

Ignition!

Status > Systems > Overview

Architecture

Gateway | Ignition-ignition8-ubuntu-64bit
Version: 8.0.0-beta0 (b2019032009)
License: Licensed
Uptime: a day

No Redundancy

Add a redundant backup gateway to protect your system from downtime caused by failures.

Gateway Network	Bytes Sent	Bytes Received
Active Connections 1 / 2	2 KB/sec	1 KB/sec
Remote Gateways 1		

Connections

Designer Sessions
 2 open

Databases
 1 / 1 connected

Gateway Network Connections
 2 / 2 connections

OPC Connections
 1 / 1 connected

Store & Forward
 0 stores quarantined

Devices
 5 enabled

Vision Clients
 0 open

Environment

Process Id	37117
Operating System	Linux amd64
Java Version	11.0.2+7-LTS
Local Time	10:04:17 AM
Available Disk Space	3gb / 16gb
Detected NICs	10.10.115.3

Systems

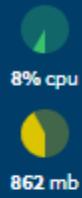
Performance	9% CPU 512mb
Redundancy	Not configured
Modules	18 installed
Tags	1,103 tags
Alarm Pipelines	0 / 1 active
SFCs	0 running
EAM Role	Unknown
Reports	4 scheduled

Architecture

The Architecture segment provides a top down view of your Gateway. You can see your Ignition version and resource usage, as well as similar information with a redundant Gateway, if one is connected. You also get an overview of the Gateway Network including how many active connections there are, and what is the amount of data being transferred between them.

Architecture

Gateway | Ignition-
ignition8-ubuntu-64bit



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(b2019032009)

License: licensed
Uptime: a day

No Redundancy

Add a redundant backup gateway to protect your system from downtime caused by failures.

Gateway Network

Active Connections

2 / 2

Remote Gateways

2

Bytes Sent

2 KB/sec

Bytes Received

1 KB/sec

Environment

The Environment segment provides some basic information about your server such as the Operating System (OS), Java version, available disk space, and IP address of detected network interface cards (NIC)..

Environment

Process Id	37117
Operating System	Linux amd64
Java Version	11.0.2+7-LTS
Local Time	11:18:31 AM
Available Disk Space	3gb / 16gb
Detected NICs	10.10.115.3

Systems

The Systems segment summarizes each of Ignition's systems. Here, you can see how many modules you have installed as well as how many Tags are configured in your Gateway, along with a handful of other information. Click on any of the links in blue to find out more information about a

particular system.

Systems	
Performance	6% CPU 504mb
Redundancy	Not configured
Modules	18 installed
Tags	1,103 tags
Alarm Pipelines	0 / 1 active
SFCs	0 running
EAM Role	Unknown
Reports	4 scheduled

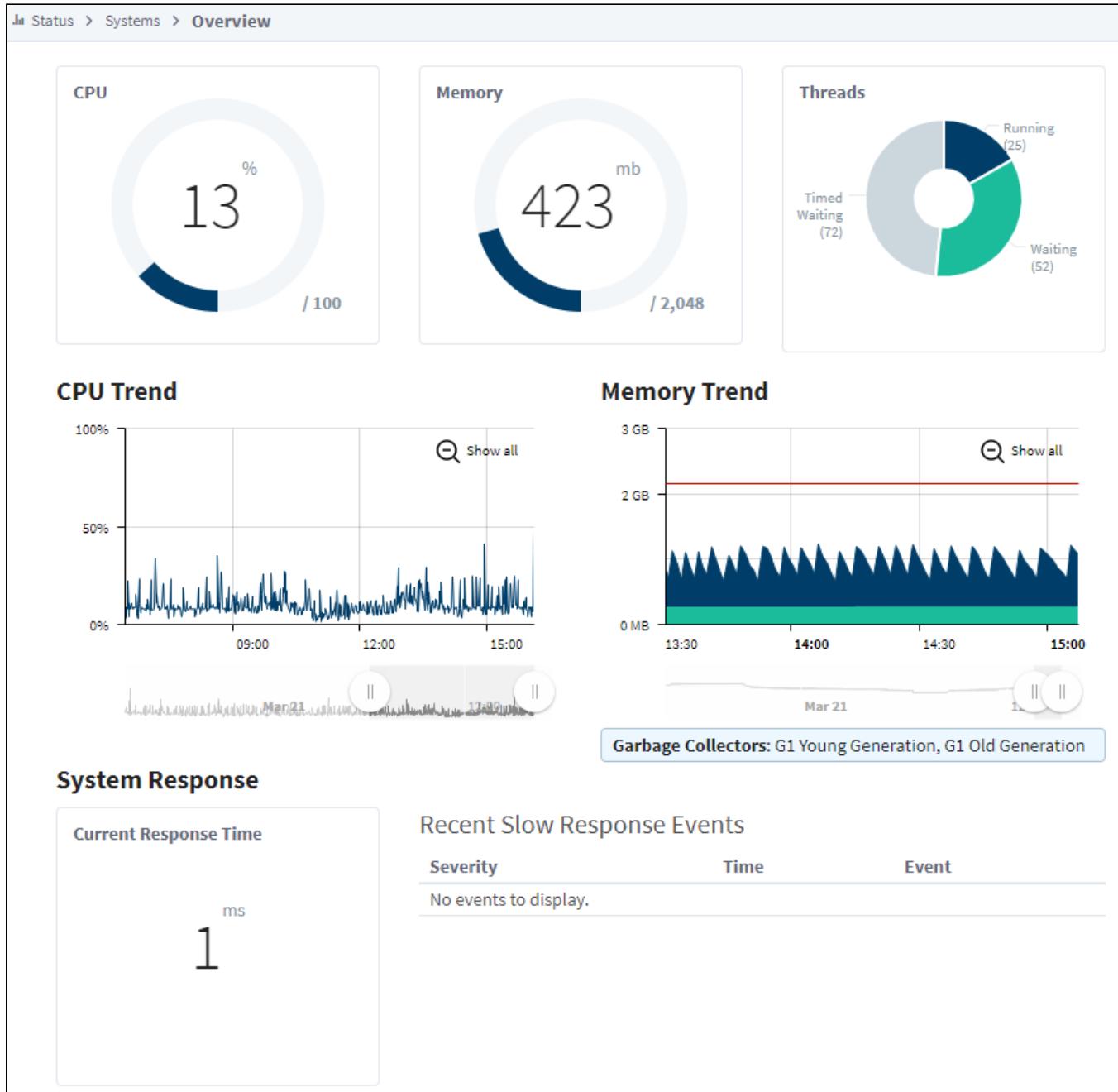
Connections

The Connections segment shows all of the systems that Ignition is connected to. If any of these have issues, they will be outlined in red. Clicked on the connection to be taken to the relevant page within the Status tab.

Connections	
 Designer Sessions	3 open
 Databases	1 / 1 connected
 Gateway Network Connections	2 / 2 connections
 OPC Connections	1 / 1 connected
 Store & Forward	0 stores quarantined
 Devices	5 enabled
 Vision Clients	0 open

Performance

The Performance page displays information on the resource usage of the Gateway. This page enables you to quickly assess your Gateway's overall health and determine if the Gateway is being taxed too heavily for the server it's running on. You can see the current CPU usage, the current memory usage (in megabytes) out of the total allocated for the Gateway, and how CPU threads are performing. In the CPU Trend and Memory Trend sections there are sliders you can move to set the time range anywhere within in the previous 24 hours. The lower portion of the page shows the current system response time as well as a log of any recent slow response events.



Alarm Pipelines

The Alarm Pipelines page lists the currently configured alarm pipelines in the Gateway. Each pipeline displays the number of alarm items currently running through it. Click on the Details button to the right to open up a new page that will show the alarm pipeline status and logs. There will also be a set of tabs at the top of the page. One for the Pipeline Status that is already open, the other for Pipeline Logs. This [log viewer](#) will act as a miniature log viewer that will only show logs that pertain to this particular pipeline.

The screenshot shows a web-based interface for managing alarm pipelines. At the top, there is a navigation bar with links for Status, Systems, and Alarm Pipelines. The 'Alarm Pipelines' link is highlighted with a red box. In the center, there is a large white box labeled 'Active' with the text '0/2' below it. To the right of this box is a 'Configuration' button. Below the main box, there are navigation arrows and a page number '1 of 1'. At the bottom, there is a table with columns for Name, Active?, Items, and Actions. The table contains two rows:

Name	Active?	Items	Actions
project:alarm-pipelines:/pipeline:Loop Pipeline	false	0	Details
project:NewProject_SJP:/pipeline:Test Pipeline	false	0	Details

Gateway Scripts

The Gateway Scripts page displays a list of all currently configured Gateway scripts. These are scripts that are configured in the [Gateway Event Scripts](#) section of the project. The tabs at the top of the page will swap between the different types of Gateway Event Scripts: Timer, Tag Change, Message Handler, Startup, and Shutdown. They provide useful information such as the name of the project that it is running in as well as the last time it ran, the duration and status (if it was successful or not).

With this page you can quickly verify that your scripts are running properly. If a script has an error, click on the error for more details about what went wrong with the script. All of the logs for that section are also contained in the log viewer at the bottom of the page, to make it easy to see a list of all of the logged errors for that set of Gateway Event Scripts.

Status > Systems > **Gateway Scripts**

Timer Tag Change Message Handler Startup Shutdown

« ‹ 1 of 1 › »

Filter type to filter View 20 ▾

Project ▾	Name	Rate	Last Execution	Duration	Status
No scripts found.					

« ‹ 1 of 1 › »

Log Activity

Min level INFO ▾ i Live Values on Merge to Logs ↗

Logger	Time	Message
No log entries found		

Modules

The Modules page shows a list of the currently installed modules, their current version, and if they are running properly with a license. The top of the page shows a quick count of the running and licensed modules, so you can easily tell if anything is not working. It is then easy to scroll down through the list to see which modules are having issues.

The screenshot shows the 'Modules' section of a software interface. At the top, there's a navigation bar with 'Status > Systems > Modules'. A red box highlights the 'Modules' tab. To the right, there's a 'Licensing Configuration' button. Below the navigation, there are three main sections: 'Running Modules' (18 / 18), 'Licensed Modules' (18 / 18), and 'License Details' (showing License Key LRN-IGN, Version 8, and edition standard). The 'Inductive Automation, LLC' section lists various drivers with their names, versions, licenses, and status (all are green 'RUNNING').

Name	Version	License	Status
Alarm Notification	5.0.0-beta0 (b2019032010)	Activated 🔍	✓ RUNNING
Allen-Bradley Driver	5.0.0-beta0 (b2019032010)	Activated 🔍	✓ RUNNING
DNP3 Driver	3.0.0-beta0 (b2019032010)	Activated 🔍	✓ RUNNING
Enterprise Administration	3.0.0-beta0 (b2019032010)	Activated 🔍	✓ RUNNING
Logix Driver	4.0.0-beta0 (b2019032010)	Activated 🔍	✓ RUNNING
Modbus Driver	6.0.0-beta0 (b2019032010)	Activated 🔍	✓ RUNNING

Redundancy

The Redundancy section displays information regarding the redundant system, if one is configured. It easily shows the Role of the Gateway you are viewing, the status of the connected Gateway, and their IP addresses. The trends on this page give a snapshot of the last few minutes of communication between the two Gateways. The first trend shows the data that is being sent and received between the two Gateways, the second shows the state updates that have recently occurred. The bottom of the page contains a log of the last system events, to easily track major events between the Gateways.

Force Re-Sync

The **Force Re-Sync** button forces a full synchronization of the redundant configuration state. The backup node will be forced to restart.

Request Failover

The **Request Failover** button switches the active node in a redundant pair.

Severity	Time	Event
i	22Mar2019 16:43:04	Initiating a forced configuration re-sync
i	22Mar2019 16:43:04	Forced configuration sync initiated.
i	22Mar2019 16:42:28	Redundancy state changed: Role=Backup, Activity level=Cold, Project state=OutOfDate, History level=Full

Reports

The Reports page shows information on any Reports that have at least one scheduled action set up. The top of the page gives a quick count of reports that are executing an action, have executed an action, or are going to execute an action. Below you can also find a list of Reports in those states as well, to quickly see what project they are located in, or what their last execution time was. As with most other pages, there is also a log of all events related to reports at the bottom of the page.

..> Status > Systems >

Report Stats

Currently Executing

0

Completed Scheduled Executions

1

Upcoming Scheduled Executions

1

Currently Executing Reports

Project	Report Path	Status	Execution Start	Elapsed Time
No items to display				

Completed Scheduled Executions

Project	Report Path	Status	Execution Start	Elapsed Time
TestProject	Report	Finished	30Sep2016 00:00:00	283 milliseconds

Upcoming Scheduled Executions

Project	Report Path	Scheduled Start	Actions
TestProject	Report	01Oct2016 00:00:00	Save File

Log Activity

Min levelINFOLive Values Merge to Logs

Logger	Time	Message
No log entries found		

SFCs

The [Sequential Function Charts](#) (SFCs) section displays a list of all of the currently configured SFCs along with a count of the currently running charts at the top of the page. Click the **Details** button next to any SFC for details about that particular Chart.

» Status > Systems > Sequential Function Charts

Chart Stats

Running Charts
0 / 1

Defined Charts

Chart ▲	Project	Run Mode	Running Instances	Actions
New Chart	test	✓ Callable	0	Details

On the Details for an individual SFC, there are two tabs: Chart Instances and Chart Logs. It contains a list of all currently running Chart instances, and allows you to swap tabs to look at any logged events for that particular chart.

» Status > Systems > Sequential Function Charts

- [Chart Instances](#)
- [Chart Logs](#)

Chart Instances

Status	Execution Start ▲	Current Step	Parent	Started By	Actions
No items to display.					

Voice Alarming

The Voice Alarming page provides details about the currently configured [Voice Notification Profiles](#) on the Gateway. This status can be used to quickly see which Notification Profiles are not working. Clicking the details button enables you to see the current calls with that Voice Notification profile and the current queue of calls waiting to be completed.

Status > Systems > **Voice Alarming**

[Configuration](#)

Voice Alarming

Available Voices

Name	Locale
No voice modules installed.	

Profiles

Name	Status	Pending Calls	Action
Skype	⚠️ unknown [-1]	0	Details
voiceProfile1	✓ Registered with VOIP Host	0	Details

Tags

The Tags page contains a lot of information about the Gateway's configured Tags and Tag Providers. The first page will show a list of all realtime and historical Tag Providers that make it easy to see if any of them are having issues. Clicking on an errored provider will show an error message that may help fix the problem. Clicking on the **Details** button to the left will open up a page with more information about the Tags in that particular provider.

Status > Systems > **Tags**

[Realtime Configuration](#) [Historical Configuration](#)

Realtime Providers

Name	State	Tag Count	Actions
default	● Running	299	Browse
ExportTags	● Running	11	Browse
System	● Running	104	Browse
ubuntu-64bit_default-tags	● Unknown	Not Available	Browse

Historical Providers

Name	State	Actions
MySQL	✓ Good	Details
vm_db	✓ Good	Details



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Tag Diagnostics

[Watch the Video](#)

The details of the Tag Provider will show a list of all currently configured Tags in that Tag Provider, and show some basic information about them. You can browse through the Tag structure to get more information about each Tag. When clicking the Details button for an individual Tag, you will be brought to a Tag Diagnostics screen that will provide more detailed information about that particular Tag, such as if

it has a script written in its Tag event scripts and what its last value was, among other information.

The screenshot shows the 'Tags' tab for the system 'AU 1'. There are two items listed: 'Fan1 HOA' and 'Fan2 HOA'. Both are of type 'AtomicTag' and have a quality of 'Good'. The 'Actions' column contains a 'Details' button for each entry.

Name	Type	Quality	Actions
Fan1 HOA	AtomicTag	Good	Details
Fan2 HOA	AtomicTag	Good	Details

The screenshot shows the 'Tag Diagnostics' page for the 'Fan 1 HOA' tag. It displays various properties of the tag:

Path	Value
Last Value	n/a
Last Quality	Good
Last Execution	n/a
Value Timestamp	09Jul2019 15:41:26
Last Error	n/a
Last Error Cause	n/a
Alarmed?	false
Bound?	false
Historical?	false
Secure?	false
Scaled?	false
Scripted?	false

The Groups Tab allows you to see the Tag Groups configured. It also shows the number of executions for each Tag Group, the last time the Group was executed and the average duration in milliseconds. Provider Logs display any events that relate to that particular provider.

The screenshot shows the 'Groups' tab for the 'default' group. It lists various tag groups with their execution counts and average duration:

Name	Mode	Rate	Leased Rate	Is Leased	Executions	Last Duration	Avg Duration
Direct	Direct	1000	1000	false	73787	0	0
Direct 5 Seconds	Direct	5000	1000	false	14769	0	0
Driven	Driven	10000	1000	false	81172	0	0
Driven Machine State	Driven	10000	1000	false	81172	0	0
Driven Manual	Driven	4000	500	false	165852	0	0
Driven One Shot	Driven	120000	1000	true	1	0	0
Leased	Leased	10000	1000	false	81172	0	0
Time Driven	Driven	60000	1000	false	75018	0	0
default	Direct	1000	1000	false	73787	0	0

EAM Tasks

The EAM Tasks section will only show up once the [EAM module](#) is configured. This page shows information regarding the currently running and scheduled tasks, as well as tasks that were recently executed and whether they were successful or not. From here you can pause a scheduled task, or see the error that caused a previous execution to fail.

The screenshot shows the 'EAM Tasks' page within a software interface. At the top left, the path 'Jit Status > Systems > EAM Tasks' is visible, with 'EAM Tasks' highlighted by a red box. At the top right is a 'Configuration' button. Below the header, there are two main sections: 'Executing Agent Tasks' and 'Scheduled Agent Tasks', each displaying a count of 0.

Executing Agent Tasks

Task Name	Task Type	Task State	Execution Start	Progress	Message
No items to display.					

Scheduled Agent Tasks

Task Name	Task Type	Repeats	Next Execution Start	Status
No items to display				

Recently Completed Tasks

Task Name	Task Type	Task Start	Agent	Task Result
Collect Backup (forced)	backup	25Mar2019 12:39:32	Ignition-2	✓ Success

Transaction Groups

The Transaction Groups page makes it easy to get a quick count of the currently running [Transaction Groups](#) as well as the currently errored groups. Below the counts is a list of Projects that contain Transaction Groups and some basic information like how many are running and how many database queries it generating. Clicking the details button to the right for one of the Projects brings up more information about that Project's Groups. There are some counts on the number of Groups in various states, as well as a list of the groups. Any Groups that have problems can be clicked on to see what the error is to get a better idea of why the Group is unable to run.

Gateway Stats

Running Groups

0 / 5

Errored Groups

0 / 5

<< < 1 of 1 > >>

Filter type to filter

View 20 ▾

Project ▾	Total	Running	Errored	Tag Writes	DB Queries	Actions
Tank_Control	1	0	0	0 / sec	0 / sec	<button>Details</button>
NewProject_SJP	4	0	0	0 / sec	0 / sec	<button>Details</button>

<< < 1 of 1 > >>

Related Topics ...

- [Connections](#)
- [Diagnostics - Logs](#)

Connections

Status of Gateway Connections

The Connections section of the Status tab on the Gateway Webpage contains information regarding the status of Gateway connections to external systems. The list of systems displayed under the Connections section is based on what modules are installed. It can include EAM Agents, Databases, Devices, Store and Forward, the Gateway Network including other Gateways within the Gateway Network, and many more. The Connections section allows you to drill down and open up more specific information to easily find problems with anything connected to the Gateway, and even find crucial information about a faulty connection.

On the left side of the Status section of the Gateway Webpage, you'll see a list of all your connections. Click on any system to open a detailed page to see all the available options, and to get more detailed information. Some third party modules could potentially add sections that are not discussed in this manual.

A screenshot of a sidebar menu titled "CONNECTIONS". The menu items listed are: Databases, Designers, Devices, Gateway Network, Store & Forward, OPC Connections, Perspective Sessions, and Vision Clients. The "Gateway Network" item is highlighted in white, indicating it is the active section.

On this page ...

- [Status of Gateway Connections](#)
- [Log Activity](#)

Log Activity

Most of the systems in the Connection section have a Log Activity area somewhere within the details of the connection. This Log Activity area functions much like the [Logs in the Diagnostics](#) section of the Status page in that you see a list of all log messages depending on the logging level you are looking at as well as the filters you have setup. However, what makes the Log Activity areas in each Connections page unique is that they are filtered to only show loggers for that particular system. This helps you narrow down any potential problems by showing you only the information that pertains to the section you are looking at.

A screenshot of a "Log Activity" panel. At the top, there is a "Min level" dropdown set to "INFO" with a help icon (info symbol) next to it. To the right of the dropdown are buttons for "Live Values" (with a "ON" switch) and "Merge to Logs" (with a circular arrow icon). Below this is a table header with columns: "Logger", "Time", and "Message". A message below the table states "No log entries found". Above the table are navigation icons: back, forward, and search.

Related Topics ...

- [Diagnostics - Logs](#)

In This Section ...

Connections - EAM Agents

EAM Agents

The EAM Agents page shows a list of all the currently configured Agents, including information on the connection status. Agents can be organized into groups allowing you to group agents by location or agent function. If no groups exist, all Agents will be in the Default Group.



On this page ...

- [EAM Agents](#)
 - [EAM Agents Page](#)

EAM Agents Page

The EAM Agents page contains some useful information about all of your Agent connections.

Attribute	Description
EAM Agent Connections	
EAM Agents	Number of connected agents out of the number of configured agents.
Default Group and all groups	
Gateway	Name of the Agent.
Edition	Identifies a Standard vs Edge Gateway. Edge edition shows "edge," and if it's a Standard Gateway, this field is left blank.
Status	Current status of the Agent connection.
Last Comm	Date and time recorded for the last communication with the Agent.
Last Event	Name of the event last recorded with the Agent.
Event Date	Date and time recorded for the last occurring event with the Agent.
Log Activity	Shows any EAM Agent activity along with the Time the log was created and a brief message. You can find more of these same type of messages in the Gateway Logger which is found in the Status section under Diagnostics > Logs , and the Wrapper Logger file under Program Files > Inductive Automation> Ignition > logs > wrapper.log .

