Insert A Page Break Cell

While viewing the report grid, select the desired cell row and select "Insert Page Break" from the Actions Panel.

A Page Break will be inserted for the entire row. No other cells can be on the same row with a Page Break.

A Page Break will be displayed in the previously selected row.

Part

V

Using StatusWatch

Topics:

The following section will cover the basic ways to use StatusWatch. Some sections may require that the reader have a basic understanding of the concepts laid out in the "Setting up StatusWatch" section of the manual.

Raw Data Editor

There will be times when it will be necessary for you to adjust your StatusWatch data manually. To do this, you will use the Raw Data Editor interface. This interface allows the user to adjust the values in the database directly, but without requiring them to have direct database table access. Different data points will display differently in the Raw Data Editor, based on what visualization is appropriate for the specific point. Be especially careful when editing Data Points that are used heavily in complex formulas, as errant edits can cause problematic results that are difficult to track down.

How To: Use The Raw Data Editor

1. Navigate to the "Assets" section of the application using the Navigation Tree.
2. Double-click on the Asset that contains the Data Point that is to have its data edited.
3. Single-click on the Data Point that is to have its data edited, then select "Edit Raw Data" from the Actions Panel or double click on the Data Point.
4. The Raw Data Editor will launch, and display recent data for the point.
5. Based on the type of data, different options will be available to you to edit existing rows. Adjust any existing values as desired.
6. To add in missing values, use the DatePicker next to the "Insert Time Stamp" button to select the appropriate time stamp, then click the "Insert Time Stamp" button to add a row to be edited at that time. The following image has a timestamp added at

9:56:00.
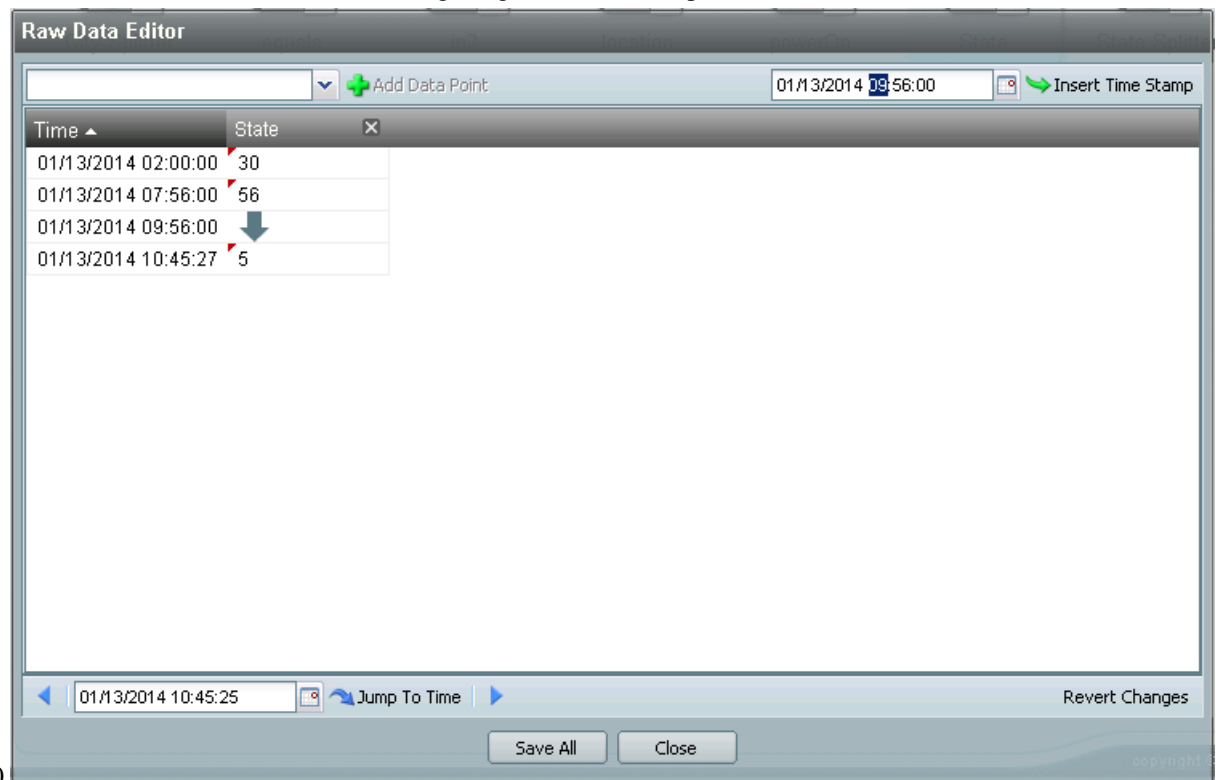
7. To browse forward or backwards through the records, use the forward and backward arrow buttons at the bottom of the window.
8. To jump to a specific time, use the DatePicker next to the "Jump To Time" button to select the desired time, then click the "Jump To Time" button. The view will adjust to show the records closest to the time indicated.
9. To remove a value, select "Delete" from the combobox at the appropriate time stamp. For continuous Data Points, this can also be done by setting the value to be the same as that of the previous record.
10. To add another Data Point to the editor, select the desired data point from the "Data Point" drop-down box, then click the "Add Data Point" button.

