

# **Scheduler Plug-In**

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## Scheduler Plug-In Help

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Help version 1.007

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## Overview

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The Scheduler Plug-In allows the server to control communications to connected devices. This is critical in SCADA industries, like oil and gas and water/waste water, where communication bandwidth is limited and tight control of polling is necessary.

The Scheduler Plug-In is used to define a schedule and a collection of devices and tags to poll on that schedule. For example, it is possible to configure a schedule to poll all status data for well sites every 15 minutes, starting on the hour. Once the server collects this data, it's available to any and all clients.

The Scheduler Plug-In simplifies creating and managing many devices with the same tag sets. The Scheduler also supports static and dynamic tags, copy and paste, CSV import/export, and provides system tags for review and optimization of scheduling performance.

Device polling is controlled by the client-requested scan rate without the Scheduler Plug-in. Once a schedule is created for a device, polling is controlled through the schedule. This overrides existing configurations and includes data only from those tags defined in the schedule. Ensure that all desired data is defined in a schedule during the transition to communication managed through the Scheduler Plug-in.

**Notes:** If using both the [Scheduler Plug-In and the Media-Level Redundancy Plug-In](#), additional configuration is required to tune the application.

A client requesting scans beyond the bandwidth capability cannot receive all the requested data.

#### See Also:

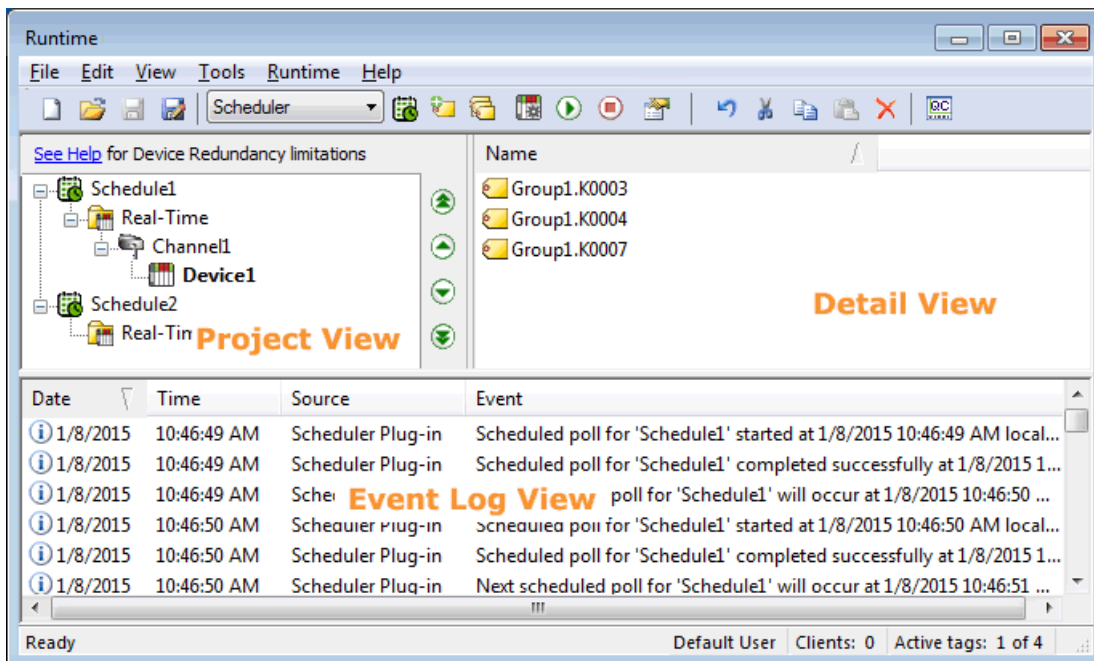
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## Plug-In Interface

The Scheduler Plug-In is divided into three panes: the Project View, the Detail View, and the Event Log View.









### Button Bar

The standard buttons are described in the server help system, but specialized buttons added by the Scheduler Plug-In are described below:

-  **Add New Schedule:** Opens the [Schedule Properties](#) dialog box, where a new schedule can be defined.
-  **Define New Tag:** Opens the [Tag Properties](#) dialog box, where a new tag can be defined and added to a device or schedule.
-  **Browse for Tags:** Opens the [Tag Browser](#) dialog box, where tags can be located and selected for the schedule.
-  **Add Devices:** Invokes the [Add Devices Wizard](#), which steps through selecting similar devices and their tags for the schedule.
-  **Enable:** Activates the selected device or schedule for polling.
-  **Disable:** Prevents the selected device or schedule from polling activity.

### Project View

This view displays schedules that control when real-time data is read from devices and delivered to internal and external clients. When static and/or dynamic tags are added to a schedule, they're automatically grouped into "Channels" and "Devices" under the Real-Time folder.

-  **Enabled Schedule:** Scheduled polling occurs based on the configured recurrences, exceptions, and override settings.
-  **Schedule with Warning:** Schedule contains a channel with unscheduled devices, a potential misconfiguration because communication across the channel cannot be controlled by the schedule for that device. To resolve the issue, add the unscheduled devices to a schedule.
-  **Disabled Schedule:** No scheduled polling occurs. Demand and override polls may still occur.
-  **Real-Time:** Channel/device tag data polled by the Scheduler Plug-In.
-  **Enabled Channel:** Scheduled and demand polling occurs for all valid and enabled child devices. When a referenced channel is moved or deleted, the change is reflected in the Scheduler.
-  **Invalid Channel:** This channel is no longer valid in the project; none of the child devices or tags can be polled.



**Enabled Device:** The device is polled when scheduled polls, demand polls, or override polls occur. When a referenced device is moved or deleted, the change is reflected in the Scheduler.



**Overridden Device:** The device is configured for [real-time override](#).



**Disabled Device:** Device is not polled when scheduled polls, demand polls, and or override polls occur.



**Invalid Device:** This device is no longer valid in the project. Device cannot be polled.

The priority of the schedules is also controlled through the Project View. Use the ordering buttons to the right to move schedules up and down the priority list. *For more information, refer to [Priority and Order](#).*



Moves the selected schedule to the top of the list, making it first priority.



Moves the selected schedule up one place in the list.



Moves the selected schedule down one place in the list.



Moves the selected schedule to the bottom of the list, making it last priority.

#### Notes:

1. To avoid conflicts, configuring a tag within the Scheduler Plug-In automatically disables [Scanned Reads](#) and redirects all [Client-Driven Reads](#) item requests for all items/tags for that device. Ultimately, the schedule configuration and data availability of the physical device determine when and what data updates are made available to external/internal client applications in the server.
2. Tag(s) may be included in an unlimited number of schedules. *For more information, refer to [Schedule and Adding Devices](#).*

#### Detail View

This view depends on the folder selected in the Project View. When a device is selected, the Detail View displays the scheduled tags for that device. When a channel is selected, the Detail View displays the scheduled tags for the devices in that channel. The following icons indicate tag states.