Status > Connections > EAM Agents

Configuration

Connected Agents
1 / 1

Default Group

Gateway ▾	Edition	Status	Last Comm	Last Event	Event Date
Ignition-2		✓ Connected	25Mar2019 14:26:30	cpu [NORMAL]	25Mar2019 12:39:20

Log Activity

Min level: INFO

Live Values Merge to Logs

Logger	Time	Message
E AgentLicenseDetailPage	25Mar2019 12:41:53	license.ipl cannot be loaded from the archive!
I AgentEventRecorder	25Mar2019 12:37:43	EAM event record table successfully verified.
I Agent	25Mar2019 12:37:43	[Ignition-2] Agent state has transitioned to Running
I AgentModel	25Mar2019 12:36:59	New agent 'Ignition-2' has connected to this controller. It needs to be approved. <input type="button" value="Merge"/>

Related Topics ...

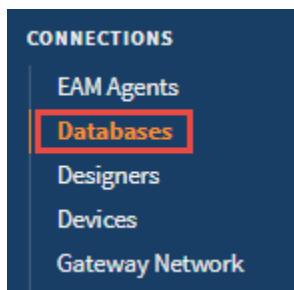
- [Enterprise Administration](#)
- [Creating a Controller](#)
- [Adding an Agent](#)

Connections - Databases

The Databases page shows a list of configured databases, and if they have a valid connection or not. Clicking on the **Details** button to the right of a connection will either show the full error if the connection is faulted, or it will bring you to a Details page for that database connection. On the Details page, you can easily see any active queries, long running queries, the number of queries a second that are running, as well as a trend showing the percentage of queries that completed in that time.

On this page ...

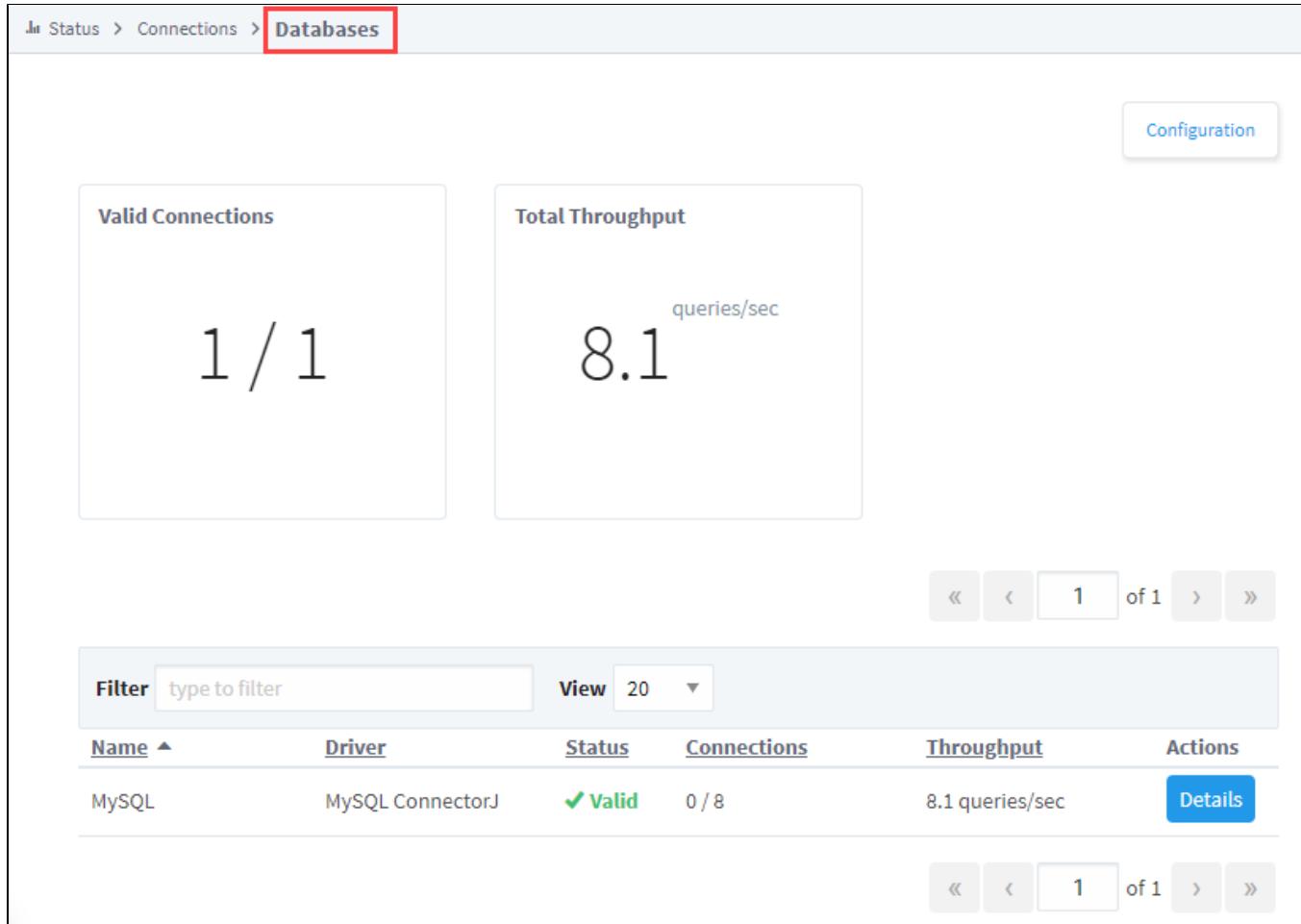
- [Databases Page](#)
- [Database Connection Details](#)



Databases Page

The main database page contains some useful information about all of your database connections.

Attributes	Description
Valid Connections	Number of valid connections.
Total Throughput	Number of queries and their status.
Name	Name of the query.
Driver	Name of the driver.
Status	Current status of the database connection.



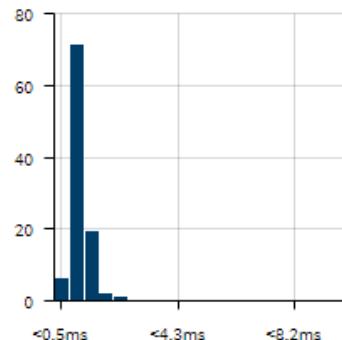
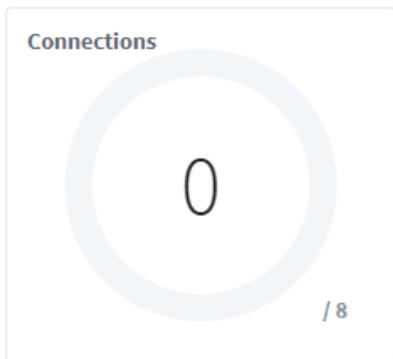
Database Connection Details

The **Details** page for an individual connection provides more in depth information for that particular database connection.

Attribute	Description
Database Stats - Stats about the database connection	
Connections	Number of database connections out of configured databases.
Queries / Sec	Number of queries running per second along with a trend showing the percentage of queries that completed in that time.
Active Queries - A list of currently active queries	
Query	Currently running queries.
Started	When the query was started.
Actions	The ability to cancel a query.
Longest Recent Queries - A list of the longest running queries.	
Query	Displays the actual query.
Duration	Amount of time the query ran.
Started	When the query started running.

[Configuration](#)

Database Stats



Active Queries

Query ▲	Started	Actions
No items to display.		

Longest Recent Queries

Query ▼	Duration	Started
SELECT a.`id`,a.`tagpath`,a.`datatype`,a.`scid`,a.`querymode`,a.`created`, b.`drvid` FROM sqlth_te a left join sqlth_scinfo b on a.`scid`=b.`id` WHERE b.`drvid` in (?, ?, ?) and a.`retired` is null or a.`retired`=0	30 ms	7 minutes ago
SELECT `id` FROM sqlth_scinfo WHERE `scname`=? AND `drvid`=?	8 ms	7 minutes ago

[Related Topics ...](#)

- [Database Connections](#)

Connections - Designers

Designers

The Designers page displays information on currently running designer sessions. All the open designers are displayed on the page along with some basic information about each session, such as what user is logged into each designer session and the project they are currently working on. Clicking on the **Details** button to the right of a designer session will display more information about that particular designer. On the Details page, you can see session information, as well as what designer locks the session currently has set. Locks are when a designer is working on a particular page or set of pages, the system places a lock on those resources (i.e., window, pipelines, etc.) to prevent other designers from working on the same resource. There is also a log at the bottom of the page displaying any errors pertaining to that designer session.



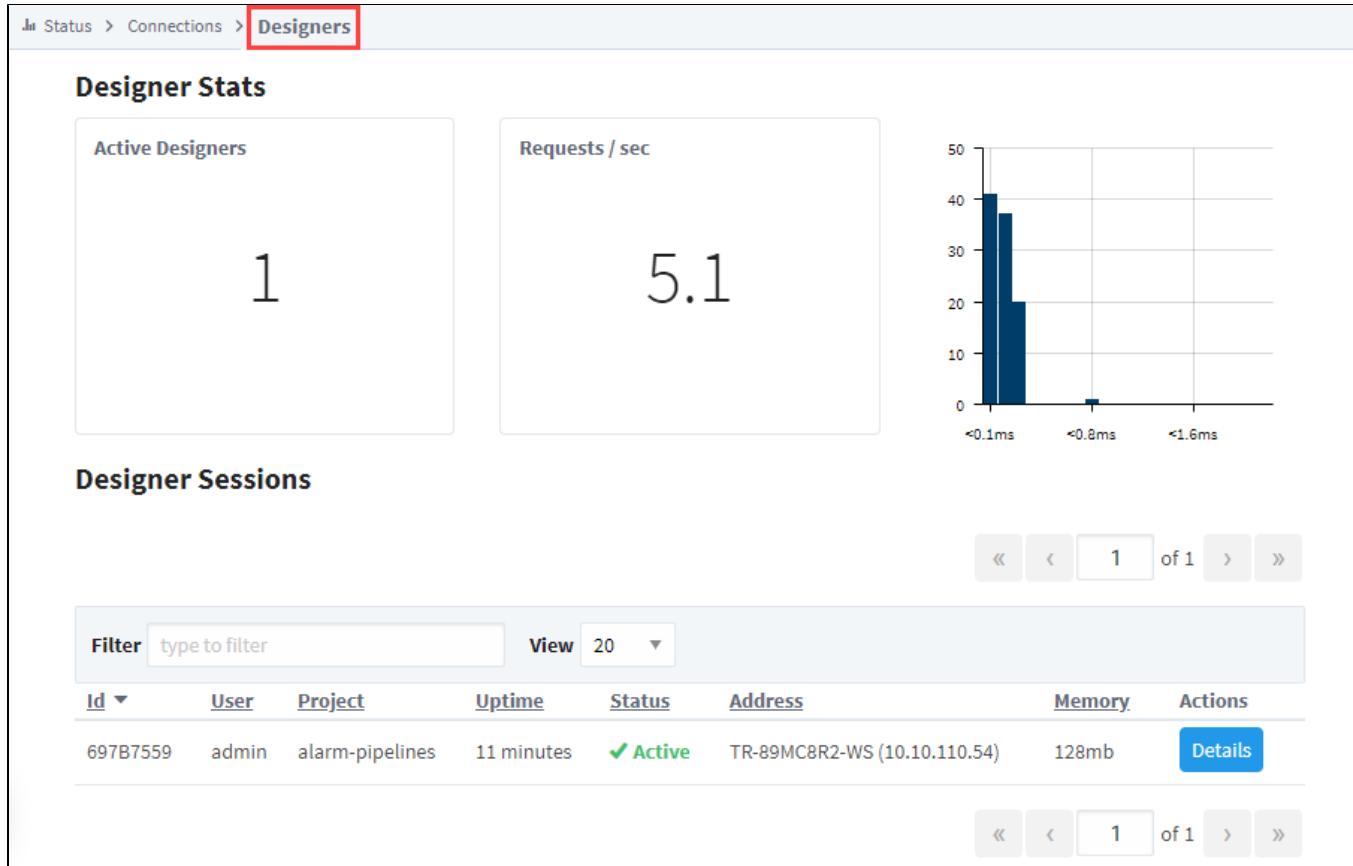
On this page ...

- [Designers](#)
 - [Designers Page](#)
 - [Designer Details](#)

Designers Page

The main Designers page has a list of all currently running designer sessions, and some basic information about all of them.

Attribute	Description
Designer Stats	
Active Designers	Number of active Designer connections.
Requests / Sec	Number of requests running per second along with a trend showing the percentage of requests that completed in that time.
Designer Sessions	
Filter	Search criteria to filter for specific designer sessions.
View	The number of designer sessions to preview.
Id	Designer session id number.
User	Name of the user logged into the Designer.
Project	Name of project the user is currently working on.
Uptime	Amount of time the user is logged into the designer session.
Status	If the Designer is actively connected or not.
Address	The IP Address and name of the computer running the designer.
Memory	Current memory usage for the session.



Designer Details

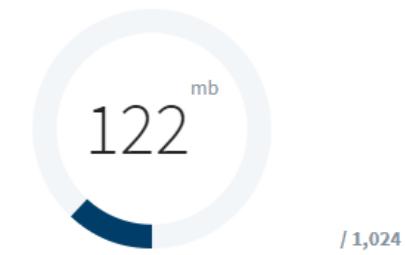
The Designer Details page shows more in depth information about that particular designer session, with the most important being the list of Designer Locks. The locks are project resources that the designer session is using. Because that designer session is using those project resources, no other designers will be able to access those resources, to prevent two designers from working on the same thing.

Attribute	Description
Session Details	
User	Name of the user logged into the Designer.
Project	Name of project the user is currently working on.
Address	The IP Address and name of the computer running the designer.
Uptime	Amount of time the user is logged into the designer session.
Memory	Current memory usage for the session.
Timezone	Local time of the user.
Log Activity	
Min Level	Dropdown menu with options Info, Debug, and Trace.
Live Values	Toggle switch to turn live values on or off.
Logger	Name of the logger that describes the context of the message.
Time	Time of log.
Message	Message for the log.

Session Details

User	admin
Project	alarm-pipelines
Address	TR-89MC8R2-WS (10.10.110.54)
Uptime	22 minutes
Timezone	America/Los_Angeles [GMT-8:00]

Memory



Log Activity

Min level **INFO**Live Values

Merge to Logs

Logger

Time

Message

T Gateway

26Mar2019 14:42:27

Writing push notifications

Related Topics ...

- [Designer](#)

Connections - Devices

Devices

The Devices page lists the currently configured OPC UA devices, and lets you know which are connected and which have a faulty connection. From here, you can drill into a device connection to see how many Tags Ignition is requesting from the device, along with how often it is requesting them. This information can be used to determine if we are overloading the device with too many requests too quickly, or if we can request more from our device.



On this page ...

- [Devices](#)
 - [Devices Page](#)
 - [Device Details](#)

Devices Page

The main Devices page lists out all OPC UA devices, as well as how many currently have a valid connection. Note: this will only show the devices connected through an Ignition device connection. For information about devices connected through other OPC Servers, see those programs.

Attribute	Description
Connected Devices	Number of devices connected out of configured devices.
Name	Name of the device.
Driver	Name of the device driver.
Status	Current device status.

A screenshot of the 'Devices' page. At the top, there's a summary box showing 'Connected Devices' with the value '4 / 5'. Below this is a navigation bar with 'Connections' and 'Devices' tabs, and a 'Configuration' button. A search bar labeled 'Filter type to filter' and a 'View 20' dropdown are also present. The main content area displays a table of connected devices with columns for 'Name', 'Driver', 'Status', and 'Actions'. The table shows three rows: CLX (ControlLogix, Connected: Protocol: EIP - Run Mode, Details), Dairy (DairyDemoSimulator, Connected, Details), and Generic (Simulator, Connected, Details). Navigation arrows at the bottom right indicate the table has one page with one item.

Device Details

Clicking the **Details** button to the right will display a diagnostics page for that device which provides a lot of useful metrics like a Tag count. The log at the bottom of the page will display recent events that pertain to that particular device.

The Device Details page also lists statistics to help determine if the device is overloaded with requests. There are values for each Tag Group that are configured on Tags from the specified device, as well as aggregate statistics which pull from all Tag Groups to get an average for the device. The four values are listed in the table below.

Attribute	Description
Aggregate Statics	
Request Count	Tracks the number of requests that are coming in from the device, each request consisting of multiple Tags. How many Tags are in a request can vary between devices, which Tags are being requested, and how often they are requested.
Throughput (Mean)	Average amount of requests that come through per second since the device was last started. If the device connection is edited and saved, this will cause the device connection to reinitialize and this value will be reset.
Throughput (1 min)	Average amount of requests that come through per second for the last minute.
Mean Response Time	Average time it takes for Ignition to get a response from the device. This number should be an average of the graph on the right of the page.

So based on the statistics above, we can determine if we are overloading our device by requesting too many Tags too quickly. We simply need to take the throughput and use that to determine how many total requests come in per Tag Group execution. If this is at or above the request count, then our device can keep up with the numbers we are requesting. If it is below the request count, then the number of requests we are making to the device aren't coming in as fast as we want them, which can lead to poor device performance or bad values.

For example, take the image below. Scheduled at 2000ms, we have 81 requests. Our average throughput is about 40.8 requests a second. This means that every two seconds, we get 81.6 requests. Since we are making 81 requests every two seconds, this is exactly what we would expect to be getting from this device.

[Devices / Device \[MicroLogix\]](#)

Aggregate Statistics

Details	
Request Count	81
Throughput (Mean)	69.33/sec
Throughput (1 min)	40.67/sec
Mean Response Time	9.82ms

Tag Count

3168

Time Range	Count
<3.4ms	15
<20.5ms	38
<37.6ms	30
<54.7ms	5

Scheduled at 2000ms

Details	
Request Count	81
Throughput (Mean)	40.85/sec
Throughput (1 min)	40.82/sec
Mean Response Time	9.78ms

Load Factor

40 % / 100

Log Activity

Min level: **INFO** Live Values: **ON** Merge to Logs: **OFF**

Logger	Time	Message
No log entries found		

Overloaded Device

However, if we altered the Tag Group on the same device to 500ms, we see a very different picture. The request count is still 81, but because we are requesting values every 500ms, we should see about 162 requests coming through every second. The throughput values only show us getting about 87.5 requests per second, which is about half of what we actually are asking for. This would indicate that our device is overloaded, which can also be seen in the Load Factor. Our Tags would not be updating as quickly as we would like, which could lead to bad Tag values.

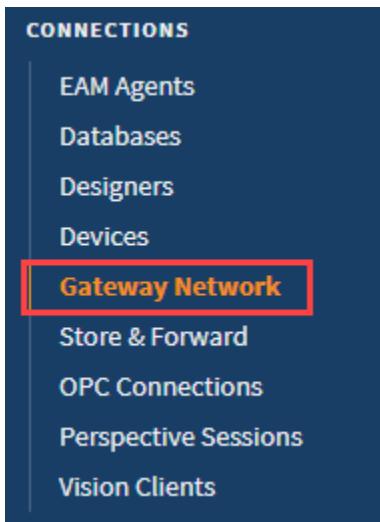


Related Topics ...

- OPC UA
- Allen Bradley Ethernet
- Modbus
- Siemens

Connections - Gateway Network

The Gateway Network Status page is designed to give a quick overview of the status of all Gateways within the Gateway Network. If a Gateway connection is faulted, the status message in red can be selected to see the error that pertains to why it is faulted. Any Gateway connections with a status of 'Connected' can be drilled into by clicking the **Details** button to the right. On the Details page, metrics for the selected Gateway connection are displayed, giving an idea of the rate of data transfer between the two Gateways, as well as a list of recent connection events.



On this page ...

- [Gateway Network Page](#)
- [Gateway Area Network Connection Details](#)
 - [Active Outgoing and Incoming Tasks List](#)
 - [Gateway Network Statistics](#)
 - [Outgoing Queues](#)
 - [Temporary Queue Actions](#)
 - [Outgoing and Incoming Tasks Statistics](#)

Gateway Network Page

The main Gateway Network page displays a list of all current Gateway Network connections both incoming and outgoing, as well a list of all Remote Gateways that the Local Gateway can see both from its Gateway Network connections and through proxy connections. Each list has some basic information along with the ability to see more details on a specific Gateway Network connection or a Remote Gateway.

Attribute	Description
Gateway Network Connections	
Remote Gateway	Name of the Remote Gateway connection.
Direction	The direction of the Gateway Network connection. Can either be Incoming or Outgoing.
Redundancy Role	The redundancy role of the Gateway. Can either be Independent, Backup, or Master.
Last Comm	The time of the last communication with the Gateway.
Ping Time	Reaction time of Gateway connection. How fast you get a response after you've sent out a request.
Status	Current state of the Gateway Network Connection.
Fault Count	Number of times the connection has faulted since the Gateway has been started.
Remote Gateways	
Gateway Name	Name of the Remote Gateway.
Outgoing Msg/Sec	The number of outgoing messages per second.
Incoming Msg/Sec	The number of incoming messages per second.
Pending	Number of messages pending in a queue that are waiting to be dispatched to the Gateway Network connection.
Connected Through	How the Gateway is connected to the Remote Gateway.
Status	Current state of the Remote Gateway Connection.