11. To remove a Data Point from the editor, click the "X" found in the column header for the Data Point. If you have unsaved changes in the Data Point, you will be prompted to save them before the Data Point is removed from the editor.
12. Click the "Save All" button when you are satisfied with your changes. Click the "Close" button to dismiss the editor.

The data for all adjusted Data Points has been saved and will be reflected in Reports and notifications.

Calendar

Calendars are useful for three primary functions within the StatusWatch application. First, they can be used as filters on a chart or Report. For example, if you wanted a Report that displayed only data for first shift, you could create a first shift Calendar and apply it to a Report as a filter, thereby filtering out any time outside the bounds of your first shift Calendar.

Secondly, Calendars can be used to define the actual timespan of a chart or Report. For example, if you wanted to run a series of Reports for the entire first quarter of a year, a Calendar could be created that would include all time from January through March. Applying such a Calendar to a Report as its timespan would allow you to quickly set the Report to run for the first quarter of the year without having to explicitly set the start and end dates every time.

Finally, Calendars can be used to divide up the data on a chart or Report into useful segments. For example, you may want a Report that shows a machine's uptime in minutes, with each day of the week represented by a separate column on the chart. In this scenario, a Calendar that defines a 24-hour day could be applied to the Report as a division, thereby causing the Report to generate a new bar for each day within the timespan.

Calendar Rule

A Calendar Rule contains a single set of both start conditions and stop conditions. The start and stop conditions must be defined by the start of a time event. Imagine the sentence "From when X starts until when Y starts". For example, a Calendar that will be used to filter out weekends might start on Saturday and end on Monday.

The "end on Monday" statement above may be initially confusing. To clarify, keep in mind that a stop condition defines when the calendar rule ends, but must be defined by the start of an event. If your weekend calendar is to include all of Saturday and all of Sunday, then it is to start as soon as Saturday starts, and it is to end as soon as Monday starts.

How To: Create A Calendar

1. Navigate to the Calendars section of the application, then to the desired sub-folder (if necessary)
2. Click the button labeled "New Calendar" in the Actions Panel. The following window will display:
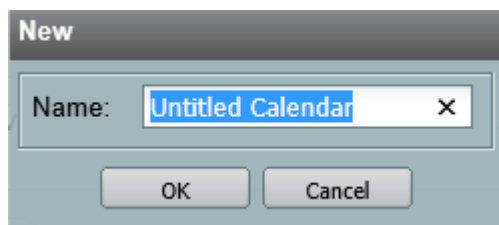
3. Name your Calendar and click "OK". A mostly blank workspace will appear where you can begin to add rules.
4. Use the "New Rule" button in the actions panel to add a rule to your calendar.
5. Define each rule's start and stop conditions using the fields labeled "From" and "Until"
6. Specify whether each rule is an "Add" rule or a "Remove" rule by clicking on the "+" symbol next to the word "Condition". "Add" rules add time into a calendar, while "Remove" rules do the opposite.
7. Continue adding rules and defining their start and stop conditions as desired.
8. Click the button labeled "Close Calendar" to save your Calendar and return to the gallery.

Your new Calendar can now be used as a Timespan, a Filter, or a Division for a Report or chart.

Images

The images category allows you to upload images into StatusWatch and then view them. It is used in conjunction with the iStatusWatch app to create shop floor layouts. By uploading a floorplan of the factory and placing the Assets on it.