**Valid Tag:** Tag is polled when scheduled, demand, and override polls occur on the parent device.



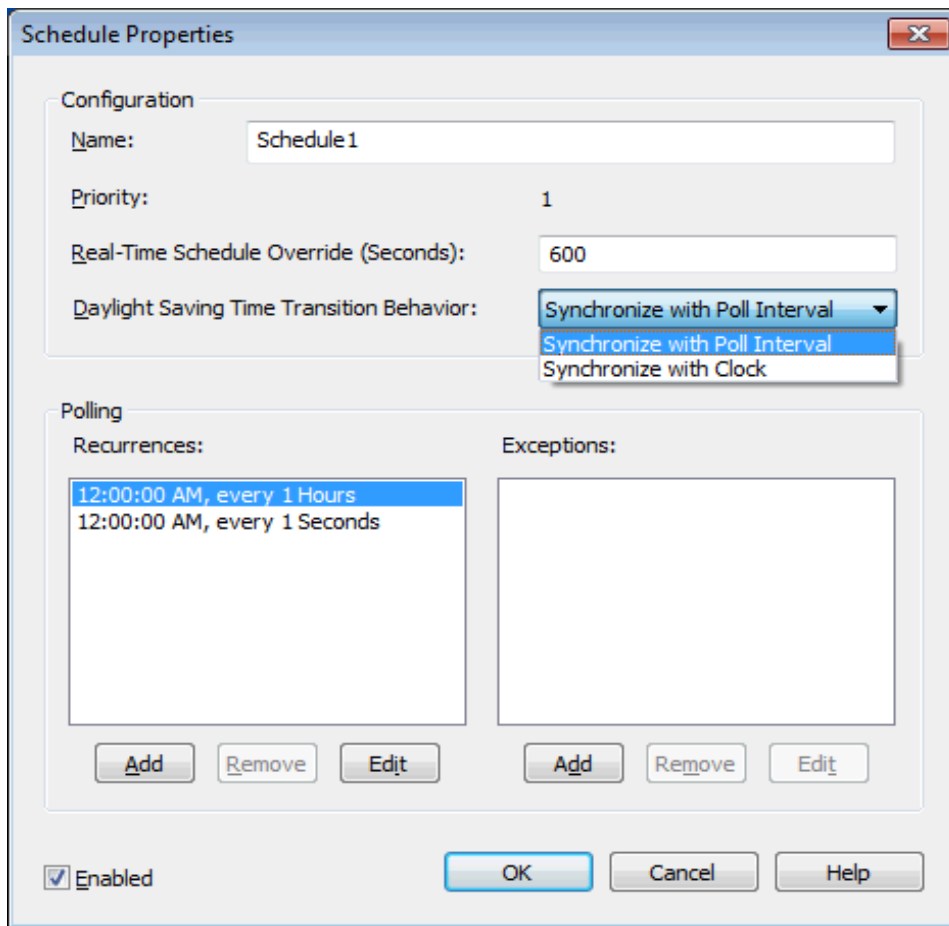
**Invalid Tag:** The tag is no longer valid in the project and cannot be polled. This can occur when a referenced tag is moved or deleted.

#### Event Log View

This view displays [error, warning, and information messages](#) for the plug-in and the server. The source of Scheduler Plug-In events is listed as "Scheduler Plug-In" in the Event Log View.

## Schedule Properties

The schedule controls when data is collected from the devices configured in that schedule.



Descriptions of the settings are as follows:

**Name:** This setting specifies a unique name for the schedule. The default setting is "Schedule<n>", where "n" is a number automatically incremented if multiple schedules with the default name are created.

**Priority:** Each schedule has a priority number used to determine the order of schedules polled where multiple schedules are triggered at the same time. By default, new schedules are assigned the lowest [priority](#). The priority of schedules is managed in the [Project View](#).

**Real-Time Schedule Override (Seconds):** This setting specifies the override poll interval in seconds. This interval is used anytime a device is put into override mode. When a device is in [override mode](#), the schedule's recurrence and exception settings are ignored and the device is polled as the highest priority in this period. Use this setting to poll a device that requires service or faster polling. It is not recommended to keep devices in this mode for extended periods. If desired, assign the device to a more frequent schedule. Multiple devices in a schedule can be in override mode. The default setting is 600 seconds (10 minutes).

**Daylight Saving Time Transition Behavior:** This setting is used to control a schedule's behavior when the system time clock is adjusted during Daylight Saving Time (DST). When set to Synchronize with Poll Interval, the Scheduler always polls according to the interval with Start Time recurrent types to ensure that data is never older than the configured poll interval. When set to Synchronize with Clock, the Scheduler adjusts the poll interval to ensure that the poll times are synchronized with the recurrence Start Time. This setting does not affect Specific Time recurrences or devices using poll override. The default setting is Synchronize with Poll Interval. *For additional information, see [Daylight Saving Time](#).*

**Recurrences:** The list box contains all repeating events currently configured for a schedule. Multiple recurrence patterns can be configured for the same schedule to allow for a variety of poll patterns. All schedules must have at least one recurrence; the default recurrence polls once per hour synchronized to midnight. Use the buttons beneath the recurrence list box to Add, Remove, and Edit the selected recurrence. *For additional information about configuring recurrences, see [Recurrence Configuration](#).*

**Exceptions:** An exception is a period of time where scheduled polls cannot occur. The exceptions list box contains all the times when no data is polled currently configured for a schedule. Like recurrences, multiple exceptions may be configured to allow for a variety of black-out periods. Use the buttons beneath the exceptions list box to Add, Remove, and Edit the selected exception. *For additional information about configuring exceptions, see [Exception Configuration](#).*

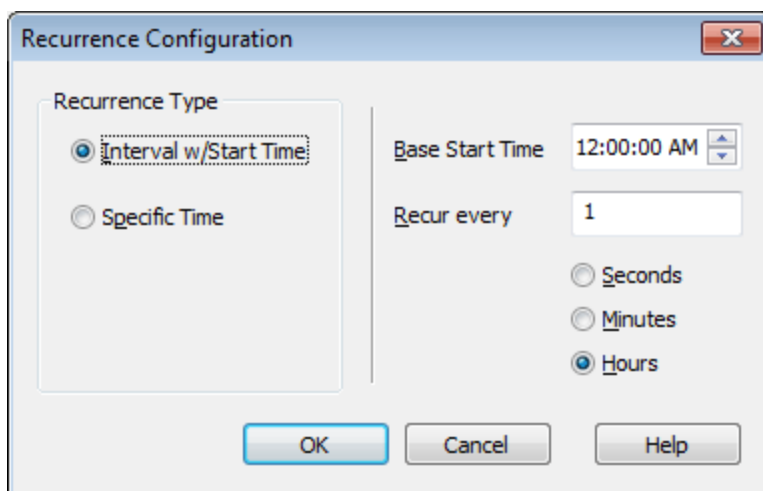
**Enabled:** When checked, the schedule polls based on the configured recurrences and exceptions. The default setting is enabled.

**See Also:**

[Daylight Saving Time](#)

## Recurrence Configuration

The recurrence configuration specifies the timing and pattern a schedule uses to determine when scheduled tags are polled.



The Recurrence Type specifies the fundamental behavior of the repeating pattern. The following options are available:

**Interval w/Start Time:** A poll occurs every specified number of seconds, minutes, or hours based on the configured interval and unit. This is the default setting.

- **Start Time:** Specifies the local synchronization time used for the recurrence.
- **Recur every:** A poll occurs every specified number of the selected time unit.
- **Seconds / Minutes / Hours:** Selects the time unit for how often recurrence polls.

**Specific Time:** A single poll occurs at the specified local time each day.

- **Start Time:** Specifies the local synchronization time used for the recurrence.