Status > Connections > **Gateway Network**

[Configuration](#)

Connections

« < 1 of 1 > »

Remote Gateway ▾	Direction	Redundancy Role	Last Comm	Ping Time	Status	Fault Count	Actions
ignition-mrobertson-lt4	Incoming	Independent	a few seconds ago	N/A	Running	0	Details
ignition-dartmouth-backup-backup	Incoming	Backup	a few seconds ago	N/A	Running	0	Details
controller	Incoming	Independent	a few seconds ago	N/A	Running	0	Details

« < 1 of 1 > »

Remote Gateways

« < 1 of 1 > »

Gateway Name ▾	Outgoing Msg/Sec	Incoming Msg/Sec	Pending	Connected Through	Status	Actions
Ignition-mrobertson-lt4	0.3	0.3	0	ignition-mrobertson-lt4	Connected	Details
Ignition-ignition8-ubuntu-64bit	0.0	0.0	0	ignition-mrobertson-lt4	Connected	Details

Gateway Area Network Connection Details

Ignition's Gateway Network system shares information across Gateways using threads to send and receive information. For example, if you have a Remote Tag Provider configured between Gateway A and Gateway B, messages containing live tag information will be sent between these two Gateways using threads to send and receive live tag data. Similarly, a Remote Historical Tag Provider will send/receive messages with historical tag data between Gateway A and Gateway B using this same set of threads. Each Ignition sub system that uses the Gateway Network will utilize these threads in some way.

Ignition's Gateway Network also has a queue associated with each Ignition subsystem. These queues allow for Ignition to have a way to prioritize which sub system should have access to a send or receive thread. Prioritization here is especially important because if all send threads are in use, messages cannot be sent between two Gateways. The Gateway Network page includes additional information that will help better monitor Gateway interactions.

Home Status > Connections > Gateway Network

Configuration

Connections

« < 1 of 1 > »

Remote Gateway ▲	Direction	Redundancy Role	Last Comm	Ping Time	Status	Fault Count	Actions
gateway+b	Outgoing	Independent	a few seconds ago	1 ms	Running	0	Details

« < 1 of 1 > »

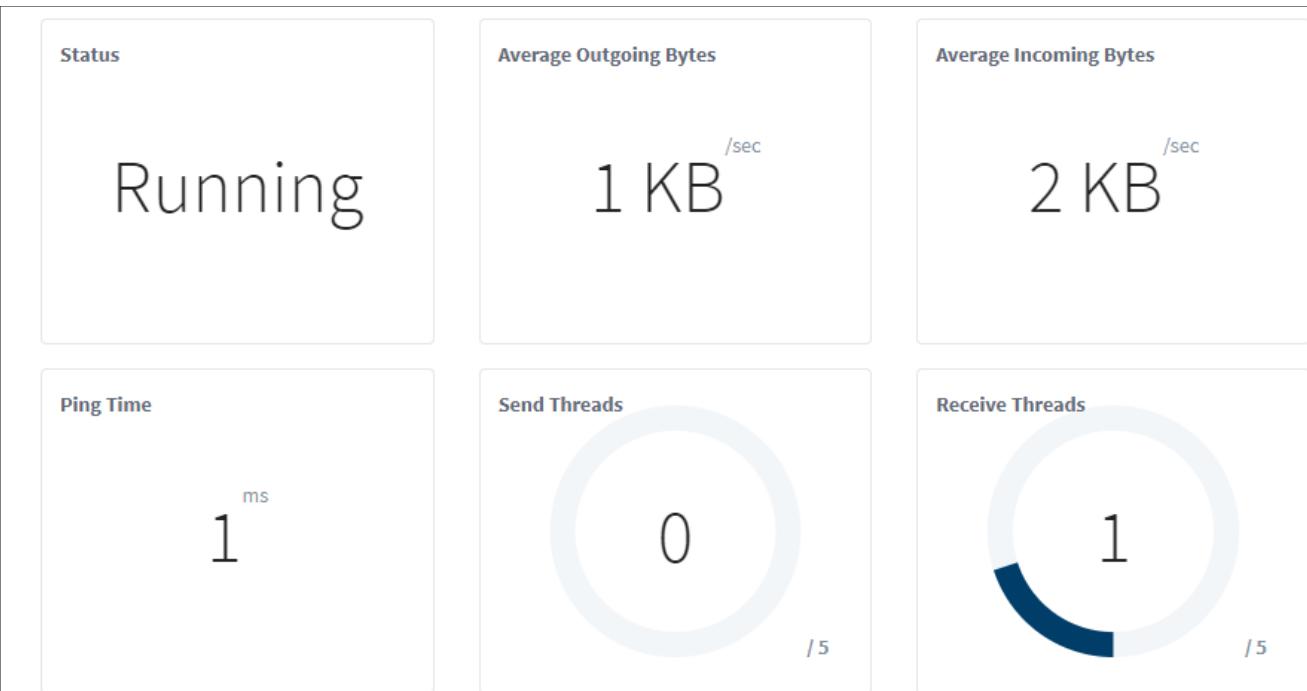
Remote Gateways

« < 1 of 1 > »

Gateway Name ▲	Outgoing Msg/Sec	Incoming Msg/Sec	Pending	Active	Connected Through	Status	Actions
Gateway B	0.5	1.2	0	0	gateway+b	Connected	Details

« < 1 of 1 > »

The image above shows the basic Gateway Network Connection Status page where we can see there is an outgoing Gateway Network connection from Gateway A to Gateway B. Pressing the Details button will bring up detailed information about this connection as below:



Active Outgoing Tasks

<u>Task Name</u> ▾	<u>Source Queue</u>	<u>Duration Secs</u>
CallResult:Services/Get Service State	Call Results Queue	30354
CallResult:Services/Get Service State	Call Results Queue	401254
CallResult:Services/Get Service State	Call Results Queue	554102

Active Incoming Tasks

<u>Task Name</u> ▾	<u>Duration Secs</u>
No items to display.	

Attribute	Description
Status	Current state of the Gateway Network Connection.
Average Outgoing Bytes	Average bytes of data going from the Local Gateway to the Remote Gateway per second.
Average Incoming Bytes	Average bytes of data going from the Remote Gateway to the Local Gateway per second.
Ping Time	Reaction time of Gateway connection. How fast you get a response after you've sent out a request.
Active	Number of messages being actively processed by the gateway network connection.
Send Threads	A thread that is used by the Gateway Network to upload messages from one gateway to another.
Receive Threads	A thread that is used by the Gateway Network to download messages from one gateway to another.
Local Id	Id of the local Gateway.
Remote Id	Id of the remote Gateway.
Remote Gateway	Name of the Gateway on the Gateway network.
Network Address	Physical address used to communicate with all devices on the Gateway network.
Redundant Role	The redundancy role of the Gateway. Can either be Independent, Backup, or Master.
Direction	The direction of the Gateway Network connection. Can either be Incoming or Outgoing.
Session Id	Gateway connection session Id number. Connected gateways use the same session Id on both gateways.
Last Comm	The time of the last communication with the Gateway.

Fault Count	Number of times the connection has faulted since the Gateway has been started.
Connection Events	Displays a list of recent connection events.

Active Outgoing and Incoming Tasks List

Attribute	Description
Task Name	Name of the task that is using a thread.
Source Queue	The Ignition sub system queue that dispatched this task.
Duration Secs	This is how long in seconds it takes for a task to be performed.

Gateway Network Statistics

In addition to showing live thread and task information, users can also keep track of Gateway Network Statistics. By clicking on the Details button below, the Gateway Network Statistics Page appears for Gateway B:

Remote Gateway	Direction	Redundancy Role	Last Comm	Ping Time	Status	Fault Count	Actions
gateway+b	Outgoing	Independent	a few seconds ago	1 ms	Running	0	Details

Gateway Name	Outgoing Msg/Sec	Incoming Msg/Sec	Pending	Active	Connected Through	Status	Actions
Gateway B	0.5	1.2	0	0	gateway+b	Connected	Details

Outgoing Queues

The Gateway Network Statistics page has three sections associated with it. First, the Outgoing Queues section. The Outgoing Queues section shows tasks that are both in a pending and active state. A pending task is a task that has not yet been dispatched to the gateway network thread pool. An active task is a task that is being processed by the gateway network thread pool and should show up under the Gateway Network Connection Status page as either an outgoing or incoming task.

Outgoing Queues

Name ▲	Priority	Inserts/Sec	Pending	Active	Avg Pending Secs	Total	Actions
Call Results Queue	Highest	0.5	0	0	0.0	333,299	<button>More ▾</button> <button>Clear</button>
Default Queue	Normal	0.0	0	0	0.0	2	<button>More ▾</button> <button>Clear</button>
Long Wait Queue	Low	0.0	0	0	0.0	0	<button>More ▾</button> <button>Clear</button>
Proxy Queue	AboveNormal	0.0	0	0	0.0	0	<button>More ▾</button> <button>Clear</button>
Tag Value Publishing	Normal	0.0	0	0	0.0	0	<button>More ▾</button> <button>Clear</button>

Attribute	Description
Name	Name of the queue.
Priority	Level of priority for a queue.
Inserts/Sec	Rate of task inserts per second for a queue
Pending	Number of pending tasks in a queue that have not yet been dispatched to a Send/Receive thread.
Active	Number of messages being actively processed by the gateway network connection.
Avg Pending Secs	Average number of seconds that a task has been pending in a queue.
Total	Total number of tasks executed from this queue.
Actions	Set of actions associated with a queue. Users can both Pause and Clear a queue.

Temporary Queue Actions

The Gateway Network Statistics page has controls for pausing and clearing a queue. To **pause** a queue means no new tasks will be allowed to be inserted into the paused queue. To **clear** a queue means that all pending tasks will be purged. These actions are designed to help the user deal with a possibly overloaded gateway network connection due to a specific sub system flooding the queue with more tasks than the connection can handle. Note that neither of these actions will have any effect on active tasks, as they have already been dispatched to the gateway network connection and cannot be cancelled.

Outgoing Queues

Name ▲	Priority	Inserts/Sec	Pending	Active	Avg Pending Secs	Total	Actions
Call Results Queue	Highest	0.5	0	0	0.0	333,313	<button>More ▾</button> <button>Clear</button>
Default Queue	Normal	0.0	0	0	0.0	2	<button>Pause</button> <button>More ▾</button> <button>Clear</button>
Long Wait Queue	Low	0.0	0	0	0.0	0	<button>More ▾</button> <button>Clear</button>

Outgoing and Incoming Tasks Statistics

The Outgoing and Incoming Task Statistics section shows individual tasks that have been processed by the Gateway Network Connection.

Outgoing Task Statistics

Name ▲	Description	Queue	Invocations/Sec	Avg Duration Secs	Total
Remote Tags (v7)/getProviders	Returns a list of tag providers	Remote Tags (v7)	0.0	0.3	1
Remote Tags/cancelSubscription	Cancel a remote tag subscription	Remote Tags	0.0	0.4	1
Remote Tags/getProperties	Return a list of tag provider properties for a specified provider	Remote Tags	0.0	0.4	2
Remote Tags/modifySubscription	Modify a remote tag subscription	Remote Tags	0.0	0.4	1
Remote Tags/validateSubscription	Validates that tag subscriptions between gateways is synchronized	Remote Tags	0.1	0.6	39
Services/Enumerate Services	Returns a list of available services on a remote machine	Default Queue	0.0	0.7	12
Tag History Storage Service/canAcceptData	Indicates whether the local historian can store new data	Tag History Storage Service	0.0	0.4	1
Tag History/getHistoricalProviders	Returns a list of historical providers	Tag History	0.0	0.3	1

Incoming Task Statistics

Name ▲	Description	Invocations/Sec	Avg Duration Secs	Total
CallResult:Remote Tags (v7)/getProviders	Returns a list of tag providers	0.0	0.0	1
CallResult:Remote Tags/cancelSubscription	Cancel a remote tag subscription	0.0	0.0	1
CallResult:Remote Tags/getProperties	Return a list of tag provider properties for a specified provider	0.0	0.0	2
CallResult:Remote Tags/modifySubscription	Modify a remote tag subscription	0.0	0.0	1
CallResult:Remote Tags/validateSubscription	Validates that tag subscriptions between gateways is synchronized	0.1	0.0	39
CallResult:Services/Enumerate Services	Returns a list of available services on a remote machine	0.0	0.0	10
CallResult:Tag History Storage Service/canAcceptData	Indicates whether the local historian can store new data	0.0	0.0	1
CallResult:Tag History/getHistoricalProviders	Returns a list of historical providers	0.0	0.0	1

Outgoing and Incoming Tasks Attributes	Description
Name	Name of a task.
Description	Description for a task.
Queue	Queue invoking a task (For Outgoing Tasks only)
Invocation/Sec	Rate at which a task is invoked per second.
Avg Duration Secs	Average duration in seconds of the time it takes for this task to execute.
Total	Number of times the task has been executed in total.

Note: If you are looking for connection details for Ignition version 8.0.14 and earlier, refer to [Connections - Gateway Network](#) page in version 8.0 of the Ignition User Manual.

Related Topics ...

- [Gateway Status](#)
- [Diagnostics - Logs](#)

Connections - Store & Forward

Store & Forward

The [Store and Forward](#) page displays a list of the Store and Forward engines, including their status, as well as the number of records currently in each Store and Forward system. If the database connection becomes faulted, the database records wait in the Store and Forward system until the database connection is restored.



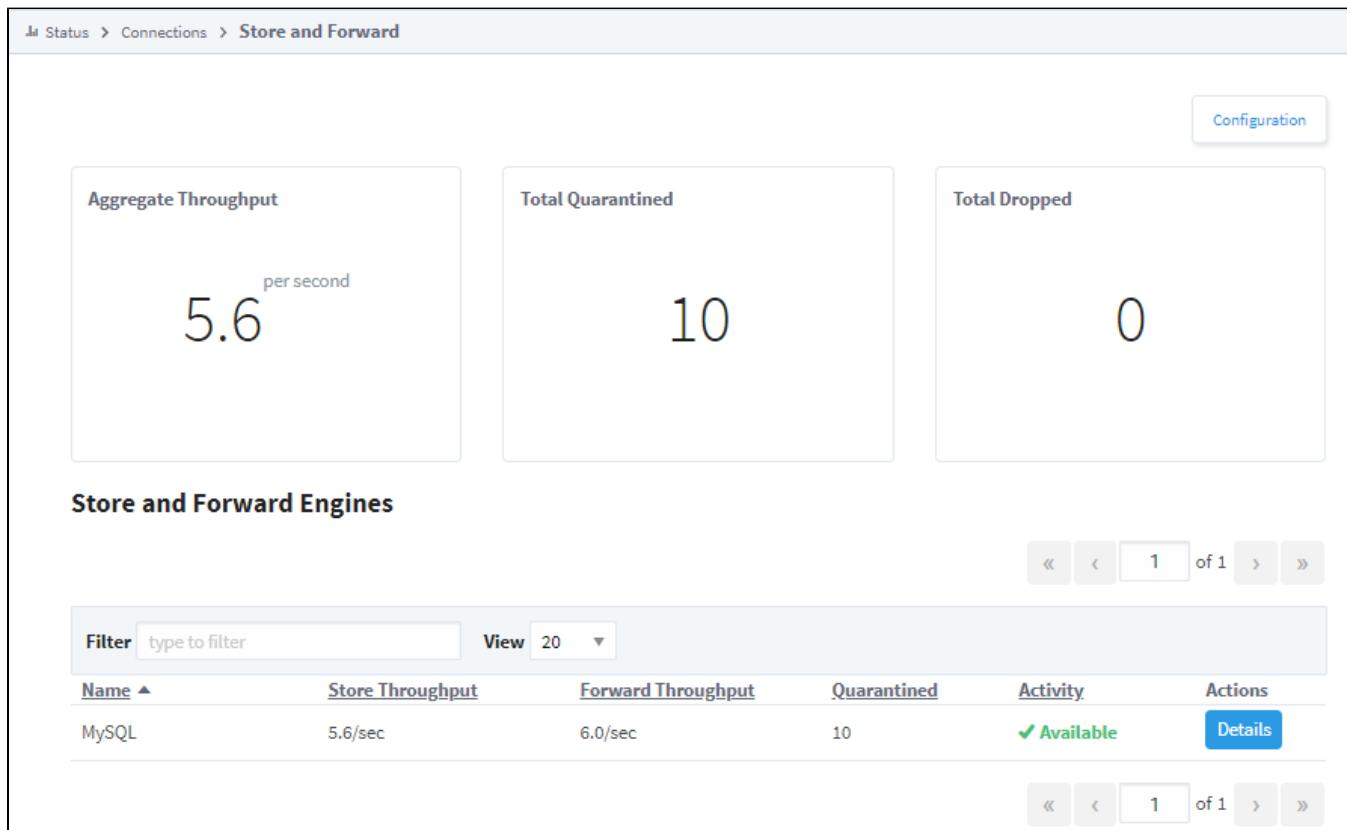
On this page ...

- [Store & Forward](#)
 - [Store & Forward Page](#)
 - [Store & Forward Details](#)

Store & Forward Page

The main Store and Forward page lists out all store and forward engines. Typically, each database connection gets its own store and forward engine, so there should be one engine for each database connection. In addition to displaying some basic stats for each engine, you can also find some totals for all store and forward systems, to get an idea of how much data is being pushed through the system to databases and if any records are being dropped.

Attributes	Description
Store and Forward Connections	
Aggregate Throughput	Aggregate number of records inserted into a database from any Store and Forward engine per second.
Total Quarantine	Number of quarantined items for all Store and Forward engines.
Total Dropped	Number of records dropped from the Store and Forward engines. A record is considered dropped if it can not be added to one of the buffers, (i.e., when a buffer is full and the Store and Forward engine can no longer accept new records).
Store and Forward Engines	
Name	Name of the Store and Forward engine.
Store Throughput	Number of records that go through the Store and Forward Engine per second.
Forward Throughput	Number of records to be forwarded on to the database per second.
Quarantined	Is data that has errored-out multiple times during attempts to forward it, or data that could not be stored because of some configuration issues.
Activity	Current state of the Store and Forward engine.
Actions	By clicking Details, shows additional information about Store and Forward engines.



Store & Forward Details

Clicking the **Details** button brings up a new window that will show even more details about the records in the selected Store and Forward Engine. Here, we can see a count of the number of records in the memory buffer and local cache, as well as the number of quarantined records. The quarantined items at the bottom of the Details page will have some buttons that allow you to [control the data that is in the quarantine](#). The quarantined item can be retried, where it will be thrown back through the Store and Forward system to see if it will go through properly, assuming the original reason why it was quarantined has been fixed. It can also be deleted so that it is no longer taking up space in the Store and Forward system, or exported to your local machine where you can save it to try again later. You can then import the file back from the same page when you resolved the issue that caused the data to be quarantined in the first place.

Attribute	Description
Memory Buffer	Number of records entering the Memory Buffer per second. The progress bar shows the percent of the buffer being utilized, along with the current and max number of records.
Local Cache	Number of records entering the Local Cache per second. An "Idle" state means the engine is able to successfully store all records into the database before the Write Size or Write Time values have been reached. The progress bar shows the percent of the buffer being utilized, along with the current and max number of records.
Database Storage	Displays the number of records pushed from either buffer to the database per second.
Quarantine d Items	Shows a list of quarantine items and allows you to choose the quarantined file and import it.
ID	Identification number of the quarantine item.
Count	Number of occurrences for the quarantined item.
Description	Description of where the quarantine item originated from.
Reason	Explanation why the record was placed into quarantine.
Actions	Provides and opportunity to retry, delete, or export the items from quarantine.

Status > Connections > Store and Forward

Configuration

Store Details

Memory Buffer	Local Cache	Database Storage
6 /sec	1 /sec	6 /sec
2% (5/250)	0% (0/25000)	

Quarantined Items

Import quarantine file

Retry All

Delete All

« < 1 of 1 > »

ID	Count	Description	Reason	Actions
1	10	SQLTag History Data	This data sink does not accept data of the given type.	Retry Delete Export

« < 1 of 1 > »

Related Topics ...

- [Using Store and Forward](#)
- [Controlling Quarantine Data](#)

Connections - OPC Connections

OPC Connections

The OPC Connections page displays all currently configured OPC (both UA and DA) connections.



If you are using an OPC UA connection, you should be using the [OPC UA Module](#). If you are using the DA connection, you should be using the [OPC COM Module](#).



On this page ...

- [OPC Connections](#)
 - [OPC Connections Page](#)
 - [Nodes](#)

OPC Connections Page

Here on the main OPC Connections page, we can see a list of all current OPC connections, as well as their status. If any are faulted, you can click the red faulted status to get an error message popup with a full description of the error.

Attribute	Description
Connected Servers	Displays the list of OPC servers out of configured servers, and their status.
Name	OPC server name.
Filter	Search criteria to filter for specific server names.
Type	OPC server type - UA or DA
Uptime	Total time OPC server is connected.
Status	Current status of OPC server.
Diagnostics	Displays diagnostic information for any connected OPC UA server. <ul style="list-style-type: none">• Server - Shows server diagnostics.• Client - Shows client connection subscription diagnostics.