How To: Upload an Image

1. Navigate to the Images section of the application, then to the desired sub-folder (if necessary).
2. Click the 'Upload Image' button. The following window will display.
3. Click the browse button and navigate to a .jpeg or .png file.
4. Optional: If you are using Mozilla Firefox or Google Chrome you can drag and drop an image file onto the new image popup.
5. Click Upload.
6. Refresh the page to view the image.

Your new image can now be utilized by the iStatusWatch app.

Viewing Reports

Once a *Report* has been created, any User with the ability to see a Report can run the Report and view its result. After selecting the Report and choosing to view it, several options may be available to the User before the Report is actually generated. If the Report creator has allowed it, the User may adjust the Report's Timespan and Data Filters at runtime. Once any allowed options have been adjusted, the User can generate the Report. To view a Report, first double-click on it. A window will appear containing two tabs, "Timespan" and "Data Filters".

Report Time Span

If allowed by the Report (as set when it was created) the Timespan tab will allow you to set the span of time to be included in the Report. In the Timespan Type drop-down box, you may select one of three timespan types. They are Preset, Explicit, and Calendar Occurrence. The Preset option allows you to select one of several useful hard-coded timespans, such as Today or Yesterday. The Explicit option allows you to set a specific start and end time for the span. The Calendar Occurrence option allows you to limit the Report to display only data that appears within a set of Calendar rules *(see Creating Calendars).* , and allows you to set the number of calendar spans prior to runtime that should be used.

Note: For a more detailed description of the Report timespan options see. See *Timespan Options*

Data Filters

Filters can be used to set additional limitations to the data that will be displayed in a chart or Report. On the "Data Filters" tab, you may choose to limit your Report or chart to show only data for a specific Asset or Asset Group. Additionally, data may be limited using a Calendar. This filter setting will only be valid for one viewing of the Report it will revert to the saved value after the Report is closed.

Go to *'Report Filters'* for a further details on how to set the filters for Report.

How To: Run A Report

- An understanding of how to navigate within the StatusWatch user interface
- A basic understanding of Assets and Calendars
- Security privileges that allow for viewing of the Report

This task describes how to run a pre-built Report called, Daily Summary report with a time span of last month and apply filters to include only one machine and exclude the weekends. This is a standard example for how to run all Reports.

1. Navigate to the Report folder containing the Daily Summary report (`/Reports/Summary Reports`).
2. Click on the Report named *by Day* to select it.
3. Click on the **View Report** button in the **Actions** menu to load the report. This will cause the **Report Parameters** window to be displayed.
4. In the panel on the left side of the **Report Parameters** window the report node (*by Day*) is selected. The two nodes under 'by Day' are cells inside the Report. The **Time Span** and **Data Filters** options apply to the selected item in the panel on the left side of the window. Therefore, if the report node is selected the **Time Span** and **Data Filters** settings apply to the Report as a whole. Likewise, if one of the Report's child nodes were selected, the **Time Span** and **Data Filters** settings would apply to that cell.
5. On the Time Span tab, select Preset for the Time Span Type value, and select Last Month for the Preset value.
6. On the Data Filters tab, expand Assets and Calendars in the Filters tree.
7. From the Assets, click and drag one Asset to the list of applied filters at the right.
8. From the Calendars, drag and drop the Work Week calendar to the list of applied filters at the right.
9. Click the View Report button to generate the Report with the selected parameters.

The Daily Summary report is displayed in the browser including only data for the selected Asset, during last month, excluding weekends.

Appendix

A

Glossary

Topics:

The following is a collection of terms used within StatusWatch and their definitions.

Asset

Any machine or device that is monitored

Beacon

Graphic representation of data at current time

Boolean

True or False value

Calendar

Inclusive or exclusive time filter used to narrow or broaden the scope of data used in a Report

Chart Cell

Graphic representation of data at a specific time stamp or within specific time stamps

Continuous

Has time component and always has value

Data Point

The simplest segment of data that can be monitored

Data Point Group

One or more data points referenced as a collection

Data Splitter

Object that converts a single data point into a series of mutually exclusive boolean data points

Device

A mobile device that connects to StatusWatch.

Filter

Used to limit report data to specified machines, Data Points, and/or time periods.

Function

Formulas created to perform calculations on data

Function Instance

Instance of a Global Function on an Asset, populated with values found within the Asset

Global Function

Function that is defined outside the Asset and can be referenced on any Asset

Immediate

Has no time component; Is primitive

Instantaneous

Has time component, but does not always have value

Integer

Positive or negative whole numeric value

iStatusWatch

StatusWatch mobile app designed for the iPad. Acts as a read-only client to the StatusWatch server.