**See Also:**

[System Tags](#)

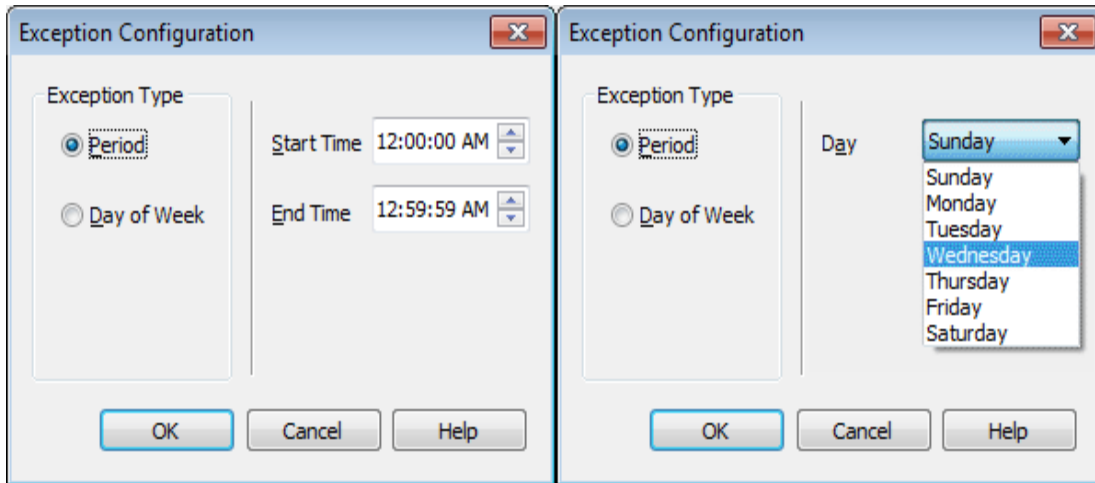


[Priority and Order](#)

[Daylight Saving Time](#)

## Exception Configuration

Exceptions define times when no data is polled despite a schedule that would normally poll a device for data. An exception creates a break or “black-out” period to prevent polling for a specified time window.



The Exception Type specifies the fundamental behavior of the exclusion from the schedule. The following options are available:

**Period:** No scheduled polls occur during the specified period of the day (every day).

- **Start Time:** Start of the period in local time during which polls do not occur.
- **End Time:** End of the period in local time during which polls do not occur (or the time polls resume).

**Day of Week:** No polls occur on the specified day of the week.

- **Day:** Specifies the named day (Sunday, Monday, Tuesday, and so forth.) to be excluded from polling. The day starts at 00:00:00 local time and ends at 11:59:59 local time.

**Note:** Exceptions do not apply to devices with Real-Time Schedule Override enabled. Polling for these devices follows the schedule’s Real-Time Schedule Override (Seconds) setting. *For more information, see [Real-Time Schedule Override](#).*

**See Also:**

[Daylight Saving Time](#)

## Daylight Saving Time

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When the system is using Daylight Saving Time (DST), recurrence and exception start and end time behavior should be considered.

### **The following behavior applies when a schedule's Daylight Saving Time Transition Behavior is set to Synchronize with Poll Interval.**

#### **Transition into Daylight Saving Time (Clocks Move Ahead One Hour)**

To obtain data at a specific time, regardless of the time of year and DST, use the Specific Time recurrence type. The Specific Time recurrence type assures that the poll is started at the configured local time year-around. When using the recurrence type with a poll interval equal to or greater than one hour, the poll start time is adjusted according to local time observing DST. For example, recurrence configured to poll every four hours starting at 12:00 AM polls at 12:00 AM, 4:00 AM, 8:00 AM, 12:00 PM, and so forth. After the poll occurs at 12:00 AM on the morning when Daylight Saving Time starts, the next start time is adjusted to 5:00 AM because the time is shifted ahead by one hour, going from 1:59:59 AM to 3:00 AM. The next schedule poll times are 5:00 AM, 9:00 AM, 1:00 PM, and so forth.

#### **Transition out of Daylight Saving Time (Clocks Move Back One Hour)**

To obtain data at a specific time, regardless of the time of year and DST, use the Specific Time Recurrence type. Polls are started at the configured time year-around. To obtain data at a specific rate, regardless of the time of year and DST, use the Period Recurrence type. When using the recurrence type with an interval equal to or greater than one hour, the next poll start time is adjusted accordingly. For example, a schedule configured to poll every 4 hours starting at 12:00 AM, polls at 12:00 AM, 4:00 AM, 8:00 AM, 12:00 PM, and so forth. After the poll occurs at 12:00 AM on the morning when Daylight Saving Time ends, the next start time is adjusted to 3:00 AM because the time is shifted back by one hour, going from 1:59:59 AM back to 1:00 AM. The next schedule poll times are 3:00 AM, 7:00 AM, 11:00 AM, and so forth.

### **The following behavior applies when a schedule's Daylight Saving Time Transition behavior is set to Synchronize with Clock.**

#### **Transition into Daylight Saving Time (Clocks Move Ahead One Hour)**

To obtain data at a specific time, regardless of the time of year and DST, use the Specific Time recurrence type. The Specific Time recurrence type assures that the poll is started at the configured local time year-around. When using the recurrence type with a poll interval equal to or greater than one hour, the poll start time remains true to the clock setting and does not adjust for any time gained due to a DST transition. For example, recurrence configured to poll every four hours starting at 12:00 AM polls at 12:00 AM, 4:00 AM, 8:00 AM, 12:00 PM, and so forth. After the poll occurs at 12:00 AM on the morning when Daylight Saving Time starts, the next start time will remain 4:00 AM since the setting remains true to the clock time even though there was a shift in local time. The next schedule poll times are 4:00 AM, 8:00 AM, 12:00 PM, and so forth.

#### **Transition out of Daylight Saving Time (Clocks Move Back One Hour)**

To obtain data at a specific time, regardless of the time of year and DST, use the Specific Time recurrence type. The Specific Time recurrence type assures that the poll is started at the configured local time year-around. When using the recurrence type with a poll interval equal to or greater than one hour, the poll start time remains true to the clock setting and does not adjust for any time gained due to a DST transition. For example, recurrence configured to poll every four hours starting at 12:00 AM polls at 12:00 AM, 4:00 AM, 8:00 AM, 12:00 PM, and so forth. After the poll occurs at 12:00 AM on the morning when Daylight Saving Time starts, the next start time will remain 4:00 AM since the setting remains true to the clock time even though there was a shift in local time. The next schedule poll times are 4:00 AM, 8:00 AM, 12:00 PM, and so forth.

#### **See Also:**

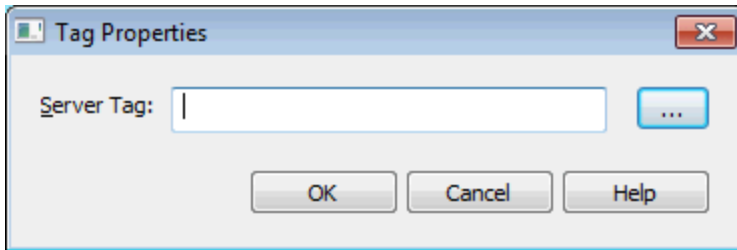
[Schedule Properties](#)

[Recurrence Configuration](#)

[Exception Configuration](#)

## Defining and Editing Tags

Static and dynamic tags must be associated with a schedule for the Scheduler Plug-In to determine which tags from a device should be polled. Tags added to schedules or devices can be edited by right-clicking and selecting **Properties...**



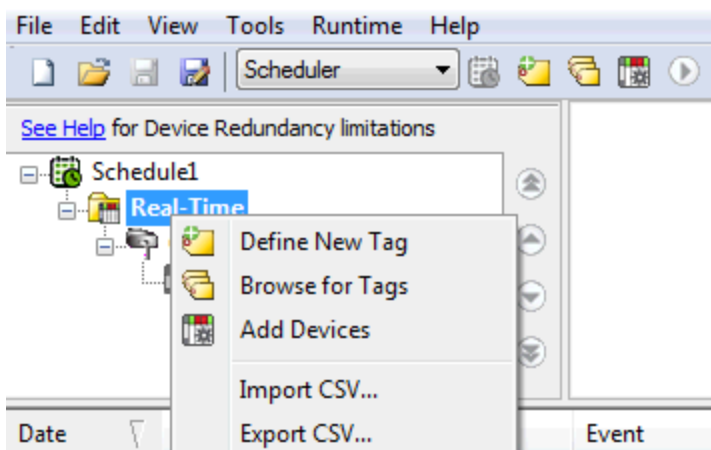
**Server Tag:** This setting specifies the fully-qualified name of the referenced server tag for the selected schedule. Enter the server tag or click the Browse (...) button to use the [Tag Browser](#) to locate and select a tag. When adding tags to a device, the channel and device names are automatically populated. This parameter must contain at least one character that is not either an underscore ('\_') or a period ('.'). The maximum length of field is 256 characters. Dynamic addresses may also be used to specify a server tag (see server help for more information).