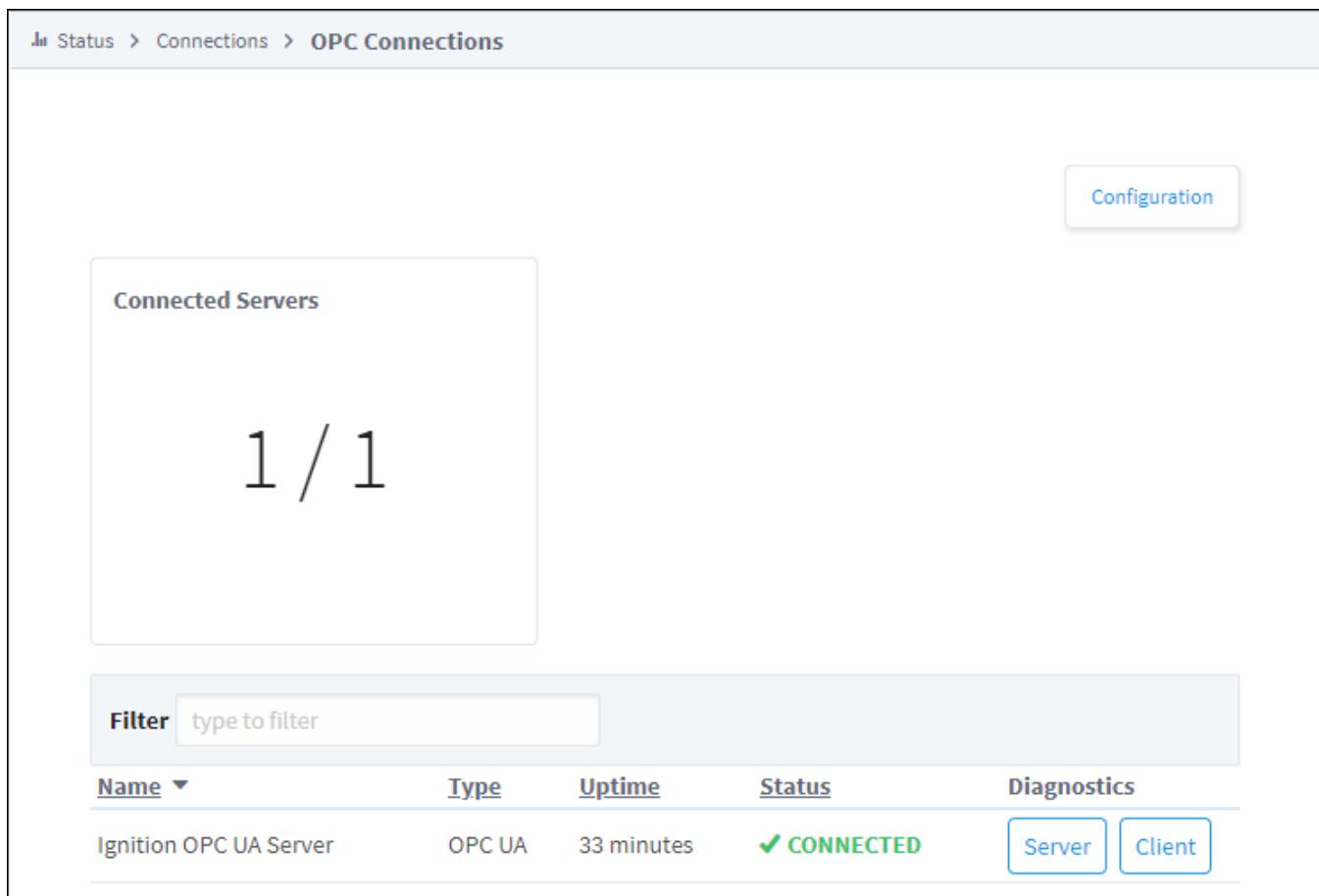
» Status > Connections > OPC Connections

Configuration

Connected Servers
1 / 1

Filter type to filter

Name ▾	Type	Uptime	Status	Diagnostics
Ignition OPC UA Server	OPC UA	33 minutes	✓ CONNECTED	<button>Server</button> <button>Client</button>



Server

Click the **Server** button to get information on the server. By default, diagnostics are set to off since they can generate a considerable amount of network overhead and impact performance. To turn on diagnostics, click **Enable Diagnostics**. Not all OPC UA servers support diagnostics.

[Configuration](#)

Ignition OPC UA Server

[← Return to Servers](#)[Server Information](#)[Session Diagnostics](#)

Server Status

Parameter ▾	Value
currentTime	2020-07-10T10:37:36.900-07:00
startTime	2020-07-09T09:35:29.474-07:00
state	CONNECTED

Build Info

Parameter ▾	Value
buildDate	2020-07-09T09:35:28.127-07:00
buildNumber	dev
manufacturerName	Inductive Automation
productUri	urn:inductiveautomation:ignition:opcua:server
softwareVersion	dev

Server Diagnostics

[Enable Diagnostics](#)

This server does not have diagnostics enabled.

Clients

By clicking on the **Client** button, it brings up the subscription information for that particular server. It will list out all of the subscriptions to that server with the publishing rates, as well as the number of items within that subscription.

Attribute	Description
Filter	Search criteria to filter for specific subscriptions.
Refresh	Refreshes subscription data.
Name	Displays the subscription name.
Rate	The rate defined in the Tag Group, used as the requested sampling interval for monitored Items belonging to the corresponding subscription.
Request Publishing Interval	The rate a subscription will report accumulated change notifications at. The interval is derived from Rate, unless explicitly defined.
Revised Publishing Interval	The server's revised rate for accumulated change notifications.
Tag Count	The number of Tags currently subscribed to that Tag Group.

! Status > Connections > OPC Connections > Ignition OPC UA Server - Subscriptions

Configuration

Ignition OPC UA Server

Name	Rate	Request Publishing Interval	Revised Publishing Interval	Tag Count	
tag-group-exporttags_default	10000	1000	1000	3	<button>Nodes</button>
tag-group-default_time driven	60000	1000	1000	2	<button>Nodes</button>
tag-group-default_driven machine state	10000	1000	1000	2	<button>Nodes</button>
tag-group-default_direct 5 seconds	5000	1000	1000	4	<button>Nodes</button>
tag-group-default_direct	1000	500	500	2	<button>Nodes</button>
tag-group-default_default	10000	1000	1000	188	<button>Nodes</button>

Nodes

Clicking the **Nodes** button for one of the subscriptions will bring up the list of subscribed OPC items.

Attribute	Description
Filter	Search criteria to filter for a specific node.
Refresh	Refreshes node data.
Node ID	The OPC item path.
Requested Sampling Interval	The rate the underlying tag/node will be polled at.
Revised Sampling Interval	The revised rate at which the underlying tag/node will be polled at.
Requested Queue Size	Determines how many data points can be stored and transferred to the client once the sampling rate elapses when the sampling rate is slower than the publishing rate.
Status Code	Status of the node.

Configuration

Ignition OPC UA Server > tag-group-default_driven machine state-unleased

Node ID ▾	Requested Sampling Interval	Revised Sampling Interval	Requested Queue Size	Revised Queue Size	Status Code
ns=1;s=[Generic]_Meta:Sine/Sine9	10000	10000	1	1	Good
ns=1;s=[Generic]_Meta:Sine/Sine8	10000	10000	1	1	Good
ns=1;s=[Generic]_Meta:Sine/Sine0	10000	10000	1	1	Good
ns=1;s=[Generic]_Meta:Ramp/Ramp9	10000	10000	1	1	Good
ns=1;s=[Generic]_Meta:Ramp/Ramp8	10000	10000	1	1	Good
ns=1;s=[Generic]_Meta:Ramp/Ramp7	10000	10000	1	1	Good

Related Topics ...

- [OPC UA](#)
- [OPC UA Client Connection Settings](#)

Connections - SECS/GEM Equipment

SECS/GEM Equipment

The SECSGEM Equipment page displays a list of all equipment connections, their status, as well as the number of sent requests and received messages. If any piece of equipment becomes faulted, it will show a status of "Not Connected." If you click the **Details** button, it opens a new page with some Connection Stats. Note: the SECSGEM Module is not standard and will be missing for most installs of Ignition. The SECSGEM Equipment Connection will only be displayed in the Status section of the Gateway webpage under Connections when the module is installed.



On this page ...

- SECS/GEM Equipment
 - SECS/GEM Equipment Page
 - SECS/GEM Equipment Details

SECS/GEM Equipment Page

The main SECS/GEM Equipment page lists out all equipment connections and displays the number of messages sent between them and Ignition.

Attribute	Description
Connections	The total number of active SECS/GEM Equipment connections.
Aggregate Throughput	The messages per second the system is sending and receiving from all devices at that time.
Name	The name of the equipment connection in the list.
Sent Messages	The number of messages sent to the equipment.
Received Messages	The number of messages received from the equipment.
Status	The status of the equipment.

A screenshot of the SECSGEM Equipment page. At the top, there is a breadcrumb navigation: Status > Connections > SECSGEM Equipment. On the right, there is a 'Configuration' button. Below the breadcrumb, there is a section titled 'Equipment Stats' with two cards: 'Connections' (value: 1) and 'Aggregate Throughput' (value: 0.2 per second). At the bottom, there is a table with columns: Name, Sent Messages, Received Messages, and Status. One row shows 'SimEquipOne' with '154' Sent Messages, '77' Received Messages, and a green checkmark 'Communicating' in the Status column. There is also a 'Details' button next to the status.

SECS/GEM Equipment Details

Clicking the **Details** button to the right of a piece of equipment will take you to a page that shows more detailed information for that particular piece of equipment.

Attribute	Description
Sent Messages	
Throughput	The messages per second the system is currently sending.
Average	The average messages sent per second from when the equipment was first enabled.
Total	The total messages sent.
Received Messages	
Throughput	The messages per second the system is currently receiving.
Average	The average messages received per second from when the equipment was first enabled.
Total	The total messages received.

Status > Connections > SECS/GEM Equipment

Configuration

Connection Stats

Sent

Last to: S1F14

Throughput per second 0.1	Average per second 0.0	Total 166
---------------------------------	------------------------------	--------------

Received

Last from: S1F13

Throughput per second 0.1	Average per second 0.0	Total 83
---------------------------------	------------------------------	-------------

This screenshot shows the 'Connection Stats' section of the SECS/GEM Equipment Details page. It displays two sets of metrics: 'Sent' and 'Received'. Under 'Sent', it shows 'Last to: S1F14' with three cards: 'Throughput' (0.1 per second), 'Average' (0.0 per second), and 'Total' (166). Under 'Received', it shows 'Last from: S1F13' with three cards: 'Throughput' (0.1 per second), 'Average' (0.0 per second), and 'Total' (83). A 'Configuration' button is located in the top right corner of the main content area.

Related Topics ...

- SECS/GEM

Connections - Perspective Sessions

Perspective Sessions

Much like the Designers page, the Perspective Sessions page shows a ton of information regarding currently open Sessions. All the open Perspective Sessions are displayed on the page along with some basic information about each session, such as what user is logged into each session and the project they are currently working on, their IP address, and much more. Each session has a Details button that allows you navigate all the elements of a session: pages, view instances, and components.



On this page ...

- Perspective Sessions
 - Perspective Sessions Page
 - Perspective Session Details
 - View Instances
 - Components

Perspective Sessions Page

The main Perspective Sessions page displays a list of all currently running Designer and Client Sessions to show how many are open, and the name of the users that are currently using them. By clicking on the **Details** button to the right of a session will display even more information about that particular session, including any Log Activity pertaining to errors recorded while the session was active.

Attributes	Description
Sessions Details	
Total Sessions	The number of currently active Designer and Perspective Sessions.
Device	Type of device running the Session.
User	The user logged into the Session.
Project	The name of the project open in the Session.
Uptime	The total uptime of the Session.
Last Comm.	Date and time recorded for the last communication with the Session.
Address	The IP Address and computer name where the Session is launched.
Session Scope	Indicates what browser opened the Session, and the Perspective icon indicates the Designer is open.
Actions	Displays more details about the session.

Status > Connections > Perspective Sessions

Session Stats

Total Sessions

2

Session Details

Device ▾	User	Project	Uptime	Last Comm.	Address	Session Scope	Actions
Windows 10	admin	TestProject	a minute	a few seconds	0:0:0:0:0:0:1		Details
Windows 10	admin	TestProject	8 hours	a few seconds	TR-563JBZ1-WS (127.0.0.1)		Details

Perspective Session Details

The Performance Page within the session displays more in depth information such as the Page Id and how many views are on each Page. Hit the **Details** button to get more detailed information about each page in the session.

Attributes	Description
Performance	
Total Views	The number of currently active pages.
Total Bytes Sent	Displays total number of bytes sent out.
Pages	
Id	Page Id
Views	Displays total number of views on a page.
Actions	Displays the details of the view instances in the session.
Log Activity	
Min level	Dropdown menu with options Info, Debug, and Trace.
Live Values	Toggle switch to turn live values on or off.
Merge to Logs	Merge the settings of the current view with the main Diagnostics Log Viewer.
Logger	Name of the logger that describes the context of the message.
Time	Time of log.
Message	Message for the log.
(Log Properties)	Displays log properties of the logged event.

Performance

Total Views

2

Total Bytes Sent

60 MB

Pages

<u>Id</u> ▾	<u>Views</u>	<u>Actions</u>
2c3e945	2	Details

Details

Session Details

User	Unauthenticated
Project	Perspective
Device	Windows NT 10.0; Win64; x64
Address	0:0:0:0:0:0:1
Uptime	20 hours
Last Comm.	a few seconds
Session Scope	

Log Activity



Min level	INFO	Live Values	Merge to Logs
	▼	ON	
Logger	Time	Message	
DesignSession	29Mar2019 10:37:26	Socket connected to session. pageld=nav topbar	
DesignSession	29Mar2019 10:37:21	Socket connected to session. pageld>New View	
ClientSession	29Mar2019 09:45:04	WebSocket disconnected from session.	

View Instances

The View Instances page shows the number of View Instances on a Page and the number of Components in each view instance. Press the **Details** button next to each View Instance to get even more information about the type of components used in each view.

Attributes	Description
Sessions Details	

InstanceID	Displays View Instances for each view.
Components	Total number of components used in the specified view.
Actions	By clicking on the Details button shows more information for each view instance.

The screenshot shows a table titled "View Instances" with three columns: "Instance ID", "Components", and "Actions". The "Instance ID" column contains "nav topbar@T[0]" and "New View@C". The "Components" column contains the value "7" for both rows. The "Actions" column contains a blue "Details" button for each row. The table is set against a background of a web application interface with a header bar.

Instance ID	Components	Actions
nav topbar@T[0]	7	Details
New View@C	7	Details

Components

The Components page lists all the components used in a View Instance of Page along with the following information about each component.

Attributes	Description
Name	Name of the component.
AddressPath	Address of the component.
Bindings	Displays the number of bindings for each component.
Children	Displays the number of children for each component.
Properties	Displays the number of properties for each component.
PropertyChangeScripts	Displays the number of property change scripts for each component
Actions	Displays the number of actions for each component.

Components

Name ▾	Address Path	Bindings	Children	Properties	Property Change Scripts	Actions
LedDisplay_2	0:15	1	0	4	0	0
LedDisplay_1	0:9	1	0	4	0	0
LedDisplay_0	0:8	1	0	4	0	0
LedDisplay	0:7	1	0	4	0	0
Label_3	0:14	0	0	4	0	0
Label_2	0:10	0	0	4	0	0
Label_1_0	0:6	0	0	4	0	0
Label_1	0:5	0	0	4	0	0
Label_0	0:4	0	0	4	0	0
Label	0:3	0	0	4	0	0
CylindricalTank_3	0:2	1	0	4	0	0
CylindricalTank_0	0:1	1	0	4	0	0
CylindricalTank	0:0	1	0	4	0	0
Button_0_0	0:13	0	0	4	0	0
Button_0	0:12	0	0	4	0	1
Button	0:11	0	0	4	0	1

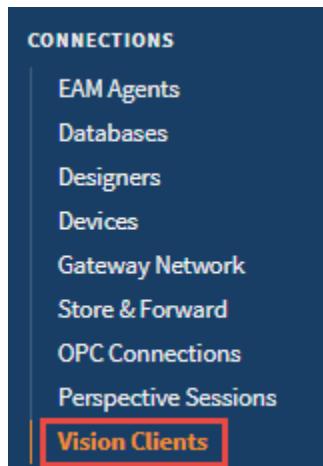
Related Topics ...

- [Launching a Perspective Session](#)

Connections - Vision Clients

Vision Clients

Much like the Designers page, the Vision Clients page shows information regarding currently opened Clients. The Clients are listed and show some basic information such as the address of the Client. From here, the Client session can be terminated by selecting the **More** button and hitting **Terminate**, or select the **Details** option to see more details about the Client session such as the number of Tags that the session is currently subscribed to, as well as a log of errors that may have happened with that Client.



On this page ...

- [Vision Clients](#)
 - [Vision Clients Page](#)
 - [Client Session Details](#)

Vision Clients Page

The main Vision Clients page displays a list of all currently running Clients which show how many clients are open and what users are currently using them.

Attributes	Description
Clients Stats and Details	
Active Clients	The number of currently active Clients.
Requests/sec	The number of requests per second coming from all Clients.
Id	The Client Id.
User	The user logged in on the Client session.
Project	The name of the project open in the Client session.
Uptime	The total uptime of the Client session.
Activity	Denotes whether the Client session is currently connected and active or not.
Address	The IP Address and computer name where the Client is launched.
Memory	The Client's current memory usage.
Actions	The option to terminate the Client session, or see more details about the session.

Status > Connections > Vision Clients

Client Stats

Active Clients

1

Requests / sec

5.1

1 items << < 1 of 1 > >>

Client Details

Filter type to filter						View 10	
<u>Id</u> ▾	<u>User</u>	<u>Project</u>	<u>Uptime</u>	<u>Activity</u>	<u>Address</u>	<u>Memory</u>	<u>Actions</u>
38638402	admin	NewProject	18 minutes	✓ Active	ws3 (127.0.0.1)	68mb	More Details

1 items << < 1 of 1 > >>

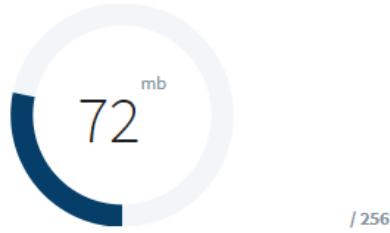
Client Session Details

Clicking on the **Details** button for a Client session will take you to a page that displays more in depth information for that particular Client session. It also gives a logger at the bottom where errors coming from that particular Client can be seen.

Attributes	Description
Client Performance and Details	
Memory	The Client's current memory use.
Subscriptions	The number of Tags the Client is currently subscribed to.
User	The user logged in on the Client session
Project	The name of the project open in the Client session.
Address	The IP Address and computer name where the Client is launched.
Uptime	The total uptime of the Client session.
Last Comm	The last time the Gateway communicated with the Client.
Client JVM Version	The Java version that the Client is currently running on.

Performance

Memory



Subscriptions

8 tags

Details

Session Details

User	admin
Project	NewProject
Address	ws3 (127.0.0.1)
Uptime	34 minutes
Last Comm	485ms
Client JVM Version	11.0.2

Related Topics ...

- [Vision Client Launcher](#)

Diagnostics - Execution

The Execution page reports the status of all tasks that your [Gateway](#) runs on a schedule. Here you can find helpful information such as the duration and execution time of an [alarm](#) journal update or the average time it takes your [Gateway](#) to execute a [Tag Group](#).

Attributes	Description
Throughput	Number of executions that come through per second.
Total Executions	Total number of times the task executed.
Delay	Amount of time waiting to execute the task.
Avg. Duration	Average time to run the task.
Last Duration	Amount of time to run the last task.

Shared Execution Engine						
Owner / Tasks	Throughput	Total Executions	Delay	Avg. Duration	Last Duration	
databaseconnectionmanager						
txtimoutdaemon	0.500 exec/sec	3,639	2 sec	0 millis	0 millis	
eam						
agentupdate	0.999 exec/sec	7,258	1 sec	0 millis	0 millis	
emailackmanager						
orphanedacknowledgementcleanup	idle	122	1 min	0 millis	0 millis	
gateway						
license-checker	idle	114	1 min	4 sec	4 sec	
logfile cleanup	idle	1	2 hours	0 millis	8 millis	
performance monitor	0.200 exec/sec	1,451	5 sec	4.7 millis	8 millis	
gatewayareanetworkconnectionmanager						
connection monitor	0.200 exec/sec	1,453	5 sec	0.1 millis	0 millis	
gatewaysystemtags						
basictags	0.999 exec/sec	7,274	1 sec	0 millis	0 millis	

Related Topics ...

- [Diagnostics - Logs](#)

Diagnostics - Logs

One of the most important troubleshooting tools of the [Gateway Webpage](#) is the Logs page. This console shows errors caused by [Gateway](#) events including things like Database or Device connections, Authentication profiles, Alarm Journals and Pipelines, and anything else that is [Gateway](#) scoped. You can find logs in the Status tab of the [Gateway Webpage](#) under **Diagnostics > Logs**.



On this page ...

- [Changing Logging Levels](#)
- [Downloading the Logs](#)
- [Printing to the Logs](#)
- [Mapped Diagnostic Context Keys](#)

The [Gateway](#) Logs also provide a wealth of information about the running state of the [Gateway](#). To learn more, refer to the section on [Troubleshooting the Gateway](#). The Logs page is where the [Gateway](#) Console is located that allows you to see a live flow of log events in the system.

Attributes	Description
Logger	Name of the logger that describes the context of the message.
Time	Time of log.
Message	Message for the log.
Filter	Search criteria to filter for specific tasks or events. Click the Calendar icon to set a filter date and time range. Options are Last Month, Last Week, Last 24 Hours, or Custom.
Min Level	Dropdown menu with options: All, Trace, Debug, Info, Warn and Error.
Live Values	Toggle switch to turn live values on or off.

Status > Diagnostics > Logs			
37978 items < < 1 of 380 > >			
Logger	Time	Message	
I ModuleManager	26Mar2019 10:46:23	Uninstalling module "secsgem"	
I ModuleManager	26Mar2019 10:30:52	Starting up module 'secsgem' (v2.9.10 (b2018112813))...	
W ModuleManager	26Mar2019 10:30:51	Module "SECS/GEM" requires Ignition 7.8.0 (b0) and is not compatible with Ignition 8.0.0-beta0 (b2019032202)	
I ModuleManager	26Mar2019 10:30:51	Installing module: "secsgem"	
I DesignSession	26Mar2019 09:15:58	Socket connected to session. pageld=Test/FirstView	
I DesignSession	26Mar2019 09:15:20	Socket connected to session. pageld=session	
I InternalDatabase	26Mar2019 09:08:07	Created auto-backup of internal database "config.idb" in 1 seconds	
I InternalDatabase	26Mar2019 09:08:06	Creating auto-backup of internal database "config.idb"...	
W LicenseManager	26Mar2019 09:04:20	Could not read license from HASP key. HASP login() failed. Last error = 14. Error executing global timer script: Perspective/Print to Diagnostic Logs @1,000ms . Repeat errors of this type will be logged as 'debug' messages.	
E TimerScriptTask	26Mar2019 09:03:37		
W SubscriptionManager	26Mar2019 09:03:37	[Ignition-ignition8-ubuntu-64bit] Subscription path model set detected to be out of sync. Will re-synchronize.	
I IgnitionGateway	26Mar2019 09:03:36	Ignition[state=STARTING] ContextState = RUNNING	
I IgnitionGateway	26Mar2019 09:03:36	Gateway started in 31 seconds.	