Number

Positive or negative floating-point numeric value

OEE (Overall Equipment Effectiveness)

Overall Equipment Effectiveness

Page Break

A CSS tag that forces the breaking to a new page within Reports.

Report

Collection of charts, tables, and text arranged in a useful fashion

Report Folder

Folder that contains Reports

Signature

Method of designating similar data across disparate Assets

String

Value containing alphanumeric characters

Table Cell

Tabular representation of data at a specific time stamp or within specific time stamps

Text Cell

Simple representation of text information such as labels or titles

Timestamp

A specific date and time.

Appendix

B

Enable Internet Information Services (IIS)

Internet Information Services(IIS) is a default service on Windows computers. IIS allows the computer to host webpages however it is disabled by default. Both StatusWatch and the StatusWatch PC Interface use IIS to communicate through web page interfaces.

Enable the following features on the computer.

- IIS Management Console
- .NET Extensibility
- ASP
- ASP.NET
- Common HTTP Features

  - Default Document
  - Directory Browsing
  - HTTP ERRORS
  - HTTP Redirection
  - Static Content

- Either enabled through the requried features through the Control Panel of the Windows computer.
- Or enable IIS through the cmd.exe program by runnning the command below to enable the features listed.

```
start /w pkgmgr /iu:IIS-WebServerRole;IIS-
WebServer;IISCommonHttpFeatures;IIS-
StaticContent;IIS-
DefaultDocument;IISDirectoryBrowsing;IIS-
HttpErrors;IIS-HttpRedirect;IIS-
ManagementConsole;IISASPNET;IIS-
NetFxExtensibility;IIS-ASP;IIS-Performance;
```

After the above features are enabled, webpages can be add to the computer through IIS that will be hosted locally. The StatusWatch web interface, the API, and the datacollector webpages are all setup on IIS through the StatusWatch installer.

Appendix
C

Database String Examples

Topics:

- *Oracle*
- *Postgres*
- *Microsoft SQL Server*

Here are three examples of connection strings for Oracle, Postgres, and SQL databases.

Oracle

Connection String #1 - "Data Source=localhost;User ID=swID;Password=swPassword; Max Pool Size=8;Min Pool Size=3;Pooling=True;"

Connection String #2 - "user id=swID;password=swPassword;data source=(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=oracle11g)(PORT=1521)) (CONNECT_DATA=(SID=orcl)));Max Pool Size=8;Min Pool Size=3;Pooling=True;"

Postgres

Connection String #1 - "Server=localhost;User Id=swID;Password=swPassword;Database=StatusWatch;MaxPoolSize=8;MinPoolSize=3;Pooling=True;"

Microsoft SQL Server

Connection String #1 - "Data Source=localhost\SQLEXPRESS;Initial Catalog=Statuswatch;Trusted_Connection=True;Max Pool Size=8;Min Pool Size=3;Pooling=True;"

Appendix

D

Built-In Functions

The following are the Built-In function with parameters and descriptions. Built-in function names are case sensitive.

- *MaxValue(MixedType Data_Point)*
- *Min(Cont/Inst Data_Point_1, Cont/Inst Data_Point_2)*
- *MinValue(MixedType Data_Point)*
- *numAssets*
- *PresetTimer(ContBool Start_Trigger, Integer Seconds)*
- *Round(Number/Integer/ Bool Data_Point, String Round_Format)*
- *ReplaceAll(Cont/Inst Data_Point, MixedType Search_Value, MixedType Replace_Value)*
- *Substring(Cont/Immed/Inst Data_Point, Integer Start_Index, Integer Length)*
- *SubValues(MixedType Data_Point, Immed Integer Start_Index, Optional Integer Stop_Index)*
- *SumOverTime(Cont/Immed/Inst Data_Point)*
- *ts*

ActualPartTime(InstInt Part_Complete, ContBool In-Cycle_Time)

Returns the number of seconds of In-Cycle_Time found between all occurrences of Part_Complete. This formula can escape the report time span backwards (finding data prior to the report start time) in order to account for Part_Complete values for parts that began prior to the time span. Parameters Part_Complete and In-Cycle_Time must be inputs that are not operated on within the function. Returns an Immediate Integer.