### Notes:

1. Each server tag may only be specified once per schedule; however, the same server tag may be specified in multiple schedules. Only device tags may be configured for scheduled polling; system and internal tags (from the host system where the Schedule Plug-In is installed) may not be added to a schedule.
2. There are several ways to add multiple tags to a schedule. *For more information, see [Add Devices](#).*
3. The Scheduler Plug-In automatically disables [scanned reads](#) when a device is associated with a schedule; the client-requested read update rate is ignored for ALL tags in the device whether or not all the tags are scheduled. For explicit client-read requests, no device read occurs and the data is updated with the latest scheduled read value. For unscheduled tags, the server performs a device read and returns the latest value. The server only performs device reads through the scheduler (scheduled, demand, and override polls) to consolidate demand on devices. Client-requested writes are processed according to a channel's write optimization settings.

## Adding Real-Time Tags

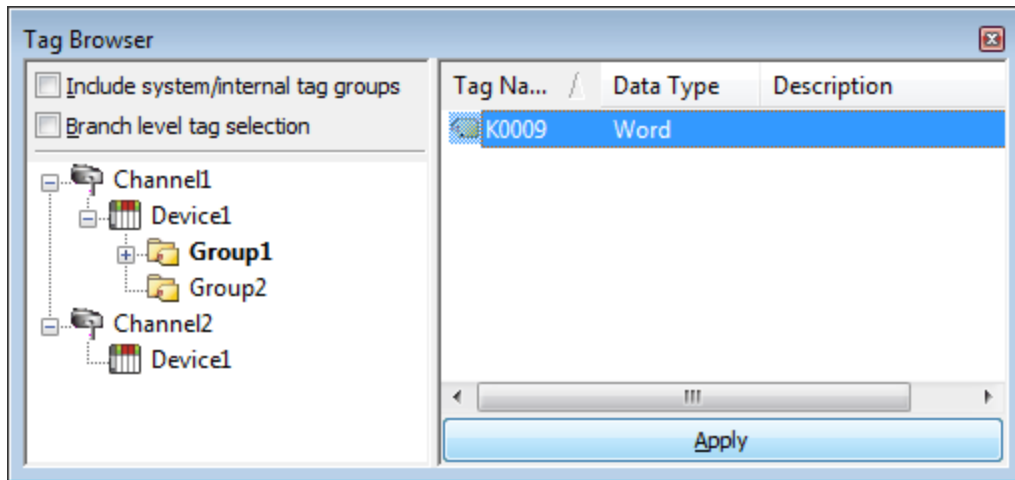
To add tags to a Real-Time folder, select or right-click on the folder and select either: **Define New Tag**, [Browse for Tags](#), [Add Devices](#), or [Import CSV](#). Adding tags to the Real-Time folder automatically sorts them into channels and devices. System and Internal tags cannot be scheduled.



## Browsing for Tags

The server supports browsing for available tags and, in some cases, selecting multiple tags to add to a project.

1. Access the Tag Browser dialog box.



2. If the **Include system / internal tag groups** is available, check to enable making these groups available for selection.  
**Note:** System and internal tags cannot be scheduled.
3. If the **Branch level tag selection** is available, check to enable selection of branch nodes in the tree view on the left (which selects all the associated tags in the right).
4. Navigate the tree in the left pane to locate the branch containing the tag(s) to add.
5. Unless **Branch level tag selection** is enabled, select the tag(s) in the right pane. Where adding multiple tags is supported, standard keyboard functions (Shift, Ctrl) work to select multiple tags.
6. Click **Apply**.

## System Tags

### Schedule-Level System Tags

Syntax Example: `_Scheduler.<ScheduleName>._Enable`

Tag	Class	Description	Access
<code>_Enable</code>	Setting	Reports the enabled / disabled state of a schedule. Writing a 0 to this tag disables the schedule.	Read/Write
<code>_InException</code>	Status	Reports 1 when a schedule is in <a href="#">exception</a> time.	Read Only
<code>_IsPolling</code>	Status	Reports 1 when a scheduled poll is being processed.	Read Only
<code>_LastPollDurationSec</code>	Status	Indicates the amount of time (in seconds) the last poll took to complete. This tag is updated whether the poll succeeds or fails.	Read Only
<code>_LastPollStart</code>	Status	Reports the time that the most recent poll began. All times are reported in local time. If no poll has started, the tag reports 01/01/1601 00:00:00.000.	Read Only
<code>_LastPollEnd</code>	Status	Reports the time that the most recent poll finished. All times are reported in local time. If no poll has started, the tag reports 01/01/1601 00:00:00.000.	Read Only
<code>_NextScheduledStart</code>	Status	Reports the time that the next upcoming poll is due to begin. All times are reported in local time.	Read Only
<code>_LastPollSuccess</code>	Status	Allows external clients to determine whether the last poll was considered successful. A poll is considered a failure if the device is in error and a polled tag reports bad quality.	Read Only
<code>_Priority</code>	Parameter	Indicates the number indicating <a href="#">priority</a> of the schedule. Writing a priority to this inserts the schedule at the specified priority and bumps lower priority schedules down.	Read/Write
<code>_PendingReads</code>	Status	Indicates the number of pending reads that must complete for a scheduled poll to finish.	Read Only

### Device-Level System Tags

Example Syntax: `_Scheduler.<ScheduleName>.ChannelName.<DeviceName>._IsPolling`

Tag	Class	Description	Access
<code>_Enable</code>	Setting	Reports the enabled / disabled state of a device. Writing a 0 to this tag disables the device.	Read/Write
<code>_Override</code>	Setting	Reports indicates whether a device is in override mode. Writing a 1 to this tag puts a device in override. While in override, the parent polling schedule is ignored and the device is polled according to the schedule's <a href="#">override duration</a> in the schedule properties.	Read/Write
<code>_IsPolling</code>	Status	Is 1 when a scheduled poll is being processed.	Read Only
<code>_LastPollDurationSec</code>	Status	Indicates the amount of time (in seconds) that the most recent last poll took to complete. This tag is updated whether the poll succeeds or fails.	Read Only
<code>_LastPollStart</code>	Status	Reports the time that the most recent poll began. All times are reported in local time. If no poll has started, the tag reports 01/01/1601 00:00:00.000.	Read Only
<code>_LastPollEnd</code>	Status	Reports the time that the most recent poll finished. All times are reported in local time. If no poll has started, the tag reports 01/01/1601 00:00:00.000.	Read Only
<code>_LastPollSuccess</code>	Status	Allows external clients to determine whether the last poll was considered successful. A poll is considered a failure if the device is in error and a polled tag reports bad quality.	Read Only
<code>_Poll</code>	Parameter	Allows external clients to issue on-demand polls by writing a value to the tag. Only <a href="#">tags defined for the device</a> within the schedule are polled.	Read/Write
<code>_PendingReads</code>	Status	Indicates the number of pending reads that must complete for	Read Only

Tag	Class	Description	Access
		this device to finish.	
_SecondsInOverride	Status	Indicates the time, in seconds, the device has been in override mode. The value is 0 if the device is not in override mode.	Read Only