Changing Logging Levels

The logs can be filtered by using a search term or by date.

1. To change logging levels, go to the Gateway's **Status > Diagnostics > Logs** page and click on the icon.
2. On the Log Configuration popup that will open, search for the logger name in the Filter box, and select the desired logging level from the dropdown to the right of the logger name

Downloading the Logs

Gateway logs can also be exported using the **Download Logs** icon on the right.

Printing to the Logs

You can print to Gateway logs by using the `system.util.getLogger()` function. Below is a simple example, you can look in the [appendix](#) for more options.

```
logger = system.util.getLogger("My Logger Name")
logger.warn("My Warning Message")
```

Mapped Diagnostic Context Keys

Mapped Diagnostic Context Keys (MDC Keys) allow you to specify a specific context, such as a particular project, and then set a logging level for it. This will set all loggers that pertain to the specified project to the logging level. This is useful to help diagnose an issue with a specific system within

the Gateway. To use MDC Keys, click the icon on the Logs page and navigate to the Context tab. Here, you can choose specific Key-Value pairs that match a particular system. Selecting the Key text field will bring up a list of possible keys in your system. Once a Key has been selected, selecting the Value text field will bring up a list of possible values that relate to the selected Key.

Log Configuration

Loggers **Context** X

Key	Value	Set Level	INFO	Add Level
store-forward-name				
connection-name				
project-name				
alarm-notification-profile	MySQL	DEBUG		
device-name				
gw-name				
module-name	Symbol Factory	INFO		
project				
route-path				
session-project				

Filter by Mapped Diagnostic Context Key

The Logs can also be filtered to show only logs that pertain to an MDC Key. This can be useful when altering the logging level of one or more MDC Keys. To set an MDC filter on the logs, simply click the **Add Mapped Diagnostic Context Filter** icon on the Logs page to open a window where MDC Key filters can be set. The filter can be specified for all values in a Key by not specifying a Value.

MDC Filter Configuration

X

Key	Value	Add Filter
enter key	enter values	

Key **Values** **Action**

No Log Filters Configured

Merging to Logs

Many of the other pages in the Status tab also contain a logger that will just show logs that are relevant for that particular section. These log views all contain a button on the right side called **Merge to Logs**. This button allows the current filter to be applied to the main logs page, allowing you to still see only the logs for that section but use all of the tools available.

◀ ▶ ⏪ ⏩

Live Values ON	Merge to Logs [x]
---	--

[Related Topics ...](#)

- [Diagnostics - Execution](#)
- [Diagnostics - Running Scripts](#)
- [Diagnostics - Threads](#)

[In This Section ...](#)

Diagnostics - Running Scripts

The Running Scripts page shows all actively running Gateway scripts, as well as providing a way to terminate any running script. In addition, the Vision client and Designer consoles have a Running Scripts tab, which also lists running scripts and provides a way to terminate them.

Attributes	Description
Thread Id	Thread Id number.
Description	Name and description of the script.
Execution Start	Time script started running.
Elapsed Time	Amount of time the script has been running.
Actions	Ability to Cancel the running script.

The screenshot shows a web-based interface titled 'Currently Running Scripts'. At the top, there are navigation links: 'Status > Diagnostics'. Below the title, there is a search bar labeled 'Filter' with a placeholder 'type to filter' and a 'View' dropdown set to '20'. A table displays a single row of data:

Thread Id	Description	Execution Start	Elapsed Time	Actions
3188	TimerScript - project:Production GatewayLogger @10,000ms	26Mar2020 10:56:07	24 seconds	<button>Cancel</button>

Pagination controls at the bottom indicate '1 of 1'.

Related Topics ...

- [Diagnostics - Execution](#)
- [Diagnostics - Logs](#)
- [Diagnostics - Running Threads](#)

Diagnostics - Threads

The Threads page displays a snapshot of information about Gateway's execution threads. This information may be important when troubleshooting certain types of issues. If you are working with Support, you may be asked for a thread dump.

Their state and CPU usages are displayed to easily find problem threads, as well as a chart of what systems are using the threads and the ability to filter the threads based on a keyword. Each thread can be expanded to give details on what it is currently doing, and that individual thread process can be copied to the clipboard.



On this page ...

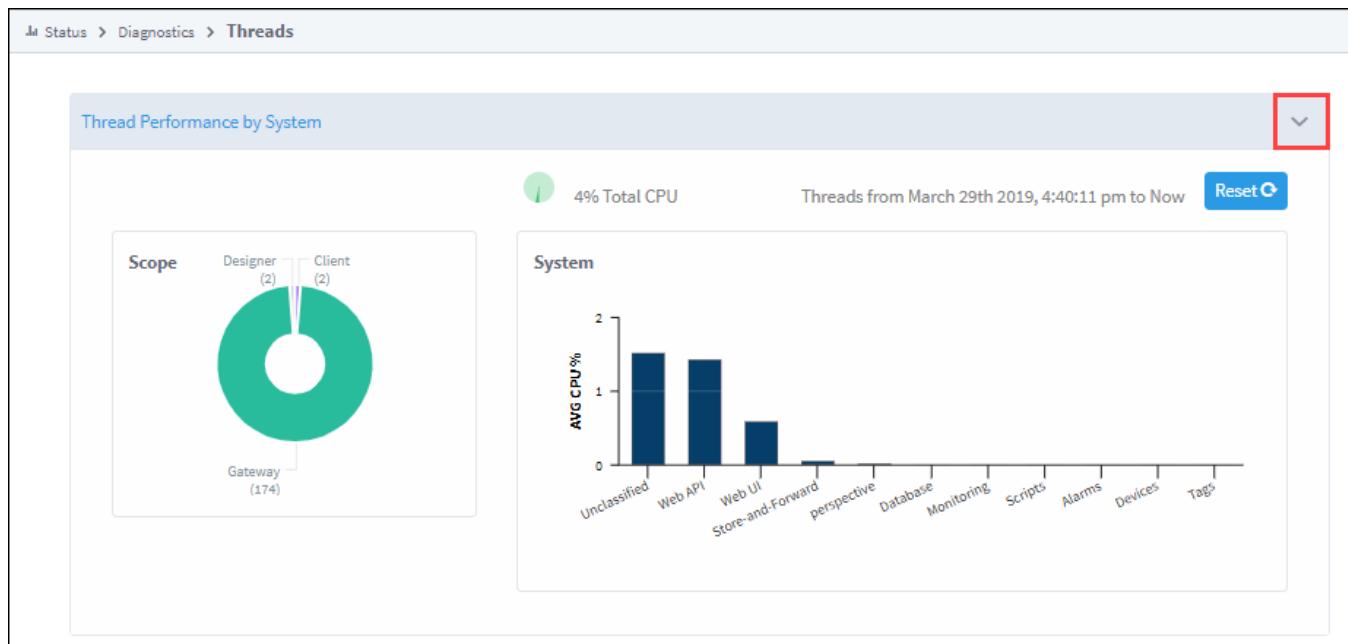
- [Thread Performance by System](#)
- [Individual Threads](#)

Thread Performance by System

The upper section of the Diagnostics - Threads page depicts graphical representation of the current threads including percentage of total CPU used, overall scope, and average CPU usage per system.

Click the **Expand** icon to see the display.

Click the **Reset** icon to reset the information.

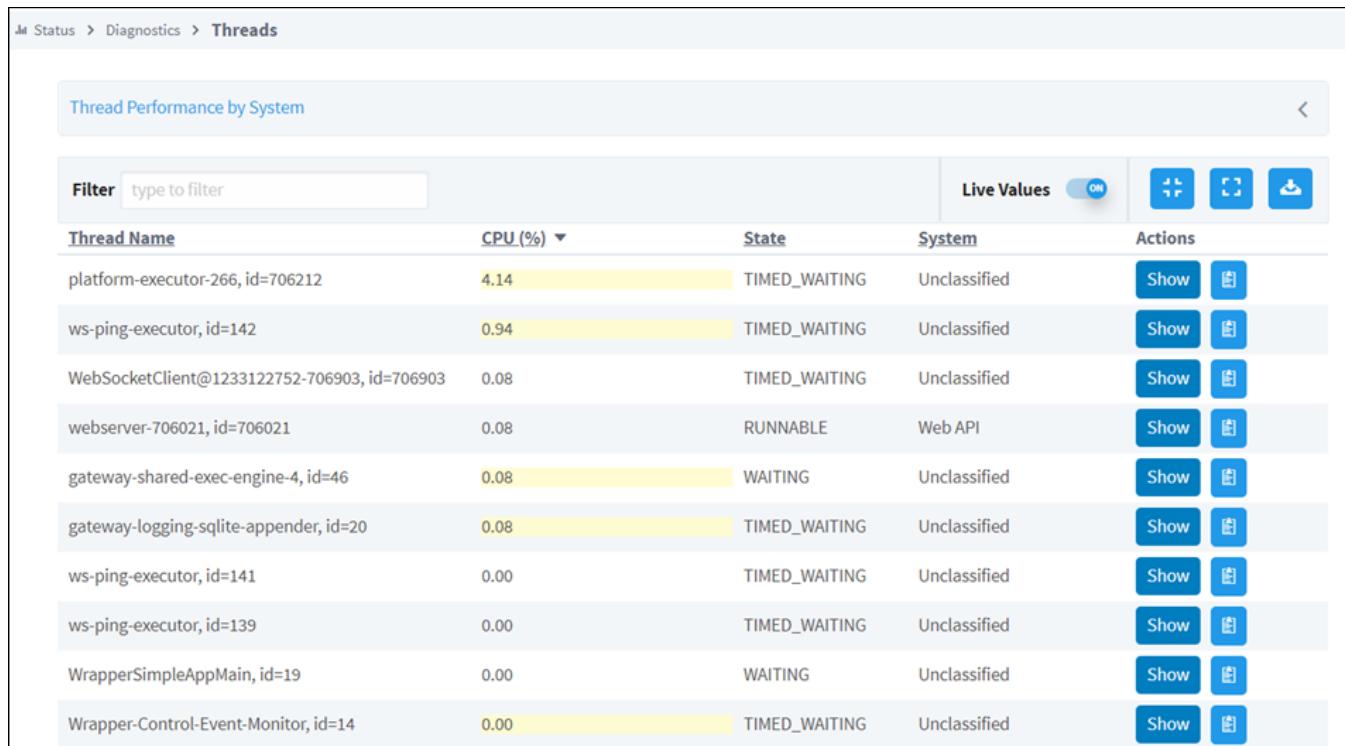


Individual Threads

The lower portion of the Diagnostics - Threads page displays statistics for individual threads.

To download a thread dump, click the **Download**  icon on the right of the page. In order to be useful, a thread dump must be taken at the time the issue is observed. Unlike logs, which maintain a record of past messages, a thread dump is a time-specific snapshot and will not contain a record of past states.

Attributes	Description
Thread Name	Name of the thread.
Filter	Search criteria to filter for specific threads.
CPU(%)	Percentage of CPU usage.
State	Current state / status of the system.
System	Search criteria to filter for specific tasks or events.
Actions	View thread details.
Live Values	Toggle switch to turn live values on or off.



Thread Name	CPU (%)	State	System	Actions
platform-executor-266, id=706212	4.14	TIMED_WAITING	Unclassified	Show  
ws-ping-executor, id=142	0.94	TIMED_WAITING	Unclassified	Show  
WebSocketClient@1233122752-706903, id=706903	0.08	TIMED_WAITING	Unclassified	Show  
webserver-706021, id=706021	0.08	RUNNABLE	Web API	Show  
gateway-shared-exec-engine-4, id=46	0.08	WAITING	Unclassified	Show  
gateway-logging-sqlite-appender, id=20	0.08	TIMED_WAITING	Unclassified	Show  
ws-ping-executor, id=141	0.00	TIMED_WAITING	Unclassified	Show  
ws-ping-executor, id=139	0.00	TIMED_WAITING	Unclassified	Show  
WrapperSimpleAppMain, id=19	0.00	WAITING	Unclassified	Show  
Wrapper-Control-Event-Monitor, id=14	0.00	TIMED_WAITING	Unclassified	Show  

Click the **Show**  icon to display additional details for a single thread. You can click the **Clipboard**  icon to copy that thread to the clipboard.

Status > Diagnostics > Threads

Thread Performance by System

Thread Name	CPU (%)	State	System	Actions
platform-executor-267, id=706857	5.15	TIMED_WAITING	Unclassified	<button>Hide</button> <button>Copy</button>
Thread [platform-executor-267] id=706857, (TIMED_WAITING for java.util.concurrent.SynchronousQueue\$TransferStack@7a8acf5) java.base@11.0.6/jdk.internal.misc.Unsafe.park(Native Method) java.base@11.0.6/java.util.concurrent.locks.LockSupport.parkNanos(Unknown Source) java.base@11.0.6/java.util.concurrent.SynchronousQueue\$TransferStack.awaitFill(Unknown Source) java.base@11.0.6/java.util.concurrent.SynchronousQueue\$TransferStack.transfer(Unknown Source) java.base@11.0.6/java.util.concurrent.SynchronousQueue.poll(Unknown Source) java.base@11.0.6/java.util.concurrent.ThreadPoolExecutor.getTask(Unknown Source) java.base@11.0.6/java.util.concurrent.ThreadPoolExecutor.runWorker(Unknown Source) java.base@11.0.6/java.util.concurrent.ThreadPoolExecutor\$Worker.run(Unknown Source) java.base@11.0.6/java.lang.Thread.run(Unknown Source)				
ws-ping-executor, id=142	0.94	TIMED_WAITING	Unclassified	<button>Show</button> <button>Copy</button>

Related Topics ...

- [Diagnostics - Execution](#)
- [Diagnostics - Logs](#)
- [Diagnostics - Running Scripts](#)

Config

Gateway Configuration

The Config tab provides access to configuration options for [Gateway settings](#). This is where most of the settings that affect the whole Gateway are set up. We can add database and device connections, users and roles, adjust alarm settings, set up security, create a schedule for a Gateway backup to be taken automatically at specific times, and much more.

The list of Config options on the left menu change based on what modules are installed on your Gateway. Third-party modules have settings that are not discussed on this page.

Once you have the [Gateway](#) up and running, you start by configuring some or all of the general services in Ignition. You make the configuration changes from the [Config](#) section of the Gateway Webpage. The different broad categories of what you can configure are as follows:

- [System](#) (Overview, Backup/Restore, Licensing, Modules, Projects, Redundancy and Gateway Settings)
- [Networking](#) (Web Server, Gateway Network and Email Settings)
- [Security](#) (Auditing ,Users, Roles, Service Security, Identity Providers, Security Levels, and Security Zones)
- [Databases](#) (Connections, Drivers, and Store and Forward)
- [Alarming](#) (General, Journal, Notification, On-Call Rosters, and Schedules)
- [Tags](#) (History and Realtime)
- [OPC Client](#) (OPC Connections and OPC Quick Client)
- [OPC UA](#) (Device Connections, Security, and Server Settings)
- [Enterprise Administration](#) (Event Thresholds, Controller Settings, Agent Management, License Management, and Agent Tasks)
- [Sequential Function Charts](#) (Settings)

Depending on what modules you have installed, some categories may be missing.

On this page ...

- [Gateway Configuration](#)
- [System](#)
- [Networking](#)
- [Security](#)
- [Databases](#)
- [Alarming](#)
- [Tags](#)
- [OPC Client](#)
- [OPC UA](#)
- [Enterprise Administration](#)
- [Sequential Function Charts](#)

System

The System section is a sort of catch all section that can do a lot of different things. The first window is the Overview page, which is what will first show up when navigating to the Configure tab. The Overview page only has links to other sections of the Config tab, but it is useful if you aren't exactly sure where the setting you are looking for is located, because the Overview page lists the most common configuration changes.

Page	Description
Backup /Restore	The Backup/Restore page is where you can manually take a backup, and restore a previous backup. It also can upgrade a legacy backup.
Ignition Exchange	On the Ignition Exchange page you can access the Ignition Exchange to browse for resources. You can also import an Ignition Exchange Package that you've downloaded.
Licensing	The Licensing page allows you to control any and all licenses currently activated on the Gateway. It will show all the modules that the license is currently good for, and have some options for activating a new or additional license.
Modules	The Modules page displays all currently installed modules and if they are active or not. This is where you can install a new module or upgrade an existing module.
Projects	The Projects page can easily manage all of the projects currently configured in the Gateway, with settings that change the Name and Title, or the default database and authentication profile of the project.

Redundancy	The Redundancy page is where all of Ignition's redundancy settings are configured. This is where the master and backup nodes are configured as well as the network settings to make sure the two nodes can properly communicate.
Gateway Settings	The Gateway Settings page is where settings are located for the system name, homepage redirect URL, launch settings, scheduled backups, error reporting and other miscellaneous.

Networking

The Networking section deals with setup and management of the [Gateway Network](#).

Page	Description
Web Server	The Web Server page is for configuring the http and https ports, setting up the SSL / TLS certificate, redirecting traffic through a known address, and whether or not all http traffic should be forcefully redirecting to https. If you are allowing users to access your Gateway from outside your network (through the internet), you will need to configure the Public HTTP Address settings. You can find out more about SSL in Secure Communication (SSL / TLS) .
Gateway Network	The Gateway Network allows you to connect multiple Gateways together over a wide area network. The Gateway's connection settings can also be changed to only allow certain connections. The Gateway Settings set the basic rules for the system.
Email Settings	The Email Settings section allows you to create an SMTP server connection in the Gateway that can be used by several different resources such as Alarm Notification and Report Schedules.

Security

Ignition provides several [Security](#) options to safeguard data and applications in Ignition which fall into the following categories, and are set up in the Config section.

Page	Description
General	<p>This feature is new in Ignition version 8.1.0 Click here to check out the other new features</p> <p>The Gateway General Security Settings page is new for 8.1.0. It determines security permissions for the Gateway and Designer. For more information, see Security.</p>
Auditing	Here you can set up an Audit Profile to record details about specific events that occurred.
Users and Roles	This is where you set up users and roles . Security policies are defined in terms of the roles set up in the system.
Service Security	A security policy can be defined for each Security Zone and is set up in Service Security . The Security Policy has four sections: Alarm Notification, Alarm Status, History Provider Access, and Tag Access. They work together to define how the local Gateway gives access to incoming Gateway connections.
Identity Providers	Identity Providers (IdP) provide a way for users to log in to Ignition using credentials stored outside of Ignition. An IdP creates, maintains, and manages identity (login) information while providing authentication services to Ignition. This provides a secure login that allows Ignition to use SSL and two-factor authentication (2FA).
Security Levels	Security Levels define a hierarchy for access inside a Perspective Session or Vision Client using IdP authentication. This authorization system provides a way to map roles from an Identity Provider (IdP) to Ignition roles.
Security Zones	A Security Zone is a list of Gateways, Computers, or IP addresses that are defined and grouped together. This group now becomes a zone on the Gateway Network , which can have additional policies and restrictions placed on it. Security Zones provide this functionality to the Gateway Network, limiting locations instead of people to be read-only for specific actions. This allows for greater control over the type of information that is passing over the network, improving security and helping to keep different areas of the business separate, while still allowing them to interconnect.

Databases

The Databases section is where [database connections](#) are set up. Databases are used in historical data logging, reporting, storing alarm logs, and Tag storage.

Page	Description
Connections	Many of the advanced features of Ignition, such as the Transaction Groups and Tags Historian require a connection to an external database, and most databases require special permissions for each computer that wants to connect. Ignition takes care of all of this. You create a connection to your database once, and every system in Ignition will use that central connection. From here, you can create new database connections and edit existing connections.
Drivers	JDBC drivers used in database connections are imported and configured in Drivers of the Database section.
Store and Forward	The Store-and-Forward system provides a reliable way for Ignition to store data to the database. The Store-and-Forward system settings offer a good deal of flexibility in tuning. Different types of situations and goals will likely require different configurations.

Alarming

The Alarming section provides general [alarm configuration](#) settings to provide up-to-date status of alarms, store alarm history, build the logic for how, why, and when alarm notifications are delivered, manage alarm notifications for user groups, and send Email, SMS, or Voice notifications. With all these features and functions in Alarming, you can easily create alarms, and design and manage your alarm notifications any way you choose.

Page	Description
General	This General setting provides of some basic alarm configuration settings.
Journal	Alarm Journals are configured in the Alarming section to store basic historical information in a database about alarms that occurred, such as their source and timestamp, associated data on the alarm, and the values of the alarm's properties at the time the event occurred.
Notification	Notification Profiles are configured in the Alarming section to allow for Email , SMS , or Voice notifications to be sent out when an alarm event occurs.
On-Call Rosters	The On-Call Roster is where you create user groups to be notified when an alarm occurs. When an alarm is triggered, it is sent to a designated On-Call Roster where it evaluates the users schedules, and only notifies those users that have an active schedule. Users that are off-schedule will not be notified.
Schedules	Defines the times of users on-call availability and unavailability by configuring Schedules .

Tags

The Tags section is where both [Realtime Tag Providers](#) as well as [Historical Tag Providers](#) are configured. Note that this is not where individual Tags are set up.

Page	Description
History	Configure the settings for each of the configured Historical Tag Providers , or create new remote or split providers.
Realtime	Configure the settings for each of the configured Realtime Tag Providers , or create new standard or remote providers.

OPC Client

The OPC Client section is where connections from Ignition's internal OPC UA server to other OPC servers are located.

Page	Description
OPC Connections	Configure OPC Connections to Ignition's built in OPC Server.
OPC Quick Client	The OPC Quick Client allows for quick and simple testing of any OPC Connections connected to the OPC server.

OPC UA

The OPC UA Server is where Ignition's internal OPC UA server is configured.