CastAsX(MixedType Data_Point, Optional String Option)

Converts the input Data_Point into the specified output type, where X in the function syntax is the output data type (examples: CastAsContBool, CastAsInstInt, etc). NOTE: Not all casts are supported. Returns a data point of the type specified in the cast formula. When casting instantaneous data to continuous, a second parameter can be used. "ChangeAtBeginning" is the default if no option is listed and it extends all records forward in time to the next record. "ChangeAtEnd" extends all records backward in time to the previous record.

ConvertIntToChar(Integer Data_Point)

Takes Continuous/Instantaneous/Immediate integer values from Data_Point and converts them to a character representing the ascii code of that value. The return type prefix will be the same as the input data point but the suffix will be a string.

Count(Cont/Inst Data_Point, String Option)

Counts the total number of value changes in the specified Data_Point. The data point must be of type Continuous or Instantaneous. The Option parameter determines which types of values will be included in the total. "All" will count every occurence, including false booleans and nulls.

Options are "ExcludeDefaultValues" which ignores nulls, empty strings, and zeros in the count, and "ExcludeNoData" which excludes null values from the count. Returns an Immediate Integer.

CreateContinuousNoData(String Data_Suffix)

Creates a segment of Continuous data with the specified Data_Suffix, and populates it with a single null record that fills the entire span. The Data_Suffix must be either "string", "integer", "number", or "boolean", and these options are case-sensitive. This function is useful primarily in tandem with the IfElse function. Returns a Continuous String/Integer/Number/Boolean, as specified in the input parameter.

CreateInstantaneousNoData(String Data_Suffix, Optional MixedType Data_Point)

Creates a segment of Instantaneous data with the specified Data_Suffix, and uses the Data_Point as a template for number of records. The Data_Suffix must be either "string", "integer", "number", or "boolean", and these options are case-sensitive. This function is useful primarily in tandem with the IfElse function. Returns an Instantaneous String/Integer/Number/Boolean, as specified in the input parameter.

Delta(Integer/Number Data_Point, Boolean Allow_Negative, Optional Integer Max_Difference)

Evaluates the difference or change between input Data_Point's records. The evaluation will skip Null data for continuous data points. This formula can escape the report time span backwards (finding data prior to the report start time) in order to account for Data_Point values that began prior to the time span. The Allow_Negative parameter if True will allow all negative differences as well as positive. While not required, the Max_Difference can be set if differences less than or equal to that integer are preferred. This evaluation happens once for each value change found in the input point during the span. The return type will be instantaneous with a suffix that matches that of the input data point.

EqualsNoData(MixedType Data_Point)

Evaluates the input Data_Point and determines if its value is no data. This evaluation happens once for each value change found in the input point during the span. The return type will have a prefix that matches that of the input data point, and will have a suffix of Boolean.

GeneratePulses(Immed Integer)

Creates a Continuous Boolean that will alternate between True and False over time span depending on the input Integer. The Integer is the number of seconds that the pulse spans. This function always starts with True at beginning.

GetValueAsImmed(MixedType Data_Point, String Cast_Option)

Takes in an argument of Data_Point and retrieves the Immediate value depending on the Cast_Option. The Cast_Option is an Immediate String of "begin" or "end". If using "begin", the function will get the first record value of the Data_Point. Using "end" will result in the last record value. This will always return an Immediate value with a suffix that matches the Data_Point.

IfElse(ContBool Evaluation_Target, Value_If_True, Value_If_False)

Takes in a data point or logical statement as the Evaluation_Target and returns the specified Value_If_True for all spans when the Evaluation_Target is determined to be true. For all other spans, the user-specified Value_If_False is returned instead. The Evaluation_Target must be either a Boolean or a statement that resolves to a Boolean. NOTE: The Value_If_True and Value_If_False elements must be of the same data type, or this function will produce an error. Returns data of the type indicated by the Value_If_True and Value_If_False parameters.

InstNow(Boolean Exclusive_Now)

Creates an Instantaneous Boolean that is empty for all time until the moment at which the report is run (hereafter referred to as "now"). If the time span of the report includes now (i.e. "Today", "This Week", "This Month", etc), a single record with a value of true will be included in the returned InstBool, time stamped at report run time. If the time span of the report does not include now (i.e. "Yesterday", "Last Week", etc), then no records will be included in the InstBool. The Boolean Exclusive_Now parameter indicates whether the notion of "now" should be exclusive (true) or inclusive (false). A false (inclusive) parameter indicates that "now" is actually the second after now, and is

useful only when the report time span ends in the future. If specified as false (inclusive), any record contained in the returned InstBool will have a value of false. Returns an Instantaneous Boolean.