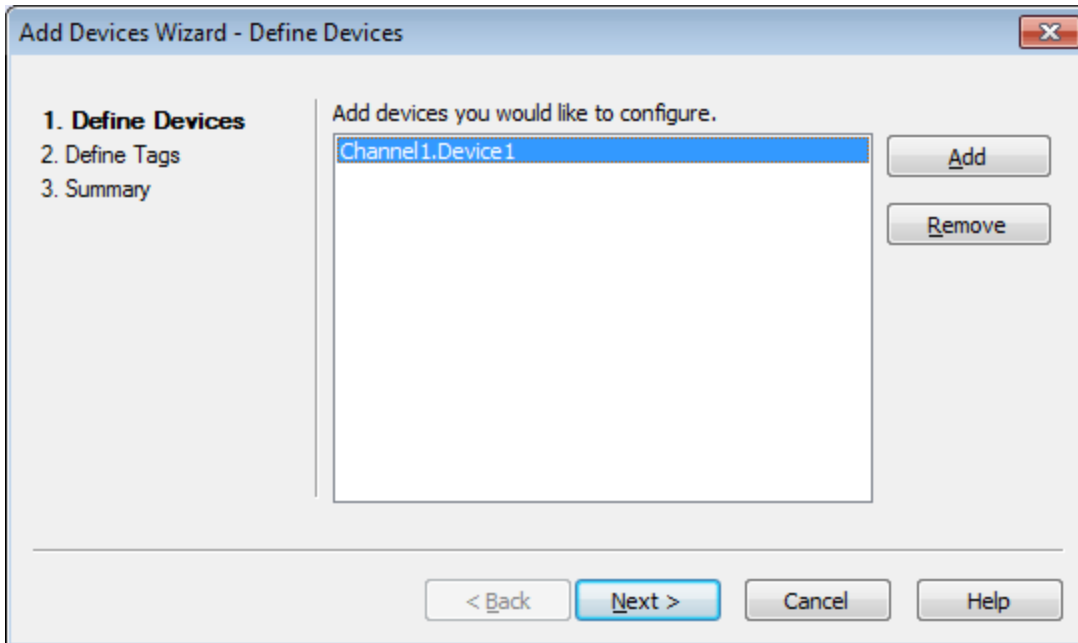
**See Also:**[Schedule Properties](#)[Exception Configuration](#)[Recurrence Configuration](#)[Priority and Order](#)

## Adding Devices

The Add Devices Wizard allows a consistent tag set to be generated for multiple devices. The tag set is defined once, exported to CSV, and re-used for different schedules or devices (or saved for future modification).

### Define Devices

Create a list of devices to share a common tag set.



Click **Add** to choose one or more devices from the list of devices defined in the server configuration and available for scheduling. At least one device must be selected to proceed with tag definition.

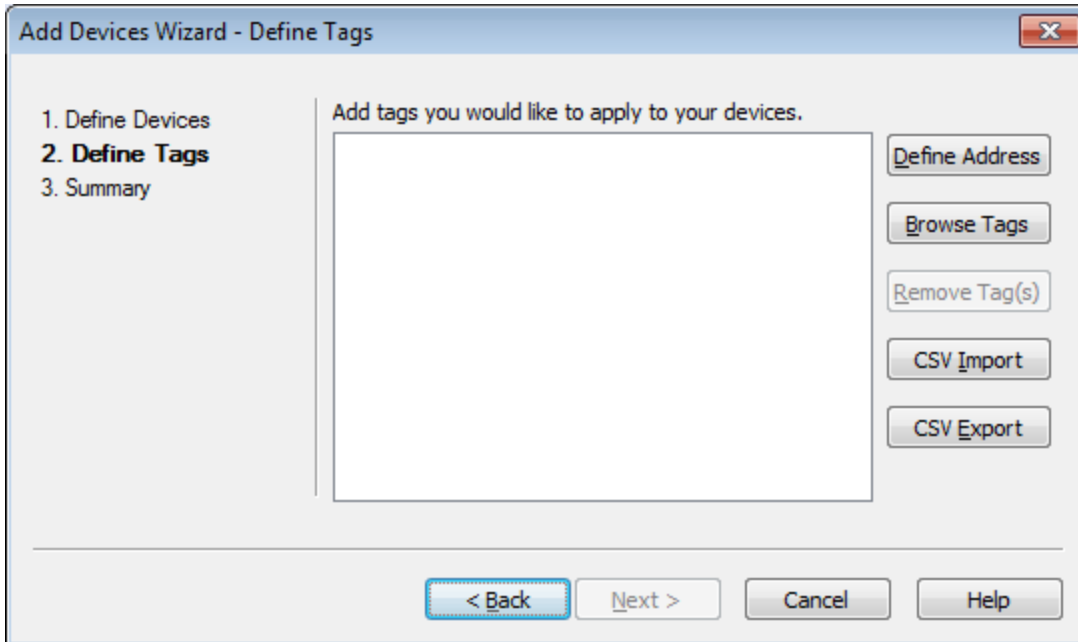
**Tip:** The devices must be defined within the server before tags for the devices may be scheduled. *For additional information about defining channels and devices, refer to the server and driver-specific help.*

Click **Remove** to delete the selected device(s) from the list.

Click **Next** to move on to the Define Tags page of the wizard.

### Define Tags

Create a tag set to be applied to the selected devices.



- **Define Address:** Specify a single, unqualified tag name or address. The tag addresses included in this step are combined with the device list to generate the fully qualified static and dynamic tag names.
- **Browse Tags:** Access the [tree of static tags defined](#) within the server to specify unqualified tag names. The channel/device name is stripped from the fully-qualified name to generate a tag set that can be combined with the device list.
- **Remove Tag(s):** Deletes the selected tag(s) from the list box.
- **CSV Import:** Import an existing tag set defined in a Comma-Separated-Value (CSV) file.
- **CSV Export:** Save the tag set defined in the list box as a Comma-Separated-Value (CSV) file. CSV export allows the list to be saved, used in different schedules, or edited to update the schedule's tags.

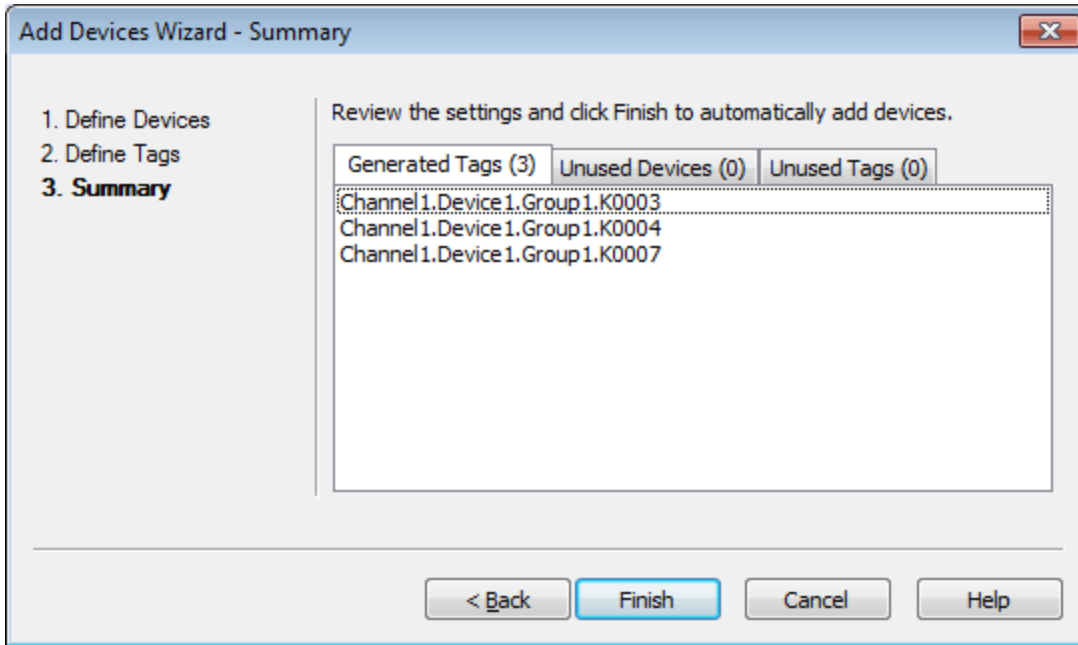
Click **Back** to adjust the list of devices or tags to be added to the schedule.