Page	Descriptions
Device Connections	This is where all device connections to our internal OPC UA server are configured.
Security	Upload and trust client and server OPC UA certificates .
Server Settings	Configure Ignition's internal OPC UA Server 's settings.

Enterprise Administration

The [Enterprise Administration](#) section controls the majority of [EAM functions](#). Setting the Gateway to be a Controller or Agent as well as creating Agent Tasks and managing the various Agents from the Controller Gateway can all be done in this section.

Sequential Function Charts

A [Sequential Function Chart \(SFC\)](#) is a series of scripts that are defined in a single location and then called in sequential order.

Page	Description
Settings	This is where the SFC Settings are configured.

Related Topics ...

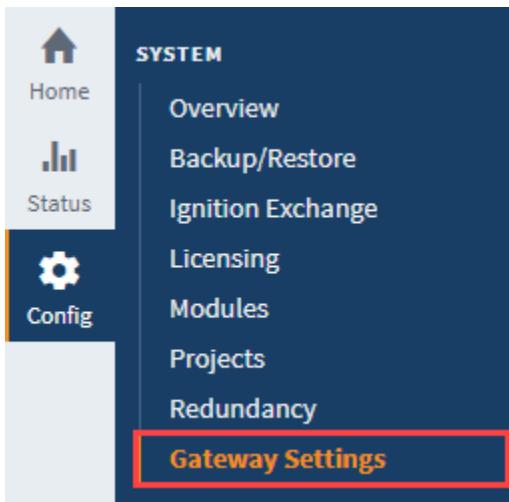
- [Gateway Settings](#)
- [Security](#)
- [Database Connections](#)
- [Tags](#)
- [Alarming](#)
- [OPC UA](#)
- [Enterprise Administration](#)
- [Sequential Function Charts](#)

In This Section ...

Gateway Settings

Gateway Settings Property Reference

After you [launch the Gateway](#), you can define the high-level settings that apply to the entire Gateway by going to the **Config > Gateway Settings** on the Gateway Webpage. From this page, you can use the default values or define a new setting. The Gateway is at the heart of the Ignition software. It runs as a web server and you can access it through a web browser. Once running, you can get various status information about the Gateway and access important functions.



On this page ...

- [Gateway Settings Property Reference](#)
 - [Local Client Fallback Settings](#)
 - [Scheduled Backups](#)
 - [Error Reporting](#)
 - [Multicast Settings](#)

This feature is new in Ignition version **8.1.0**
[Click here](#) to check out the other new features

The Gateway Settings Properties were updated significantly for release 8.1.0. Many security related settings have been moved to [Gateway General Security Settings](#).

The following tables describe all the properties on the Gateway Settings.

Gateway Settings	
System Name	Is a unique name for this Ignition installation. It is used to distinguish this server from others on the network when working with multiple Ignition installations.
Persist Alarms	Whether or not alarm properties such as acknowledgment should persist across Gateway restarts.
Homepage Redirect URL	The URL this gateway will redirect to when http://ip:port/ is visited. Can either be a relative path (e.g., /web/home), or fully qualified (e.g., https://inductiveautomation.com).
Gateway Scripting Project	The Gateway Scripting Project is a Project in which Gateway-scoped scripts with no project affiliation can access user script libraries.

Launch Settings	
Designer Memory	The maximum amount of memory that the Designer has access to.
Disable Direct3D	Disables the Direct3D rendering pipeline launched clients. Direct3D can cause performance problems with XOR painting. (affects clients on Windows only)
Disable DirectDraw	Disables the DirectDraw system for launched clients. Can be useful for some video cards that don't support DirectDraw well. (affects clients on Windows only)

Local Client Fallback Settings

Ignition provides a [Local Vision Client](#) Fallback mechanism that lets you use a Gateway running on the local machine. If the Gateway is lost, the Client can automatically retarget to a project that you specify in the local in the local Gateway.

Local Vision Client Fallback	
Enable Local Fallback	Enables a client to fall back to a project in a local Gateway if communication is lost to the central Gateway. Note that port 6501 must be open on the local machine.
Seconds Before Failover	The number of seconds to wait before switching to the local Gateway project after communication loss.
Fallback Project	The local project to use during fallback.

Scheduled Backups

The Scheduled Backup Settings control the Gateway's scheduled backup system. This system is capable of automatically making a Gateway backup and storing it to a folder path, which can be a network path. When you enable this system, you must specify a destination folder. This can be a local folder, for example C:\backups or /var/backups , or a network path such as \\fileserver\backups.

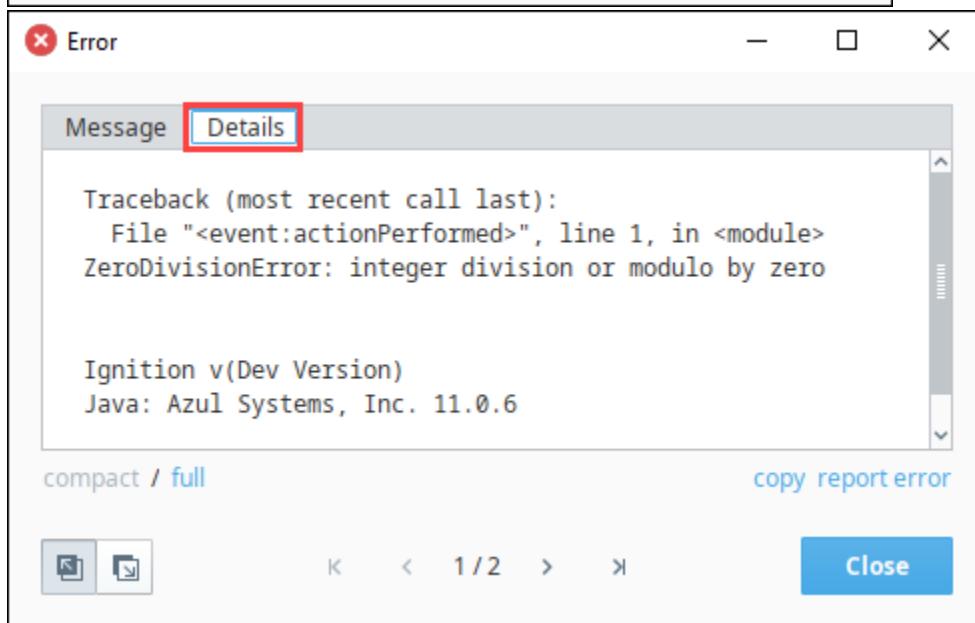
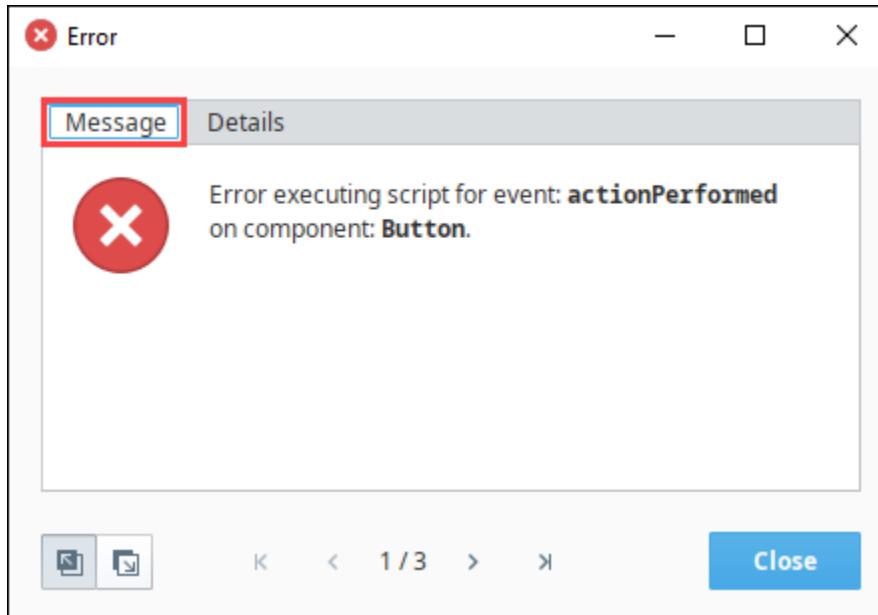
The scheduled backup system works on a schedule that is specified using UNIX Crontab syntax. This is a standard format for specifying a basic schedule. The format consists of five space-separated fields, one for minute, hour, day-of-month, month, and day-of-week. The special Gateway Configuration 72 character * means all. Slashes can be used to indicate that values should be stepped, for example, */5 in the minutes field means "every 5 minutes", or 0:00, 0:05, 0:10, etc.

To learn more on how to schedule Gateway Backups, refer the page on [Gateway Scheduled Backups](#).

Scheduled Backup Settings	
Enable Scheduled Backups	Enables the scheduled backup system which automatically makes backups at a scheduled time.
Backup Folder	A path to a folder in which to put the scheduled backups.
Backup Schedule	A UNIX 'crontab' format scheduling string representing when to make the backups.
Retention Count	The number of backups to keep in the backup folder.

Error Reporting

When an error occurs in the Client or Designer, the users can click a link on the Details tab to report the error via email.



These settings define how the errors are reported.

Error Reporting	
SMTP Server	When not blank, user-reported errors are emailed using this SMTP server.
To Address	The email address(es) that will receive the error notification. Separate multiple email addresses with a semicolon (;)
From Address	The email address that the error notification is from.
SMTP Username	A username for the SMTP server, if required.
Change Password?	Check this box to change the existing password.
Password	A password for the SMTP server, if required.
Password	Re-type password for verification.

Multicast Settings

These properties allow the Gateway to broadcast information about itself via multicast UDP packets. This allows the Gateway to be discoverable by any components that are also listening to the same multicast address. For example, native client launchers listen on a multicast address to provide a list of available Gateways on the network. Verify that the send ports and receive ports are open on the Gateway machine in order to be able to broadcast multicast message.

Multicast Settings	
Enable Multicast	Allows this Gateway to be discoverable on your local network.
Multicast IP Address	Gateway messages are broadcast on this address.
Send Port	This port must be open on this machine to send multicast messages.
Receive Port	This port must be open on any machine that will receive multicast messages.
Message Interval	The interval in milliseconds at which multicast messages will be sent.

Related Topics ...

- [Config](#)
- [Status](#)
- [Gateway Security](#)
- [Gateway Command-line Utility - gwcmd](#)

Email Settings

Gateway-Wide SMTP Server

In Ignition, there are several places that you might want to send an email from. Instead of setting up a new email server connection at each one, you can add SMTP server connections in the Gateway Config section and reference them in other places. For example, you can use a pre-configured connection in any of these places:

- [Alarm Notification](#) - While the alarm notification system allows you to set up an Email Notification Profile that is separate from the SMTP Profile, you can instead choose to use the settings configured in the SMTP Profile.
- [Report Schedules](#) - When Scheduling an Email Action in a report, the Action requires a configured SMTP Profile before the report can be emailed out.
- [system.net.sendEmail\(\)](#) - Instead of manually entering in values for the SMTP server inside each of your scripts, this function can instead use the settings from an existing SMTP Profile.

Once your SMTP Profile is set up, you only need to reference the name of the connection and Ignition will take care of the rest.

Setting Up an SMTP Server

The Email Settings page allows you to configure an SMTP server connection that can be used by several different resources in the Gateway. This means that instead of setting up an SMTP server connection within each resource (i.e., Alarm Notification Profile, Reports, etc.), you can configure them once here, and have those resources all use the same SMTP server. You can find the Email Settings in the **Config** section of the [Gateway](#) under the Networking heading. Here, you can create a new SMTP Profile, or manage your existing profiles.

The screenshot shows the Ignition Config interface. The left sidebar has a 'Config' tab selected. Under 'SYSTEM', 'Email Settings' is highlighted with a red box. Under 'NETWORKING', 'Email Settings' is also highlighted with a red box. The main content area shows the 'SMTP Profiles' configuration page. It has a table with one row for 'Ignition'. Below the table is a link to 'Create new SMTP Profile...'.

SMTP Profile Settings

Below is a list of properties available on an SMTP server connection.

Property Name	Property Description
Name	The name of the SMTP profile.
Description	A description of the SMTP profile.

On this page ...

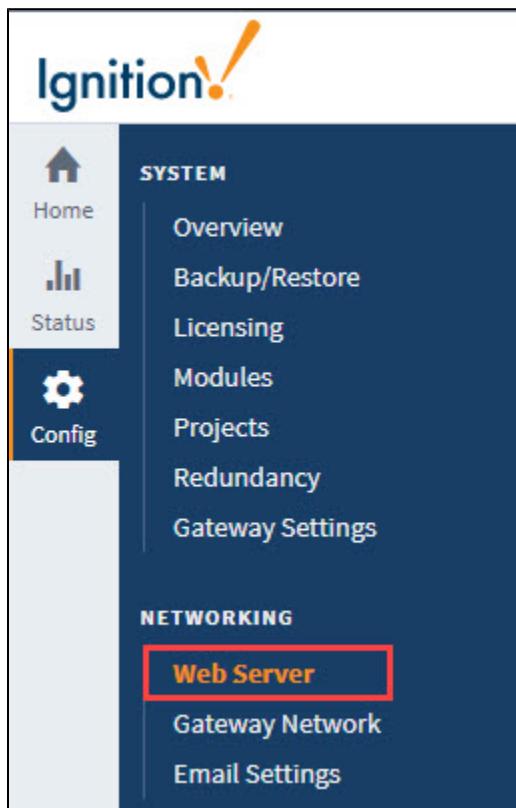
- [Gateway-Wide SMTP Server](#)
 - [Setting Up an SMTP Server](#)
 - [SMTP Profile Settings](#)

Hostname	Hostname of the SMTP server to send email through.
Port	Port SMTP service is running on. Default is 25.
Use SSL/TLS	Connect using dedicated SSL/TLS. Default is false.
Use STARTTLS	Enable use of the STARTTLS command, allowing the connection to be upgraded to an SSL or TLS connection if supported by the server. This is not necessary for connections that are already SSL/TLS. Ignored when Use SMTP Profile is checked. Default is false.
Username	The username the Gateway will use when authenticating against the mailserver. This is only required if the SMTP server expects authentication.
Password	The password the Gateway will use when authenticating against the mailserver. This is only required if the SMTP server expects authentication.
Password	Retype password for verification.
Advanced Properties	
SMTP Timeout	Timeout (in milliseconds) to use when connecting to, reading from, and writing to the SMTP server. Default is 10,000.
Debug Mode Enabled	Enable email session debugging. Information is printed to standard output (wrapper.log). Default is false.
SSL Protocols	A comma separated list of protocols that will be allowed if connecting via SSL/TLS. Default is TLSv1.2.

Web Server Settings

The Web Server page is for configuring the HTTP and HTTPS ports, setting up the SSL / TLS certificate, redirecting traffic through a known address, and whether or not all HTTP traffic should be forcefully redirecting to HTTPS.

If you are allowing users to access your Gateway from outside your network (through the Internet), you will need to configure the Public HTTP Address settings.



On this page ...

- SSL/TLS Settings
 - HTTP and HTTPS Settings
 - HTTP and HTTPS Connectors Restart
 - Public HTTP Address settings
 - Cipher Support

SSL/TLS Settings

On the Web Server screen you can view details of an SSL certificate details, export keys, remove the installed SSL certificate, and transition to a CA-signed certificate.

From the Gateway Webpage, click on **Config > Networking > Web Server**. From the Web Server page, click on the **View Details** button.



SSL / TLS ENABLED

CA-Signed SSL Certificate installed.

SSL / TLS

SSL / TLS
Certificate

[View Details](#)

View the certificate details, export keys, remove the installed SSL certificate, and transition to a CA-signed Certificate

HTTP Settings

HTTP Port

8088

The port to which Ignition will listen for incoming HTTP traffic. *Example: 8088*

HTTPS Settings

The Certificate Details are shown. From here you can generate a Certificate Signing Request (CSR) by clicking the Generate CSR button in the upper right.



SSL / TLS ENABLED

CA-Signed SSL Certificate installed.

Active SSL Certificate

[Generate CSR](#)[Delete](#)

Subject	
Country	US
State/Province	California
Locality	Folsom
Organization	Inductive Automation
Common Name	inductiveautomation.com
 Issuer	
Country	US
State/Province	California
Locality	Folsom
Organization	Inductive Automation
Common Name	Ignition Test Intermediate Certificate Authority
 Version	3
Signature Algorithm	SHA256withRSA
Not Valid After	Wed Oct 23 2019 08:47:17 GMT-0700
	⚠ Expires Soon
Not Valid Before	Mon Jul 15 2019 08:47:17 GMT-0700

[→ Upload Trusted CA-signed SSL Certificate...](#)[→ Return to Web Server...](#)For more information, see [Secure Communication \(SSL / TLS\)](#).

HTTP and HTTPS Settings

HTTP Settings	
HTTP Port	The port to which Ignition will listen for incoming HTTP traffic, for example: 8088.
HTTPS Settings	
HTTPS Port	The port to which Ignition will listen for incoming HTTPS traffic, for example: 8043.
Force Secure Redirect	When enabled, and if SSL / TLS is enabled, all http traffic will be redirected to its https counterpart. (Default: disabled)
Included Cipher Suites	Whitelist of included cipher suites for clients connecting to Ignition using SSL/TLS.
Excluded Cipher	Blacklist of excluded cipher suites for clients connecting to Ignition using SSL/TLS. Takes precedence over allowed cipher

HTTP and HTTPS Connectors Restart

Certain actions will cause the HTTP port and/or the HTTPS port to restart. Refer to the following table for details.

Configuration Change	HTTP Port Restarted?	HTTPS Port Restarted?
HTTPS Port	Yes	Yes
HTTPS Port	Yes	Yes
Force Secure Redirect	No	Yes
User Included Cipher Suites	No	Yes
User Excluded Cipher Suites	No	Yes
SSL/TLS Setup	No	Yes

Public HTTP Address settings

If you are allowing users to access your Gateway from outside your network (through the Internet), you will need to configure the Public HTTP Address settings.

Public HTTP Address	
Auto Detect HTTP Address	To specify an explicit HTTP address that Vision Clients and Perspective Sessions will use, turn this off. Most users will leave autodetect on. (Default: enabled)
Public Address	The public facing address that Vision Clients and Perspective Sessions must use to connect. If Force Secure Redirect is enabled, redirected connections will use this address, for example: yourcompany.com .
Public HTTP Port	The public facing HTTP port that Vision Clients and Perspective Sessions must use to connect, for example: 80
Public HTTPS Port	The public facing HTTPS port that Vision Clients and Perspective Sessions must use to connect. If Force Secure Redirect is enabled, redirected connections will use this port, for example: 443

Cipher Support

Below is a list of supported ciphers.

- TLS_AES_128_GCM_SHA256
- TLS_AES_256_GCM_SHA384
- TLS_CHACHA20_POLY1305_SHA256
- TLS_DHE_DSS_WITH_AES_128_CBC_SHA
- TLS_DHE_DSS_WITH_AES_128_CBC_SHA256
- TLS_DHE_DSS_WITH_AES_128_GCM_SHA256
- TLS_DHE_DSS_WITH_AES_256_CBC_SHA
- TLS_DHE_DSS_WITH_AES_256_CBC_SHA256
- TLS_DHE_DSS_WITH_AES_256_GCM_SHA384
- TLS_DHE_RSA_WITH_AES_128_CBC_SHA
- TLS_DHE_RSA_WITH_AES_128_CBC_SHA256
- TLS_DHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_DHE_RSA_WITH_AES_256_CBC_SHA
- TLS_DHE_RSA_WITH_AES_256_CBC_SHA256
- TLS_DHE_RSA_WITH_AES_256_GCM_SHA384
- TLS_DHE_RSA_WITH_CHACHA20_POLY1305_SHA256
- TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA
- TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256
- TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
- TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA
- TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384
- TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384
- TLS_ECDHE_ECDSA_WITH_CHACHA20_POLY1305_SHA256
- TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA
- TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256
- TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
- TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384
- TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384

- TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256
- TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA
- TLS_ECDH_ECDSA_WITH_AES_128_CBC_SHA256
- TLS_ECDH_ECDSA_WITH_AES_128_GCM_SHA256
- TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA
- TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA384
- TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384
- TLS_ECDH_RSA_WITH_AES_128_CBC_SHA
- TLS_ECDH_RSA_WITH_AES_128_CBC_SHA256
- TLS_ECDH_RSA_WITH_AES_128_GCM_SHA256
- TLS_ECDH_RSA_WITH_AES_256_CBC_SHA
- TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384
- TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384
- TLS_EMPTY_RENEGOTIATION_INFO_SCSV
- TLS_RSA_WITH_AES_128_CBC_SHA
- TLS_RSA_WITH_AES_128_CBC_SHA256
- TLS_RSA_WITH_AES_128_GCM_SHA256
- TLS_RSA_WITH_AES_256_CBC_SHA
- TLS_RSA_WITH_AES_256_CBC_SHA256
- TLS_RSA_WITH_AES_256_GCM_SHA384

In This Section ...

Secure Communication (SSL / TLS)

Inductive Automation recommends enforcing secure communication in Ignition using digital certificates. The Ignition Gateway Web server can provide modern end-to-end security using Transport Level Security (TLS) technologies. This protects externally-originated connections such as: Perspective sessions, Vision clients, Designers, and Ignition web configuration. Users should be familiar with the browser padlock icon (secure session) from online banking, shopping, or medical portals. TLS assures users of the distant end identity and offers protection from attackers and eavesdroppers through strong encryption. This configuration is different from Gateway-originated outbound communication such as database and device (OPC UA) connections, alarming, and web services (REST) calls, which are secured separately and have configuration that depends on distant nodes.

Ignition versions 8.0.4 and later default to TLS versions 1.2 and 1.3 with a valid certificate. Older versions of Ignition should be upgraded to offer protection against known vulnerabilities. Refer to the [Ignition Security Hardening Guide](#) for configuration recommendations.