Latch(ContBool Start_Trigger, InstInt Stop_Trigger)

Creates a Continuous Boolean that is true from the Start_Trigger until the Stop_Trigger. The Start_Trigger must be a Continuous Boolean, and the Stop_Trigger must be an Instantaneous Integer, though either of the triggers may be the results of functions themselves if necessary. NOTE: This function does not elegantly traverse divisions on a report, most notably calendar divisions. Use of this function in tandem with calendar divisions may generate unexpected results. Returns a Continuous Boolean.

LookUp(Cont/Inst Lookup_Column_Value, Table Source_Table, String Desired_Column)

Retrieves a value or set of values from a table on an asset. The Lookup_Column_Value must be a data type suffix match to the "Lookup Column" field of the Source_Table. The Source_Table is the specific table from which the value or values are to be extracted. Finally, the Desired_Column represents the string name of the column in which the desired data resides. The returned value will be either Continuous or Instantaneous, depending on what type of data was passed into the function in the Lookup_Column_Value, and its suffix will be determined by the data type suffix of the Desired_Column.

Max(Cont/Inst Data_Point_1, Cont/Inst Data_Point_2)

Creates a new Continuous or Instantaneous data point that contains the maximal values of each of the two inputs at all points across the time span. NOTE: Both of the inputs must be of the same data type. Returns a value whose data type matches that of the two inputs.

MaxValue(MixedType Data_Point)

Determines the maximal value found within the Data_Point input and returns it as an Immediate value. Returns an Immediate String/Integer/Number/Boolean, depending on the input type.

Min(Cont/Inst Data_Point_1, Cont/Inst Data_Point_2)

Creates a new Continuous or Instantaneous data point that contains the minimal values of each of the two inputs at all points across the time span. NOTE: Both of the inputs must be of the same data type. Returns a value whose data type matches that of the two inputs.

MinValue(MixedType Data_Point)

Determines the minimal value found within the Data_Point input and returns it as an Immediate value. Returns an Immediate String/Integer/Number/Boolean, depending on the input type.

numAssets

A built in variable that return a positive number. It counts the number of assets for which the report has been run. Returns an Immediate Integer.

PresetTimer(ContBool Start_Trigger, Integer Seconds)

Creates a Continuous Boolean that becomes true when the Start_Trigger becomes true, and becomes false after the specified number of Seconds have elapsed. NOTE: This function does not elegantly traverse divisions on a report, most notably calendar divisions. Use of this function in tandem with calendar divisions may generate unexpected results. Returns a Continuous Boolean.

Round(Number/Integer/Bool Data_Point, String Round_Format)

Reduces the resolution of the input Data_Point according to the specified Round_Format. In the Round_Format string, an underscore character represents the optional decimal point position, and "X" characters represent placeholders for decimal precision. Examples: "_XX" will round the input Data_Point to two decimal places; "_X" will round to one decimal place; "_" will round to a whole number; "X" will round to the tens position; "XX" will round to the hundreds postion. NOTE: Rounding to a greater precision than that of the source data will serve only to add extraneous characters to the end of the value (3.1 rounded to two decimal places via the Round_Format "_XX" will return 3.10). Returns a Cont/Inst/Immed Number, where the prefix is determined by that of the input Data_Point.

ReplaceAll(Cont/Inst Data_Point, MixedType Search_Value, MixedType Replace_Value)

Searches the input Data_Point for the specified Search_Value, replacing all occurrences found with the specified Replace_Value. When the input Data_Point is a string type, this function will find the Search_Value and replace it even when found as a substring ("hello" will be found in the string "helloworld"), while all other data types (Integer, Number, Boolean) require an exact match (42 will not be found in the integer 1428). Returns the same data type as that of the input Data_Point.

Substring(Cont/Immed/Inst Data_Point, Integer Start_Index, Integer Length)

Parses values found in the Continuous, Instantaneous, or Immediate string Data_Point, returning a subset of the characters found within, according to the specified Start_Index and Length. The Start_Index is zero-based, meaning that an index of 1 will start with the second character of the string. If the Length value is greater than the number of remaining characters in the string (Example: SubString("hello", 0, 14)), then the entirety of the remaining characters will be returned. Returns a string with the data type prefix of the input Data_Point.