Click **Next** to move on to the Summary page of the wizard. This step validates the tags for each device.

## Summary

The Summary page displays the device and tag lists combined to create fully qualified tag addresses for a schedule. The summary has three filtered views.





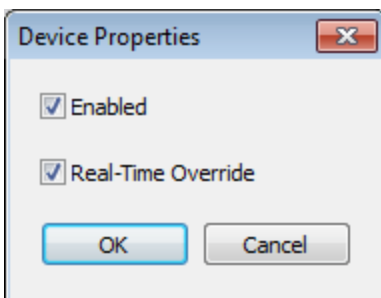
- **Generated Tags:** Lists all the valid, fully qualified tag addresses generated from the devices and tags defined.
- **Unused Devices:** Lists the devices that could not be combined with any of the defined tags. For a tag address to be used, the static tag must be defined in the device or the dynamic address must be valid for the device. For additional information about tag address syntax, refer to the driver-specific help file.
- **Unused Tags:** Lists the tags that did not result in valid fully qualified addresses after combination with the specified devices.

Click **Back** to adjust the list of devices or tags to be added to the schedule.

Click **Finish** to add the displayed list of fully qualified tag addresses to the schedule.

## Device Properties

To view device properties, right-click any device in the [Project View](#) and choose **Properties...** Devices are populated automatically when items are added to the Real-Time folder.



**Enabled:** When checked, the device is polled according to scheduled intervals. Disabling a device prevents scheduled polls, but does not prevent polling in Override Mode or using the `_DemandPoll` [system tag](#).

**Real-Time Override:** When checked, the device is polled at the schedule's configured override period, rather than the standard schedule. For more information, see [Real-Time Override Mode](#).

Click **OK** to apply the settings and close. (Click **Cancel** to close the dialog without applying any changes.)

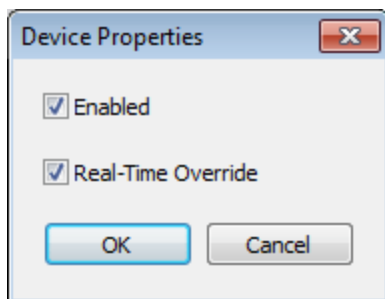
## Real-Time Override Mode

---

The Scheduler Plug-In supports the ability to deviate from the scheduled polling with an “Override” Mode that allows devices to be temporarily polled as high priority without changing their default schedule. When a device is in Override Mode, the schedule’s recurrence and exception settings are ignored and the device is polled as highest priority for the “real-time override period” within the schedule configuration. Real-Time Override is active for the time set in the Real-Time Schedule Override (Seconds) field of the schedule properties. *For more information, see [Schedule Properties](#).*

To enable or disable Real-Time Override:

1. Select the device in the Project View of the Configuration.
2. Right-click and select **Properties....**
3. Click in the checkbox to turn override on or off.



4. Click **OK** to close.
5. Verify that the Event Log View confirms the device was correctly enabled or disabled.

**Tip:** To enable or disable Real-Time Override from client application, use the `_Override` [system tag](#).

## Priority and Order

---

The following device read/write prioritization, from highest to lowest priority, is respected for scheduled tags:

1. **Writes:** Writes are sent directly to the device, regardless of the current Scheduler Plug-In settings and priorities. Writes are always considered the highest priority and Scheduler Plug-In respects the configurable Write Optimization settings at the channel level of the server. For more information, see the server help file.
2. **Demand and Override Reads:** Controlled by clients with the `_Poll` System Tags defined via the `_` Scheduler tag namespace, or the `_DemandPoll` tag in the device level [system tag](#) space, or devices set in override mode.
3. **Scheduled Reads:** The schedule priority is used to determine the polling order if overlapping polls occur.
4. **Scanned Reads:** In a given channel, a device with scheduled reads has higher priority than a device in the same channel with scanned / unscheduled reads.
5. **EFM Uploads:** EFM reads are interleaved with scheduled and scanned real-time reads at a rate of three real-time reads per EFM record read.

When a schedule triggers and there are multiple devices within a channel, the devices are polled in the order listed in the real-time group (located in the Project View). Devices on separate channels are processed in parallel. This order is not currently configurable through the Scheduler Plug-In.

The defined schedule's priority order is controlled in the Project View with the up, down, top, and bottom ordering buttons to the right. See [User Interface](#) for more information.

## Scheduled Tag Polling Examples

---

When a scheduled tag is created, the plug-in automatically alters the scan mode for that device. [Scanned reads](#) are disabled for all tags within a device once a scheduled tag is created for that device. The Scheduler Plug-In intercepts [client-driven reads](#) for all tags scheduled. Unscheduled tags are polled according to client read requests.

### Example 1: All tags in a device are scheduled

A client references the following tags:

Channel1.Device1.Tag1  
Channel1.Device1.Tag2

The plug-in is configured with a single schedule that includes the above tags. The device's scan mode is overridden to 'Do not scan, demand poll only'. Scanned reads and client-driven reads are disabled. This means that the client receives the last scheduled read data anytime reads are requested and no device reads occur. The cache value is updated anytime the scheduler performs a scheduled or demand read. No value (Bad Quality) data is provided until the first scheduled poll is triggered and completes successfully.

### Example 2: Mixed scheduled and unscheduled devices

A client references the following tags:

Channel1.Device1.Tag1  
Channel1.Device2.Tag1

The plug-in is configured with a single schedule that includes the above tag from Device1. The device's scan mode is overridden to 'Do not scan, demand poll only'. Scanned reads and client-driven reads are disabled for Device1, but not Device2. Device1 client read requests receive the latest schedule read data or Bad Quality data if a scheduled read hasn't occurred. Device2 is scanned according to the client-requested scan rate and read requests from a client result in device reads. The following prioritization applies:

1. Client read requests on Device2 take priority over scheduled Device1 reads.
2. Scheduled polls for Device1 take priority over the scanned reads of Device2.
3. On-demand polling for Device1 (through the Scheduler's `_Poll` system tags) have equal priority to client-driven reads for Device2.

### Example 3: Mixed scheduled and unscheduled tags in a single device

A client references the following tags:

Channel1.Device1.Tag1  
Channel1.Device1.Tag2

The plug-in is configured with a single schedule that includes the Channel1.Device1.Tag1, but not Channel1.Device1.Tag2. The device is overridden to 'Do not scan, demand poll only'; however, client-driven reads for the unscheduled tag (Tag2) result in device reads because this tag is not read when scheduled polls occur. Client-driven reads for Tag2 have higher priority than scheduled reads and equal priority to on-demand polls through the scheduler.

#### See Also:

[Priority and Order](#)

## Media-Level Redundancy and Scheduler

---

The Scheduler Plug-In can be used with the Media Level Redundancy Plug-In with some additional configuration:

1. During configuration, the secondary device Scan Mode must be set to **Do not scan, demand poll only** to prevent communications during fail-over. The Scheduler Plug-In cannot override the secondary device Scan Mode.
2. The Media Level Redundancy Plug-In monitored items are read at the configured interval independent of how the tag is scheduled. The Monitor Item is used to determine when the primary is back online after a fail-over.
3. When communication to the primary device fails and the secondary device is activated during a scheduled poll, all pending reads are attempted against the primary first. To bypass the communication timeout and retry delay, Auto Demotion can be used. *For additional information about Auto-Demotion, refer to the server help.*

### **Event Playback and Scheduler**

---

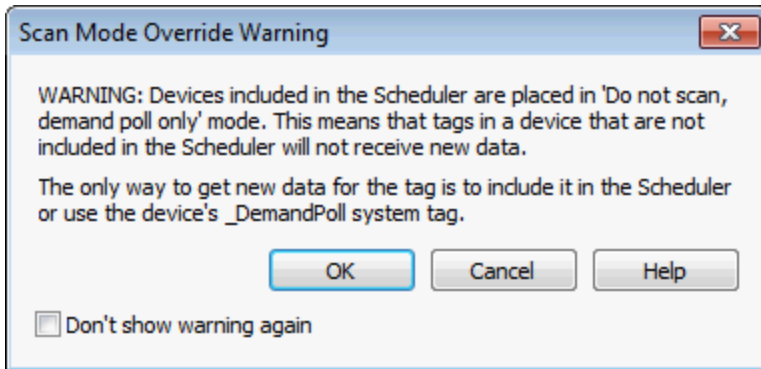
Some drivers use event playback to provide time-series data to the client. Event playback data is cached in the driver and can be accessed in the Scheduler Plug-In by setting up a schedule to handle the event playback data. When a mix of explicit (read-response) data and event data is used, the following steps should be taken to receive event playback data:

1. Configure a schedule with recurrence equal to the rate the client needs to read the event playback.
2. Place all event playback tags in the schedule.
3. Verify the device's playback rate is compatible with the desired schedule recurrence read rate.