Enabling Force Secure Redirect

Normally, Clients, Sessions, Designers, and Web browsers that communicate with the Gateway will do so over an HTTP. However, you can force these communications to be redirected to the more secure HTTPS.

1. Go to the **Config** section of the Gateway Webpage.
2. Choose **Networking > Web Server** from the menu on the left.
3. Select the checkbox for **Force Secure Redirect**, and click the **Save** button at the bottom of the page.

HTTPS Settings	
HTTPS Port	8043 The port to which Ignition will listen for incoming HTTPS traffic. Example: 8043
Force Secure Redirect	<input checked="" type="checkbox"/> When enabled, and if SSL / TLS is enabled, all http traffic will be redirected to its https counterpart. (Default: disabled)
Included Cipher Suites	<input type="button" value="Add"/> Whitelist of included cipher suites for clients connecting to Ignition using SSL/TLS
Excluded Cipher Suites	<input type="button" value="Add"/> Blacklist of excluded cipher suites for clients connecting to Ignition using SSL/TLS. Takes precedence over allowed cipher suites.

After once enabled, all requests between the host Gateway and any Clients, Sessions, Designers, or web browsers will be redirected to the HTTPS port (by default, port 8043), and thus encrypted. However, you will likely want to install a security certificate signed by a certificate authority.

Adding a Signed Security Certificates

We are not able to ship a real certificate with Ignition because security certificates have to be obtained individually from a Certificate Authority (CA). Ignition supports certificates from both your organization's internal CA, as well as commercial CAs (Verisign, GoDaddy, Comodo, etc.). In either case, the procedure for how to install a certificate is listed below.

Note: After you have added a certificate, the keystore will automatically refresh every 15 minutes. You can disable this in the `ignition.conf` file by altering the `ignition.ssl.refresh` entry (Set to 0 to not refresh).

Get a Certificate Signing Request

Since SSL/TLS requires the installation of a security certificate, filling out the form below will generate a certificate signing request (CSR) to provide to a certificate authority.

1. Go to the **Config** tab of the Gateway Webpage and choose **Networking > Web Server**.
2. You'll see a warning message indicating that SSL/TLS is not enabled. Click on the **Click here** link.

On this page ...

- [Enabling Force Secure Redirect](#)

[Adding a Signed Security Certificates](#)

- [Get a Certificate Signing Request](#)
- [Install Security Certificates](#)



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Requiring SSL

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SSL / TLS NOT ENABLED

SSL / TLS allows for secure communication with the gateway. In order to be enabled, it requires an SSL certificate to be installed.

[Click here](#) to be guided through the process of installing an SSL certificate in order to enable SSL / TLS.

3. Click on the **I don't have all the items above** button. The Create Certificate screen is displayed.
4. Fill in the required fields on the screen, then click the **Generate Certificate Signing Request** button. This can be brought to a Certificate Authority.

Basic Details	
Field	Definition
Common Name	Full DNS name (required). This is typically what you type in your browser URL bar in order to navigate to this Gateway, for example: yourdomain.com
Organization Name	Name of company (required). For example: Inductive Automation.
Organization Department	Department or section (required). For example: Engineering
Email	Email address. For example: your@email.com .
Country	Typically an ISO 3166 2 character code (required). For example: US
State / Province	State, province or region, for example: California
Locality (City)	Name of city. For example: Folsom
Street	Street number and street name. For example: 90 Parkshore Dr
Postal Code	Postal Code Example: 95630
Key Type	The algorithm of the key pair which will be generated for the self signed certificate. Options are RSA or EC. Recommended: RSA
Key Size	The strength of the generated Key. Recommended: 2048 bits
Expires in	The number of days the generated Certificate will be valid. Only applies to the self-signed certificate.
Subject Alternative Names	
Field	Definition
IP Addresses	The IP addresses of all the servers you plan on installing the certificate. Click the Add button for each additional IP address.
DNS Names	DNS names which map to the list of IP addresses above. Click the Add button for each additional IP address.

Install Security Certificates

Once you have an SSL certificate, it needs to be added to Ignition.

1. Go to the **Config** tab of the Gateway Webpage and choose **Networking > Web Server**.
2. You'll see a warning message indicating that SSL/TLS is not enabled. Click on the [Click here](#) link.
3. The Setup SSL/TLS screen is displayed. Review the following list:
 - Private Key
 - Certificate Signed By A Certificate Authority (CA)
 - Any Intermediate CA Certificates (Provided by your CA)
 - Root CA Certificate (Provided by your CA)
4. If you have the items, click on the **I have all the items above** button. If you don't have all the items, click on the **I don't have all the items above button**, and follow the previous procedure, [Get a Certificate Signing Request](#).

Setup SSL / TLS

Securing web communications requires the installation of a *SSL Certificate* and requires the following items:

- Private Key
- Certificate Signed By A Certificate Authority (CA)
- Any Intermediate CA Certificates (Provided by your CA)
- Root CA Certificate (Provided by your CA)

Do you currently have all items listed above? If you don't, we can create a certificate signing request (CSR) to provide to a CA for signing and a private key.

I have all the items above

I don't have all the items above

Return

5. The Certificate Wizard is displayed. The first step is to import your private key in one of the following three ways.

- Drag and Drop your certificate from your computer onto the screen.
- Click anywhere on the grey box to browse for the private key.
- Click **Manually enter data** button to type in the private key information

The screenshot shows the 'Certificate Wizard' step 1: Private Key. At the top, there's a note about uploading private keys over unsecured networks. Below it, a red box highlights the '1) Private Key*' label. To its right is a large dashed box containing a central download icon with the text 'Drag and drop or click to browse' and a 'Manually enter data' link below it. At the bottom left is a checked checkbox for enabling a password, and at the bottom right are 'Cancel' and 'Continue' buttons.

6. If the private key is encrypted, click the **checkbox** to enable a password for this certificate and enter the password in the field. Click **Continue**.
7. The next step is to import the server certificate. This is the The DER or PEM encoded X.509 SSL Certificate that Ignition will use for SSL / TLS. Drag and drop the certificate file, browse for it, or manually enter the data.

Config > Network > Web Server > Certificate Wizard

Note: If you upload your own private key, it will be done over an unsecured network. It is important to understand the risks and mitigations before proceeding. The certificates provided by a CA build a chain of trust. Follow the steps below in order to build this chain of trust.

1) Private Key*
The DER or PEM encoded private key in SSLeay or PKCS#8 format. Provide a password if the private key is encrypted.

Private Key Successfully Uploaded

2) Server Certificate*
The DER or PEM encoded X.509 SSL Certificate that Ignition will use for SSL / TLS.

Drag and drop or click to browse
Manually enter data

Cancel **Continue**

- The next step is to import the certificate chain. This gives you the Intermediate CA Certificate. Drag and drop the certificate file or bundle, browse for it, or manually enter the data.

Config > Network > Web Server > Certificate Wizard

Note: If you upload your own private key, it will be done over an unsecured network. It is important to understand the risks and mitigations before proceeding. The certificates provided by a CA build a chain of trust. Follow the steps below in order to build this chain of trust.

1) Private Key*
The DER or PEM encoded private key in SSLeay or PKCS#8 format. Provide a password if the private key is encrypted.

Private Key Successfully Uploaded

2) Server Certificate*
The DER or PEM encoded X.509 SSL Certificate that Ignition will use for SSL / TLS.

Server Certificate Successfully Uploaded

3) Certificate Chain
The DER or PEM encoded X.509 SSL Certificate which issued the previous certificate. If a certificate chain bundle is provided, the first entry must be the issuer of the previous certificate and each certificate which follows must be the issuer of the certificate which precedes it.

Drag and drop or click to browse
Manually enter data

Cancel **Continue**

- Finally, import the root CA certificate: Drag and drop the certificate file, browse for it, or manually enter the data. You'll see a message that the Root CA Certificate was successfully uploaded.

The screenshot shows the 'Certificate Wizard' interface with four completed steps:

- 1) Private Key***: The DER or PEM encoded private key in SSLeay or PKCS8 format has been successfully uploaded.
- 2) Server Certificate***: The X.509 SSL Certificate that Ignition will use for SSL / TLS has been successfully uploaded.
- 3) Root CA Certificate**: The X.509 root CA certificate which issued the preceding certificate and itself has been successfully uploaded.
- 4) Root CA Certificate**: The X.509 root CA certificate which issued the preceding certificate and itself has been successfully uploaded.

At the bottom, there are 'Cancel' and 'Continue' buttons.

- Click the **Continue** button.
- You'll see a confirmation message that the certificate is installed and SSL/TLS is enabled.

The screenshot shows the 'Web Server' configuration page with the following sections:

- SSL / TLS**: Shows 'SSL / TLS ENABLED' and 'CA-Signed SSL Certificate installed.'
- SSL / TLS Certificate**: A link to 'View Details' for the installed certificate.
- HTTP Settings**: Shows the 'HTTP Port' set to '8088'.

- If you have a redundant installation, you'll need to repeat this procedure on your backup server.

Related Topics ...

- Security
- Security in Perspective
- Security in Vision

Gateway Backup and Restore

Gateway Backups vs Project Exports

It is a good idea to create backups anytime you make changes to Ignition. There are two main types of backups available in Ignition: Gateway backups and Project exports. You can choose to backup up everything, or be selective about what you want to backup and restore. Ignition is designed to be architecture agnostic or compatible across all platforms. This is particularly helpful when you want to restore your Gateway on a new machine or platform.

Gateway backups are all inclusive and Project exports are simply a backup of individual projects. Whether it is a Gateway backup or Project export, it's always good practice to create backups regularly when making changes to Ignition. This page discusses making Gateway backups and restoring from a Gateway backup. To learn more about project backups and restoring projects, refer to the [Project Export and Import](#) page.

Gateway Backup and Restore

Creating Gateway backups and restoring from a Gateway backup are super easy in Ignition. Gateway backups are all inclusive, and typically takes less than a minute to run. It includes everything you find in the Ignition Gateway Webpage. Everything gets backed up - all your projects, Gateway settings, authentication profiles, Tags, database connections, OPC and device connections, alarm pipelines, scripts, sequential function charts, reports, and Image Management Library (i.e., png, jpg, and jpeg files). The only data that is not included in a Gateway backup is data stored in other programs such as SQL databases, PLC programs, other files you manually added to the install directory, and any additional files you may be using. This information needs to be backed up separately.

Perspective custom assets such as fonts, icons, and themes are included in a Gateway backup. In addition, any custom assets in a backup file will be restored when performing a Gateway restore.

You have the option of creating a Gateway backup and restoring a backup from the Gateway Webpage or [Gateway Command-line Utility - gwcmd](#). We recommend using Gateway Webpage since it's much easier. Even better, is to set up [scheduled backups](#) to run on a regular schedule.

On this page ...

- [Gateway Backups vs Project Exports](#)
- [Gateway Backup and Restore](#)
 - [Gateway Backup](#)
 - [Gateway Restore](#)



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Project Backup vs. Ignition Gateway Backup

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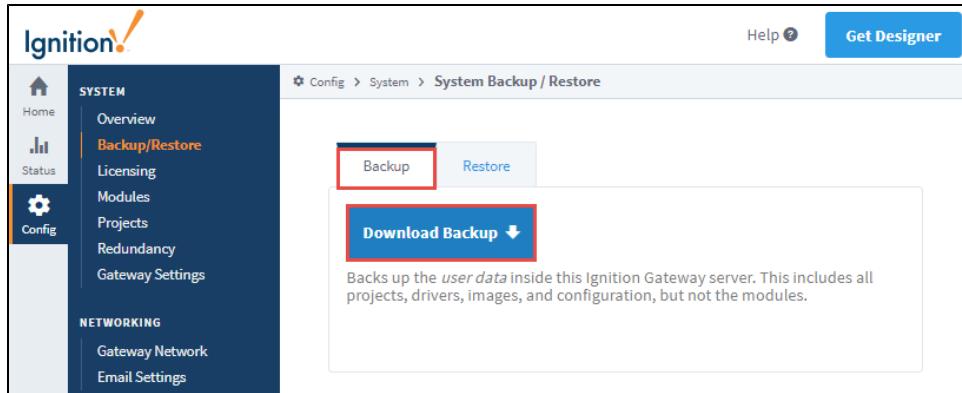
Making Ignition Gateway Backups

[Watch the Video](#)

Gateway Backup

The easiest way to create a backup of the Gateway is using the Gateway Webpage.

1. Go to the **Config** tab of the Gateway Webpage, and click on **System > Backup/Restore**.
2. The System Backup/Restore page will be displayed. Make sure the **Backup** tab is selected, then click **Download Backup**.



3. By default, this downloads a **.gwbk** file extension to your local file system in your **Downloads** folder.

Note: The Gateway Backup default filename will look like **GatewayName_Ignition-backup-YYYYMMDD-HHMM.gwbk** where **YYYYMMDD-HHMM** is the timestamp of when it was created.

Command-line Utility

In Windows and Linux, you can use the command-line utility to create a Gateway backup. To run the Command-line Utility, open a shell and enter the command below.

Note: If you want to add a timestamp, you need to enter the date and time in the filename. Refer to the [Command-line Utility](#) page for a complete list of 'gwcmd' options.

```
gwcmd -b C:\Backups\Ignition\IgnitionBackup.gwbk
```

Gateway Restore

Restoring a Gateway backup is just as easy as backing it up and can also be done from the Gateway Webpage.

Caution: When you perform a Gateway Restore, **ALL** of the server's current configuration will be permanently lost! Restoring a Gateway backup overwrites all of the existing settings including your projects. There is no merge option for a Gateway backup. We recommend you always make a backup of the existing server immediately before performing a Gateway Restore.



Restoring Ignition Gateway Backups

[Watch the Video](#)

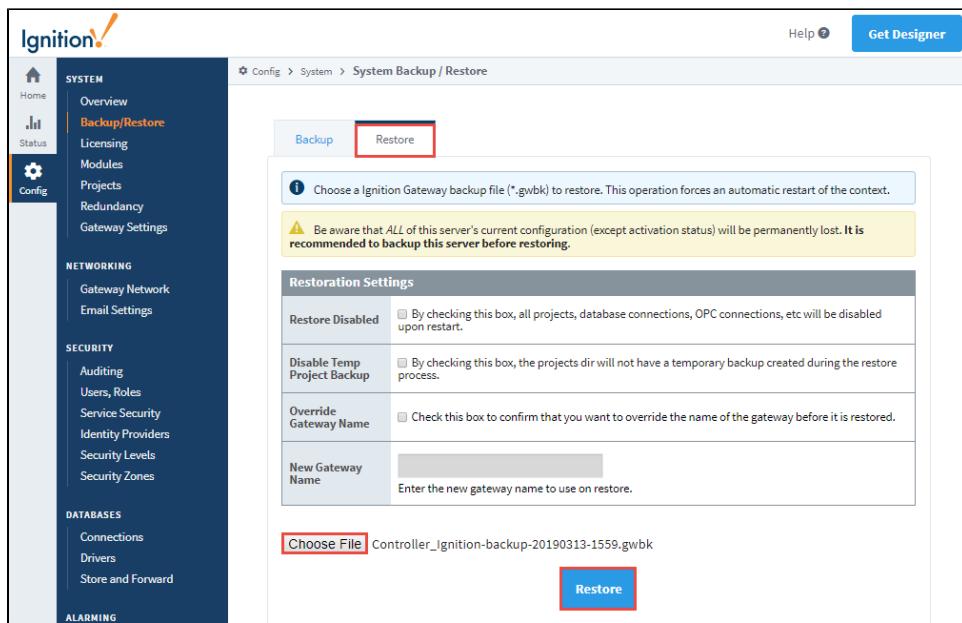
1. Go to the **Config** tab and click on **System > Backup/Restore**.
2. The System Backup/Restore screen will be displayed. Click on the **Restore** tab. Read carefully through the restoration settings, and check the ones you wish to enable.

Restore Disabled Checkbox

If you check the **Restore Disabled** box, all projects, project resources, notifications, alarm journals, database connections, OPC connections, devices, scripts and third party modules will be disabled upon restart.

3. Click **Choose File**, then navigate to your Gateway backup file (***.gwbk**). By default, all your Gateway backup files are saved in your Downloads folder unless you select another folder location to choose an existing Gateway Backup file (***.gwbk**) to restore.
4. Choose your Ignition backup file (**.gwbk**), and click **Open**.
5. Click **Restore** at the bottom of the System Backup/Restore screen. The Gateway stops while restoring the backup file. When restoring is complete, the Gateway restarts itself to apply the restored settings. The Gateway Webpage is refreshed and your projects are loaded and

your whole Gateway is restored in less than a minute.



Command-line Utility

In Windows and Linux, you can use the command-line utility to restore a Gateway backup. To run the Command-line Utility, open a shell and enter the command below. Refer to the [Command-line Utility](#) page for a complete list of '**gwcmd**' options.

```
gwcmd -s C:\Backups\Ignition\IgnitionBackup.gwbk
```

Related Topics ...

- [Gateway Scheduled Backups](#)
- [Project Export and Import](#)
- [Exporting and Importing Tags](#)

In This Section ...

Gateway Scheduled Backups

You never know when a disaster is about to happen, and scheduled backups can get you out of a bad situation. Ignition will automatically create Gateway backups based on whatever schedule you want, and save them wherever you need, even on another server. Just fill in a few settings and Ignition will do the rest.

Once you have regular scheduled backups setup, make sure to secure them too! If you have your IT department regularly save files to an off-site location, it's easy to add these scheduled Gateway backups to the list.

UNIX Crontab

The scheduled backup system works on a schedule that is specified using **UNIX Crontab** syntax. This is a standard format for specifying a basic schedule. The format consists of five space-separated fields, one for minute, hour, day-of-month, month, and day-of-week as shown below. The special Gateway Configuration 72 character * means **all**. Slashes can be used to indicate that values should be stepped, for example, */5 in the minutes field means "every 5 minutes", or 0:00, 0:05, 0:10, etc.



Crontab Format and Ranges

- Minutes - (0 - 59)
- Hour - (0 - 23)
- Day of the Month - (1 - 31)
- Month - (1 - 12)
- Day of the Week - (0 - 6) (0 to 6 is Sunday to Saturday)

On this page ...

- [UNIX Crontab](#)
- [Set Up Scheduled Backups](#)



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Making Ignition Gateway Backups

[Watch the Video](#)

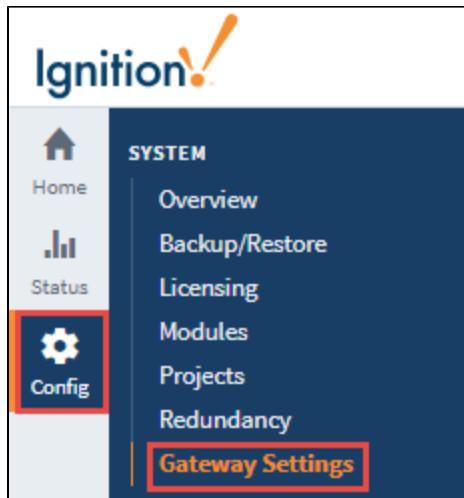
Here are some examples using Crontab formatting:

Examples	
0 1 5 * *	Once a month, on the 5th day at 1am
5 * * * *	Once an hour, on the :05 minute. 0:05, 1:05, 2:05, etc.
30 5 * * 1	Every Monday at 5:30am
* 6-14 * * *	Every minute, but only between 6am and 2pm
*/5 8-17 * * 1-5	Every 5 minutes between 8am and 5pm but only during the week (1-5). 0=Sunday, 1=Monday, etc.
*/15 * * * *	Every 15 minutes, on the quarter-hour. 0:15, 0:30, 0:45; 1:00, 1:15, etc.

Set Up Scheduled Backups

Gateway backups can be created automatically in Ignition. You can set up a schedule to perform scheduled Gateway backups in the Gateway Webpage. The following is an example of setting up a daily Gateway backup schedule.

1. Go to the Config tab of Gateway Webpage. Under System select **Gateway Settings**.



- On the Gateway Settings page, scroll down to the middle of the page to the **Scheduled Backup Settings** section. The properties in this section allow you to enable and set the backup schedule.

Scheduled Backup Settings	
Enable Scheduled Backups	<input checked="" type="checkbox"/> Enables the scheduled backup system which will automatically make backups at a scheduled time. (default: false)
Backup Folder	\computer\share\backup A path to a folder in which to put the scheduled backups.
Backup Schedule	15 1 * * * A UNIX crontab style scheduling string representing when to make the backups. (default: 15 1 * * *)
Retention Count	14 The number of backups to keep in the backup folder. (default: 5)

- Select the checkbox for **Enable Scheduled Backups**. This enables the scheduled backups to execute at a scheduled time.
 - In Backup Folder, enter a **path** to a folder where the backups will be saved. For example, you can enter:
\computer\share\backup
The path to a folder where the backups are to be saved can be a local folder (C:\backups) or a network path (\\\computer\share\backup) as shown in the image above.
 - In **Backup Schedule**, type a UNIX crontab scheduling string to specify when you want to make the backups. For example, the code below makes a backup at 15 minutes and 1 hour after midnight, every day, every month, and every day of the week (1:15am every day).
- ```
15 1 * * *
```
- In Retention Count, specify the number of most recent backups kept in the backup folder. For example, you can specify 14 if you want to only keep the last 14 backups. After 14 backups, the oldest backup will be deleted and the new one will be saved.
  - Click **Save Changes** at the bottom of the page. Now, the Gateway will automatically make backups for you based on the schedule of your settings.

**Note:** If something is wrong with the scheduled backup system, Ignition will store error messages to the [Gateway logs](#).

Related Topics ...

- Project Export and Import
- Gateway Backup and Restore

# Project Export and Import

Project backup and restoring from a project backup is referred to as Project Export and Import. Projects are exported individually, and only include project-specific elements shown in the list below. They **do not** include Gateway level configurations, like database connections, Tag Providers, and Tags. The exported file (.zip) is used to restore / import a project.

The resources listed below are included in a project export.