SubValues(MixedType Data_Point, Immed Integer Start_Index, Optional Integer Stop_Index)

The function gathers all records from the Start_Index to the last and creates a new data type like Data_Point with only those records. The optional Stop_Index allows for an end index to be specified instead of the last record. The resulting data type will be the same as Data_Point.

SumOverTime(Cont/Immed/Inst Data_Point)

Adds all values found in the input Data_Point together, returning the result as an Immediate. This formula may not be used on string data. NOTE: for Continuous data points, this may produce extremely large values (Example: SumOverTime(Temperature) when run on a reportfor "This Year"). Additionally, when used on an Immediate type data point, this formula uses an effective implicit cast toContinuous, applying the Immediate data point's value to all seconds found in the time span. Returns an Immediate data point whose suffix matches that of the input Data_Point.

ts

A built-in variable that returns the time span of the report as a Continuous Boolean. This will be affected by calendar filters. Included time will result in True and excluded time will result in False values. Can be used to help determine if a calendar is including/excluding time as desired.

Appendix

E

StatusWatch Text Tokens

Topics:

Text Tokens are any symbol or representative characters in a text box that Statuswatch will recognize and replace with the value the token symbolizes. Statuswatch replaces tokens in Report Text Cells and in Notification email bodies

Email Tokens

{Asset}

The name of the Asset being monitored

{Point}

The name of the specific Continuous Boolean Data Point being monitored

{StartTime}

The time at which the conditions for the alert were initially met

{ActiveDuration}

The total amount of time during which the conditions for the alert have been continuously met

{NotificationPeriod}

Notification Period text to be inserted here

{LastNotificationTime}

The last time that a notification was sent by this alert

{NextNotificationTime}

The next time that a notification will be sent, assuming the conditions are still met

{value([/path])}

The current value of an arbitrary Data Point. Requires the path to the arbitrary Data Point as a parameter.

Report Cell Tokens

Note: All text cell token methods must be contained within curly braces {}.

now([formatString])

The Now() method will return the current time per the application web server. Optionally, you may pass in a format string so that the date will be formatted to your liking.

The following list contains the supported format characters:

- • d - The day of the month, from 1 to 31
  - dd - The day of the month, from 01 to 31
  - ddd - The abbreviated name of the day of the week (i.e.: Mon, Tue, etc).
  - dddd - The full name of the day of the week.
  - h - The hour, using a 12-hour clock from 1 to 12.
  - hh - The hour, using a 12-hour clock from 01 to 12.
  - H - The hour, using a 24-hour clock from 0 to 23.
  - HH - The hour, using a 24-hour clock from 00 to 23.
  - m - The minute, from 0 through 59.
  - mm - The minute, from 00 through 59.

- M - The month, from 1 through 12.
- MM - The month, from 01 through 12.
- MMM - The abbreviated name of the month (i.e.: Dec, Jan, etc).
- MMMM - The full name of the month.
- s - The second, from 0 through 59.
- ss - The second, from 00 through 59.
- t - The first character of the AM/PM designator (A or P).
- tt - The AM/PM designator.
- y - The year, from 0 to 99.
- yy - The year, from 00 to 99.
- yyy - The year, with a minimum of three digits.
- yyyy - The year as a four-digit number.

value([dataPointPath])

value(dataPointPath): The Value() method will return the current value of a Data Point, but must be provided the full path of that Data Point (Example: {Value(/Assets/Lathe_01/PartString)} would return the value of the PartString Data Point on Lathe_01).

listAssetFilters(",", [booleanShowMembers])

The ListAssetFilters() method will return a list of every Asset for which the Report was run. The first parameter (shown above as "," indicates the desired delimiter to be used between Assets. In this case, a comma will be used to separate listed Assets. The second parameter, booleanShowMembers, should be either True or False, and indicates whether Asset Groups will have their members listed out separately or not.

listCalendarFilters(",")

The ListCalendarFilters() method will return a list of every Calendar filter applied to the Report. The parameter shows above as "," indicates the desired delimiter to be used between Calendars. In this case, a comma will be used to separate Calendars.

reportStartTime([formatString])

The ReportStartTime() method will return the start time of the Report timespan, formatted using the formatString parameter. The formatString parameter should be set using the supported format characters as found in the Now() method documentation above.

reportStopTime([formatString])

The ReportStopTime() method will return the stop time of the Report timespan, formatted using the formatString parameter. The formatString parameter should be set using the supported format characters as found in the Now() method documentation above.