The scheduler polls that device's cache for the event playback data at the configured recurrence rate. The device returns data from its cache when polled by the scheduler at its configured playback rate.

## Scan Mode Override Warning

---



The Scan Mode Override Warning message is displayed when any of the following actions are performed:

- Define a Tag
- Browse for Tags
- Add Devices
- CSV Import

The warning may be dismissed indefinitely by checking Don't show warning again. To enable this message again, choose **Edit | Scheduler | Reset Prompt Dialogs**.

When the Scheduler Plug-in changes the scan mode of a device to override mode, a the server configuration shows the device scan mode in 'Do not scan, demand poll only.' and does not allow it to be modified.

## CSV Import/Export

---

The Scheduler Plug-In supports the import and export of data in a Comma Separated Variable (CSV) file. Schedule-level CSV import and export allows large tag sets to be created, modified, and migrated across schedules.

### Creating a Template

The most reliable way to create an import CSV file is to create a template. Refer to the instructions below.

1. Verify a server device exists or [add at least a single device](#).
2. Use the Scheduler Plug-in [Project View](#) to add and configure at least one schedule object.
3. Added at least one valid static or dynamic tag to the schedule.
4. Verify the Project View displays the Real-Time folder with the Channel(s), Device(s), and Tag(s) added.
5. Right-click the Real-time folder and choose **Export CSV**.
6. Specify an export location and file name.
7. Use a CSV (text) editor or spreadsheet editor to add, remove, or edit tags.

**Note:** Microsoft Excel is an excellent tool for editing large groups of tags outside the server. Once a template CSV file has been exported, it can be loaded directly into Excel for editing.

### Importing a CSV File into the Server

Once the CSV file has been created and exported, it can be re-imported into the Scheduler Plug-In by clicking **File | Import CSV**. This option is only available when a poll Group is selected.

### Using Other Characters as the Delimiter

When utilizing a CSV file that does not use a comma or semi-colon delimiter, users should do one of the following:

- Save the project in XML. Then perform mass configuration on the XML file instead of using CSV.
- Perform a search-and-replace on the delimiter in the CSV file and then replace the delimiter with a comma or semicolon. The delimiter being used by the OPC server (either comma or semicolon) must be set to the replacement character.

**Note:** For information on specifying which character to use as the variable (comma or semicolon), refer to "Options - General" in the server help file.

## CSV Import/Export with the Add Devices Wizard

---

CSV files can also be imported and exported from the Add Devices Wizard. These tag sets can be used to generate the same tag sets across many devices because the CSV file does not have to contain fully-qualified tag addresses. Tag-set CSV files facilitate creating the same tag set to generate fully-qualified tags across a large number of devices. Using the [Add Devices Wizard](#) expands the tag address definitions to fully-qualified tag addresses for the chosen set of devices.

### Creating a Tag Set Template in the Add Devices Wizard

The most reliable way to create an import CSV file is to create a template. Refer to the instructions below.

1. Right-click a Real-Time folder and choose **Add Devices**.
2. Choose the device(s) associated with the CSV template being created.
3. Add as single tag (static tag name or dynamic tag address) to the list using the tag browser or by defining a dynamic address.
4. Click the **Export CSV** button.
5. Choose a path and file name, then save the template.

Once a tag set template is created, additional tag addresses may be defined using a CSV file editor. Tag addresses added need not be for a specific device type.

**Note:** CSV files created from the Add Devices wizard cannot be imported directly to a schedule.

### **Initial Updates for OPC Clients**

---

The server's OPC DA server interface allows configuration of the server's behavior for initial client updates. By default, initial updates are sent to subscribed clients as soon as data is available for an item. This means a client may receive several update notifications as items are updated by the server. When Scheduler is configured, initial updates are received the first time a scheduled item is polled or immediately (with cached data) if a client subscribes to an item that has been polled at least once.

When a client is subscribed to an item that has not been scheduled, but at least a single tag from the device is scheduled, it is possible that clients never receive an initial update for the item. This has no impact if the server OPC DA interface is configured to return initial updates to client immediately; however, if the server's OPC DA property **Return initial updates for items in a single callback** is enabled, the client never receives updates for any items in that group as the unscheduled tag. For this reason, it is suggested that this property be disabled when using Scheduler.



## Event Log Messages

---

The following messages may be generated. Click on the link for more information about each message.

[CSV import for item <record> failed.](#)

[CSV import failed: invalid or missing CSV file header.](#)

[CSV import did not load any tags.](#)

[Demand poll for device <device name> in schedule <schedule name> ended.](#)

[Demand poll for device <device name> in schedule <schedule name> failed.](#)

[Demand poll for device <device name> in schedule <schedule name> ignored because one is already polling.](#)

[Demand poll for device <device name> in schedule <schedule name> started.](#)

[<Enabled|Disabled> override for <device name> in schedule <schedule name>.](#)

[Device <device name> in schedule <schedule name> has been <enabled|disabled>.](#)

[Device <device name> is being <placed in|taken out of> 'Do not scan, demand poll only' mode by the Scheduler.](#)

[Error adding item <tag name>. System and internal tags cannot be scheduled.](#)

[Error adding item <tag name>. This item already exists in schedule <schedule name>.](#)

[Error adding item <tag name>. This is not a valid static or dynamic tag.](#)

[Failed to register <tag name>. Registration will be attempted at the start of each scheduled poll.](#)

[Failed to initiate read for <tag name>. A read will be attempted at the start of each scheduled poll.](#)

[Failed to load XML. Exception start and end times must be different.](#)

[Failed to start <device name>, all devices are either in override mode or disabled.](#)

[Failed to write <priority> to <schedule name> because schedule priority must be between 1 and <priority>, the number of configured schedules.](#)

[Next recurrence for <schedule name> will occur at <time> local time.](#)

[Scheduled poll for <schedule name> completed successfully.](#)

[Scheduled poll for <schedule name> completed with errors. At least one device in the poll group did not respond.](#)

[Scheduled poll for <schedule name> ignored due to exception time. Next recurrence will occur at <time> local time.](#)

[Schedule <schedule name> has been <enabled|disabled>.](#)

[Schedule <schedule name> has <entered|exited> exception time.](#)

[Schedule <schedule name> has been set to priority <priority>.](#)

[The poll scheduled for <schedule name> at 'local time' has overrun. The next poll will begin as soon as the current poll completes.](#)

### **CSV import did not load any tags.**

---

**Error Type:**

Error

**Source:**

Configuration

**Possible Cause:**

The CSV file is empty or contains no valid records.

**Solution:**

Add valid records or correct invalid records.

**CSV import failed: invalid or missing CSV file header.**

---

**Error Type:**

Error

**Source:**

Configuration

**Possible Cause:**

The CSV file must have a correct header for the plug-in to identify the CSV for import.

**Solution:**

Verify the CSV header is correct. When generating a CSV file for import, start with a CSV file exported by the plug-in to ensure correct format and syntax.

**CSV import for item <record> failed.**

---

**Error Type:**

Error

**Source:**

Configuration

**Possible Cause:**

The CSV import file contains an invalid record.

**Solution:**

Consider removing or correcting the invalid record in the CSV file being imported.

**Demand poll for device <device name> in schedule <schedule name> ended.**

---

**Error Type:**

Information

**Description:**

A demand poll has completed.

**Demand poll for device <device name> in schedule <schedule name> failed.**

---

**Error Type:**

Error

**Source:**

Runtime

**Possible Cause:**

A tag returned bad quality and the associated device was put into error state. This can occur when the Scheduler Plug-In loses communication with a device.

**Solution:**

Correct the device error state and verify the next poll succeeds.

---

**Demand poll for device <device name> in schedule <schedule name> ignored because one is already polling.**

---

**Error Type:**

Warning

**Source:**

Runtime

**Possible Cause:**

A previous demand poll did not complete in time. This can occur when a device takes too long to poll or when the demand poll system tag is written too quickly.

**Solution:**

Write to the `_DemandPoll` [system tag](#) only once the previous demand poll is complete.

---

**Demand poll for device <device name> in schedule <schedule name> started.**

---

**Error Type:**

Information

**Description:**

A demand poll has been initiated with the `_DemandPoll` [system tag](#).

---

**Device <device name> in schedule <schedule name> has been <enabled|disabled>.**

---

**Error Type:**

Information

**Description:**

A disabled device cannot be polled by a schedule, demand polled, or override polled.

---

**Device <device name> is being <placed in|taken out of> 'Do not scan, demand poll only' mode by the Scheduler.**

---

**Error Type:**

Warning

**Source:**

Runtime

**Possible Cause:**

This device was added to the Scheduler and automatically placed in 'Do not scan, demand poll only' mode. This prevents [scanned reads](#) from occurring on the device.

**Solution:**

Manually place this device in 'Do not scan, demand poll only' to prevent this message from being displayed.

**See Also:**[Recurrence Configuration](#)[Priority and Order](#)

**<Enabled|Disabled> override for <device name> in schedule <schedule name>.**

---

**Error Type:**

Information

**Description:**

The device has been placed in override mode. It will be polled at the schedule's configured override period setting whether the schedule is enabled or disabled. It will not be polled at the scheduled recurrence.

**Error adding item <tag name>. System and internal tags cannot be scheduled.**

---

**Error Type:**

Error

**Source:**

Configuration

**Possible Cause:**

Addition of non-device tags was attempted during CSV import or tag browse.

**Solution:**

No action required; non-device tags were not added.

**Error adding item <tag name>. This is not a valid static or dynamic tag.**

---

**Error Type:**

Error

**Source:**

Configuration

**Possible Cause:**

The CSV import file contains an invalid tag name.

**Solution:**

Consider removing or updating the invalid tag name(s).

**Error adding item <tag name>. This item already exists in schedule <schedule name>.**

---

**Error Type:**

Error

**Source:**

Configuration

**Possible Cause:**

Addition of a duplicate item was attempted. A schedule cannot contain the same tag more than once.

**Solution:**

No action required; the duplicate item was not added.

---

**Failed to initiate read for <tag name>. A read will be attempted at the start of each scheduled poll.**

---

**Error Type:**

Error

**Source:**

Runtime

**Possible Cause:**

One or more of the schedule tags are no longer valid.

**Solution:**

1. For static tags, verify that the channel name, device name, and tag name are correct.
2. For dynamic tags, verify that the address is valid. *Please see the driver-specific help for address syntax.*

---

**Failed to load XML. Exception start and end times must be different.**

---

**Error Type:**

Error

**Source:**

Configuration

**Possible Cause:**

A schedule exception has the same start and end time. Start and end times must be different for periodic exceptions.

**Solution:**

Update the periodic exception start or end time to be different.

---

**Failed to register <tag name>. Registration will be attempted at the start of each scheduled poll.**

---

**Error Type:**

Error

**Source:**

Runtime

**Possible Cause:**

One or more of the schedule tags are no longer valid.

**Solution:**

1. For static tags, verify that the channel name, device name, and tag name are correct.
2. For dynamic tags, verify that the address is valid. *Please see the driver-specific help for address syntax.*

---

**Failed to start <device name>, all devices are either in override mode or disabled.**

---

**Error Type:**

Error

**Source:**

Runtime

**Possible Cause:**

All devices in the schedule are disabled or in override; no scheduled polls can occur.

**Solution:**

Configure devices under the schedule to be enabled and not in override.

---

**Failed to write <priority> to <schedule name> because schedule priority must be between 1 and <priority>, the number of configured schedules.**

---

**Error Type:**

Warning

**Source:**

Runtime

**Possible Cause:**

A client tried to write an invalid priority to the `_Priority` schedule [system tag](#). The value must be between 1 and the number of configured schedules.

**Solution:**

Write a valid value to the schedule `_Priority` system tag.

**See Also:**

[Priority Order](#)

---

**Next recurrence for <schedule name> will occur at <time> local time.**

---

**Error Type:**

Information

**Description:**

A new poll will be attempted at this time unless the schedule enters exception time. This message is posted regardless of exception time.

---

**Schedule <schedule name> has been <enabled|disabled>.**

---

**Error Type:**

Information

**Description:**

A disabled schedule does not schedule polls. Devices can still be demand polled or override polled. Devices in a disabled schedule are placed in 'Do not scan, demand poll only' mode.

**Schedule <schedule name> has been set to priority <priority>.**

---

**Error Type:**

Information

**Description:**

Schedule's priority has been changed through the Configuration or by system tags. All schedules of equal or lower priority have been pushed down.

**Schedule <schedule name> has <entered|exited> exception time.**

---

**Error Type:**

Information

**Description:**

The schedule is in its configured exception time. No scheduled polls will occur.

**Scheduled poll for <schedule name> completed successfully.**

---

**Error Type:**

Information

**Description:**

The schedule has completed polling. No devices were in error upon completion.

**Scheduled poll for <schedule name> completed with errors. At least one device in the poll group did not respond.**

---

**Error Type:**

Error

**Source:**

Runtime

**Possible Cause:**

A tag returned bad quality and the associated device was put into error state. This can occur when the Scheduler loses communication with a device.

**Solution:**

Correct the device error state and verify the next poll succeeds.

**Scheduled poll for <schedule name> ignored due to exception time. Next recurrence will occur at <time> local time.**

---

**Error Type:**

Information

**Description:**

A scheduled poll would have occurred here, but did not because the schedule was in [exception](#) time.

**The poll scheduled for <schedule name> at 'local time' has overrun. The next poll will begin as soon as the current poll completes.**

**Error Type:**

Warning

**Source:**

Runtime

**Possible Cause:**

The poll takes longer than the schedule's configured poll period. This could be a one-time problem due to a loss of communication to devices being polled.

**Solution:**

1. If this occurs often or every time a schedule poll occurs, update the schedule's poll recurrences to increase the time between polls.
2. For one-time failures, consider using Auto-Demotion to decrease the number of failed read attempts when a device stops communicating. For additional information about Auto-Demotion, refer to the server help.
3. Consider overlapping schedules with higher priority. If higher-priority schedules are a trigger, the server services reads for these schedules before lower priority schedules.

**See Also:**

[Recurrence Configuration](#)

[Priority and Order](#)



---

## Glossary

---

**Client-Driven Reads:** Reads initiated by the client. In the OPC protocol, these are synchronous and asynchronous device reads.

**Scanned Reads:** Reads that are periodically initiated by the server. In the OPC protocol, these are subscription-based reads.

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