- Alarm Pipelines
- Named Queries
- Perspective Properties
- Perspective Views
- Project Properties
- Reports
- Sequential Function Charts
- Transaction Groups
- Vision Client Tags
- Vision Windows
- Vision Templates
- Client Event Scripts
- Gateway Event Scripts

## On this page ...

- **Project Export**
  - Export a Project from the Gateway Webpage
  - Export a Project from the Designer
- **Project Import**
  - Import a Project from the Gateway Webpage
  - Import a Project from the Designer

There are two primary ways to export and import a project:

- **Gateway Webpage** - exports and imports the entire project.
- **Designer** - exports and imports only those resources that are selected.

This page describes how to create a project export and import a project from an exported file.



## Making Project Backups

[Watch the Video](#)

## Project Export

A Project Export is a little smaller and takes even less time to run than a Gateway backup! Once you have an exported file of your project, you can take it to any other Gateway and merge it in with the other projects. This makes it simple to keep a development server and push your projects after you complete them. The [Enterprise Administration Module](#) can even do this for you. You can perform a project export from two locations, the Gateway Webpage and the Designer. This section describes how to create a project export from the Gateway Webpage and the Designer.

### Export a Project from the Gateway Webpage

Making an export from the Gateway Webpage, exports the entire project to a (.zip file). The exported file only includes resources from the project. Notably missing from the project export are any Gateway resources, even if they are presented in the Designer such as Ignition Tags. They need to be exported separately. Refer to [Exporting and Importing Tags](#).

**Caution:** Remember that Tags and Gateway level configurations (such as device connections, database connections, tags, etc) are not included in a Project Backup. Those resources are only exported in a [gateway backup](#).

1. Go to the **Config** tab of the Gateway Webpage, and click on **System > Projects**.
2. The **Projects** screen will be displayed and you can see your existing projects.  
To the right of project name, click the **More** button and select **Export**. This exports your project as a .zip file. The exported file will have the project name, date, and a 4 digit unique number followed by the file extension (i.e., Compressor\_2019-03-21\_1123.zip).

The screenshot shows the Ignition Config interface with the 'Config' tab selected. In the left sidebar, under the 'SYSTEM' section, the 'Projects' option is highlighted. The main area displays a table of projects with columns: Name, Description, Enabled, Inheritable, Parent project, and Actions. The 'Actions' column contains buttons for Delete, Details, Copy, Rename, More, and Edit. A red box highlights the 'Export' button for the project named 'NewProject'.

3. By default, the .zip file is saved in your web browser's default Downloads folder. This export of the project can be imported to any other instance of Ignition that is running the same version or later.

## Export a Project from the Designer

When making a project export from the Designer, you get to choose which project resources are added to the export file. The export does not include any Gateway resources. When restoring a project export in the Designer, you also get to choose which project resources are restored into the currently open project from the exported .zip file.

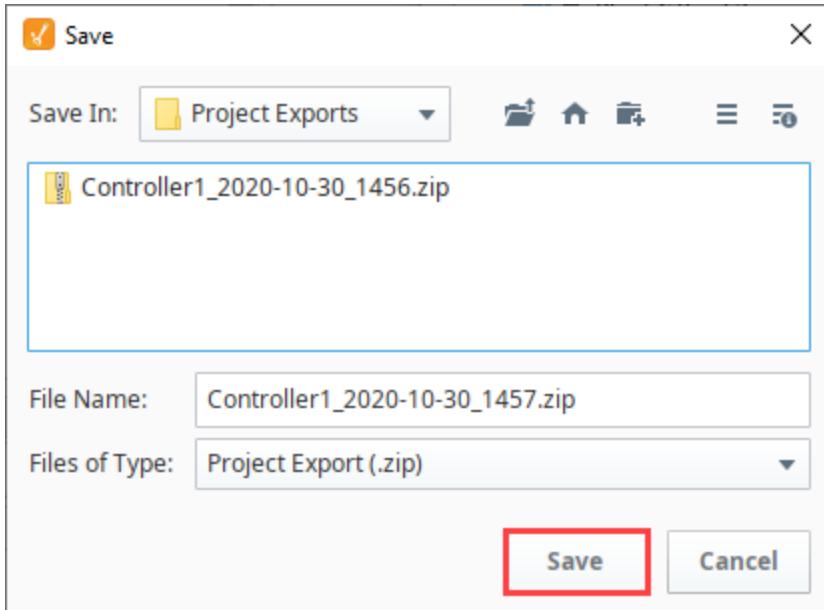
1. From the Designer, go to the top menubar, click on the **File** menu and select **Export**.
2. The Export screen will be displayed and you'll see a list of project resources to export. By default, local project resources are selected. Unselect any resources you don't want to include in the export.

When exporting a project, there is a **Send to Project** button that allows you to directly send the project (or resources in a project) to another project on the same gateway. There is a '**local**' project export option, meaning only local (non-inherited) project resources are selected and will be exported.

Click **Export**.

The screenshot shows the Ignition Designer application. On the left, the 'File' menu is open, with the 'Export...' option highlighted. To the right, a modal dialog titled 'Export Project Resources' is displayed. The 'Select Resources' section contains a tree view of project resources, with several items checked. A red box highlights the 'Perspective Views' item in the tree. At the bottom of the dialog are buttons for 'Select All', 'Local', and 'None', followed by 'Export' and 'Send to Project' buttons.

3. This opens a Save dialog window. Select a folder and click **Save**.



4. This export of the project can be imported to any other instance of Ignition that is running the same version or later.

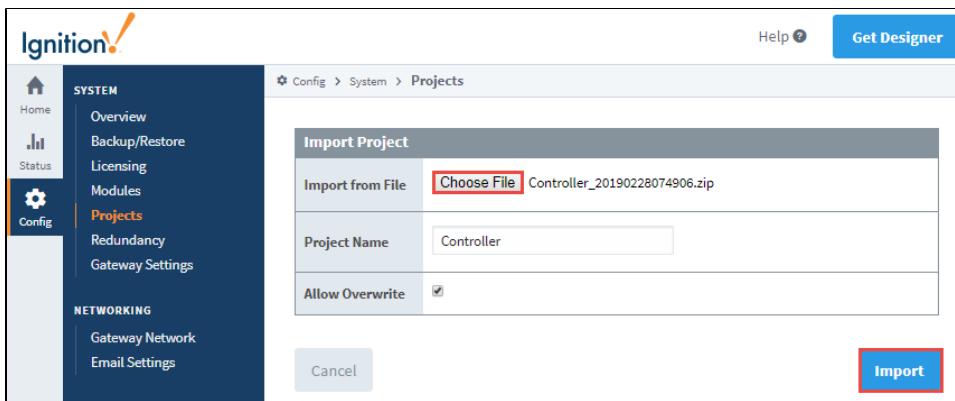
## Project Import

When you restore / import a project from an exported file in the Gateway Webpage, it will be merged into your existing Gateway. If there is a naming collision, you have the option of renaming the project or overwriting the project. Project exports can also be restored / imported in the Designer. This will even allow you to select which parts of the project import you want to include and will merge them into the currently open project.

### Import a Project from the Gateway Webpage

When restoring a project from the Gateway Webpage, Ignition imports the entire project from an exported file.

1. Go to the **Config** tab of the Gateway Webpage, and click on **System > Projects**.
2. The **Projects** screen will be displayed and you can see your existing projects. At the bottom of the screen, click the **Import project...** link.
3. A second Projects screen will open. Click on **Choose File**, find your exported .zip file from your browser, and then click **Open**.
4. Enter the **Project Name**. If there is already a project with the same name, the **Import button** will be grayed out preventing you from importing the file. The system gives you the option to **Rename** the project you want to import, or **Overwrite** the existing project.
5. Click **Import**.



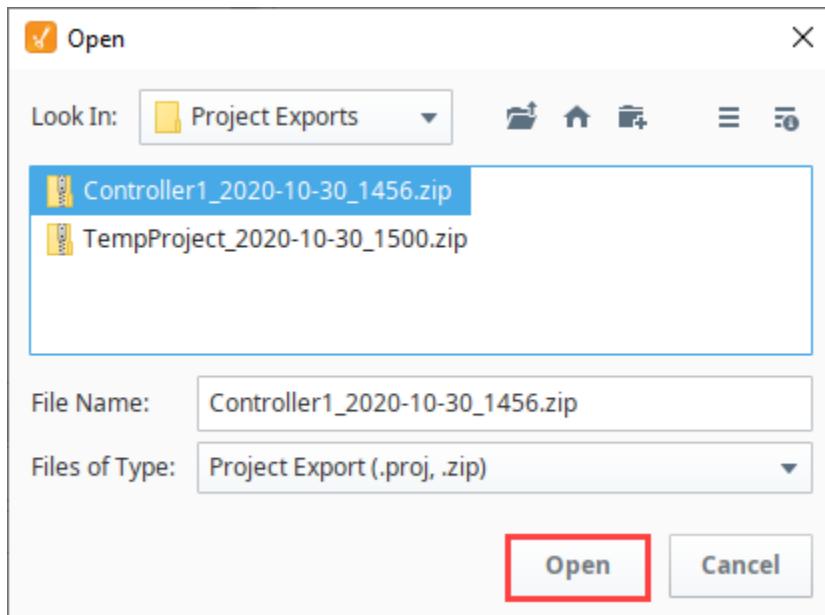
6. If you are importing a new project, you will see your new project added to the list along with the other projects.

### Import a Project from the Designer

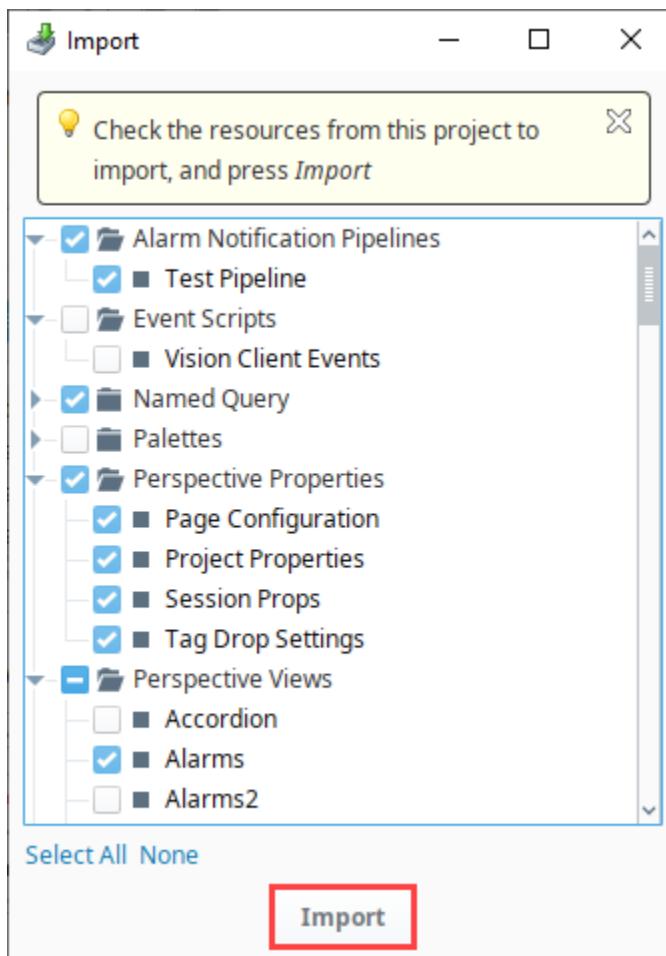
When restoring a project from the Designer, you can select the entire project or parts of the project, and merge them into the one you are currently working on. Ignition will let you choose which resources to import.

1. In Designer, select **File > Import**.

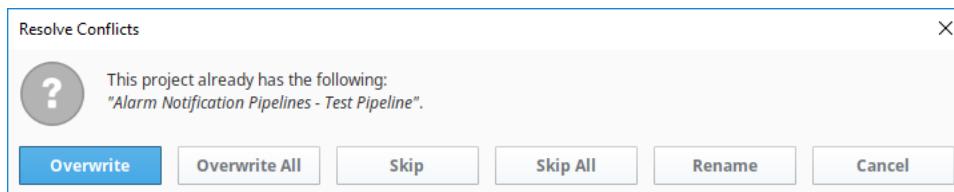
2. The dialog screen will open, select the project export file (.zip) from the default folder, and click **Open**.



3. By default, all resources are selected. Unselect the resources from the project that you do not want to import. Click the **Import** button.



4. If there are any conflicts when importing your project resources, a dialog box will appear and ask you to either **Overwrite**, **Overwrite All**, **Skip**, **Skip All**, **Rename** the affected items, or **Cancel**. Once all conflicts are resolved, **Save** your project.



#### Related Topics ...

- [Gateway Backups and Restore](#)
- [Gateway Scheduled Backups](#)
- [Exporting and Importing Tags](#)
- [Project Inheritance](#)

# Ignition Exchange

In the Ignition Exchange you can access resources, templates, and tools that you can use in your own Ignition projects. The Ignition Exchange offers a wide variety of ways to store and access these resources. Ignition assets designed by others in various industries can be shared through the Exchange. This collection encompasses anything that can be built inside of Ignition including screens, graphics, templates, views, reports, alarm pipelines, scripting functions, database backups, projects, full systems, Ignition demos, and more.

As an individual, you can upload, browse, or download your own tools. If you'd like to keep these tools private, you can store them for your own use, or you can make the resource public, so anyone can access and use it.

Organizations or teams can use the Exchange to store and access private resources they want to make available to a select user group. This gives them the opportunity to collaborate and access company templates, and use them across corporate projects.

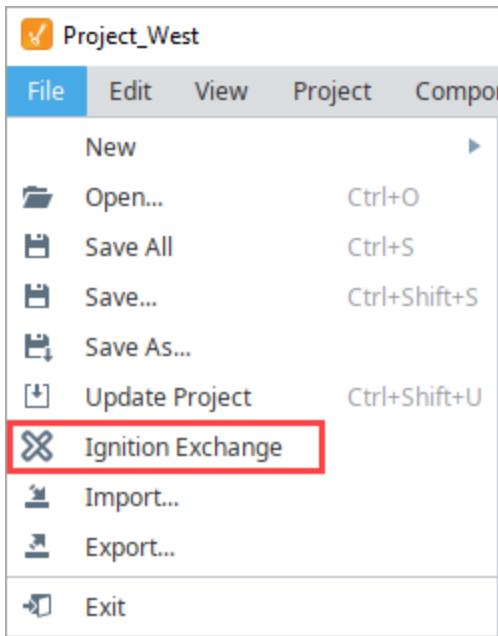
## On this page ...

- [Access the Exchange](#)
- [Import an Ignition Exchange Package from the Gateway Webpage](#)
- [Import an Ignition Exchange Project Package from the Designer](#)
- [Restore a Gateway Backup from Ignition Exchange](#)

## Access the Exchange

You can access the Ignition Exchange, in several ways:

- Go to <https://inductiveautomation.com/exchange/>.
- Within the Designer, select **File > Ignition Exchange**.



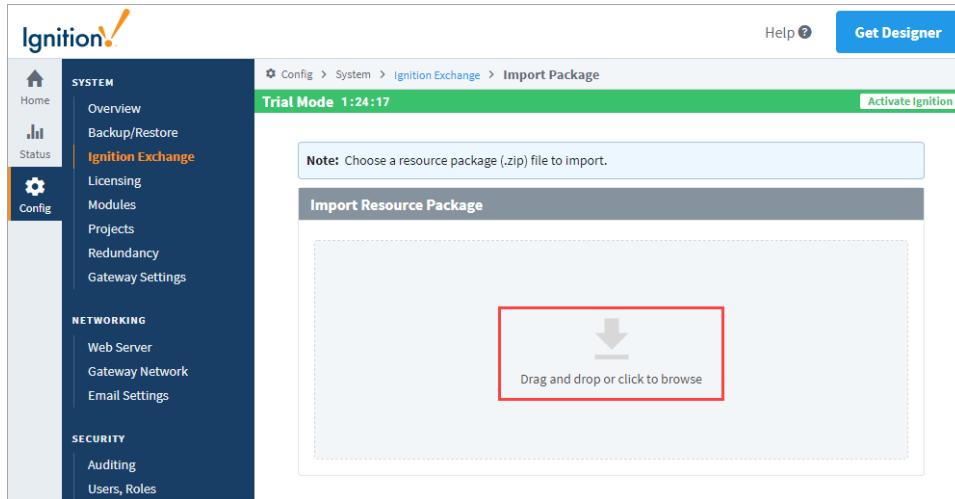
- Within the Gateway webpage, click on **Config > Ignition Exchange**. Then click **Browse Ignition Exchange**.

A screenshot of the Ignition Gateway webpage. The left sidebar shows navigation links for Home, Status, Config (selected), SYSTEM (Overview, Backup/Restore, Ignition Exchange, Licensing, Modules, Projects, Redundancy, Gateway Settings), NETWORKING (Web Server, Gateway Network, Email Settings), and SECURITY (Auditing, Users, Roles, Service Security). A search bar at the bottom left says 'Search...'. The main content area is titled 'Config &gt; System &gt; Ignition Exchange' and shows 'Trial Mode 1:43:15'. It has two main sections: 'Import your downloaded resource file' (with a 'Import Package File' button) and 'Browse Ignition Exchange' (with a 'Browse Ignition Exchange' button).

## Import an Ignition Exchange Package from the Gateway Webpage

When you restore / import a project from an exported file in the Gateway Webpage, it will be merged into your existing Gateway. To import a downloaded resource file,

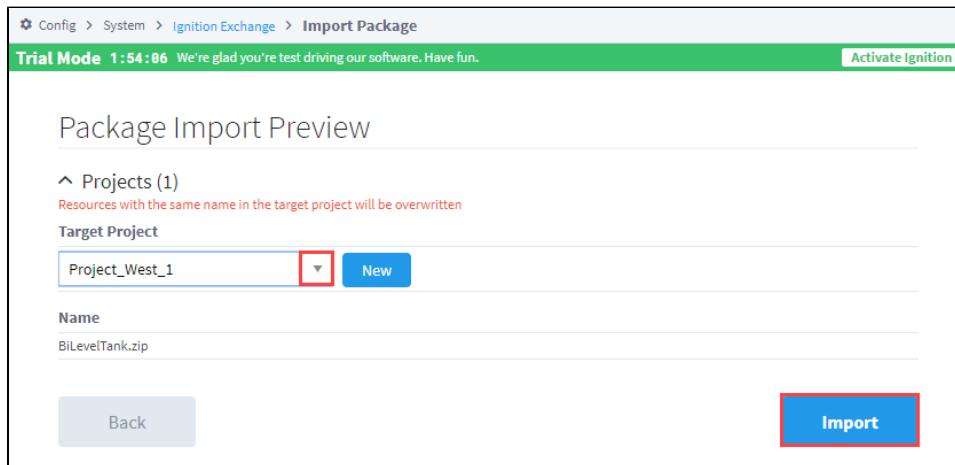
1. Go to the Gateway webpage, and click **Config > Ignition Exchange**.
2. Click on **Import Package File**.
3. Drag and drop your resource package file, or click the link to browse for the file.



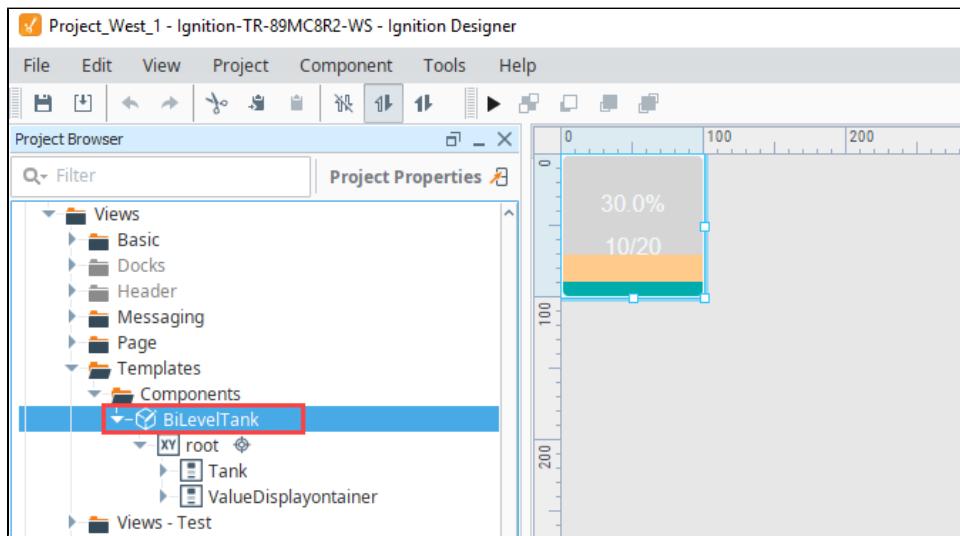
4. Navigate to the file you want to import and click **Open**.
5. The Gateway will display a confirmation message if the package is valid, and it will display some Readme instructions for the file. Click **Next**.
6. The Package Import Preview screen is displayed. Use the down arrow in the Target Project box to choose a project. Then click **Import**.

**Note:** If the new project has a name conflict with an existing project, you can provide a new name for your project.

**Caution:** Resources with the same name in the target project will be overwritten.



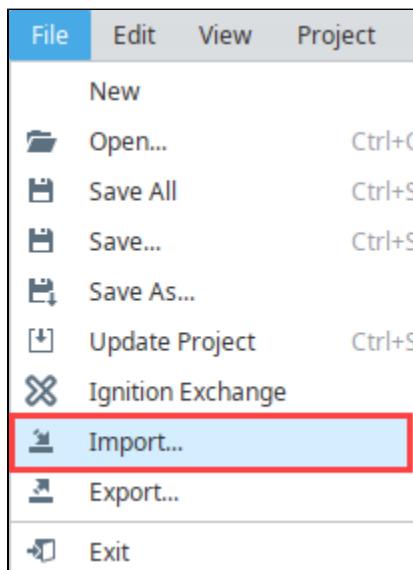
7. A confirmation message is displayed if the package was successfully imported. You can now go to your project in the Designer and see the new resource.



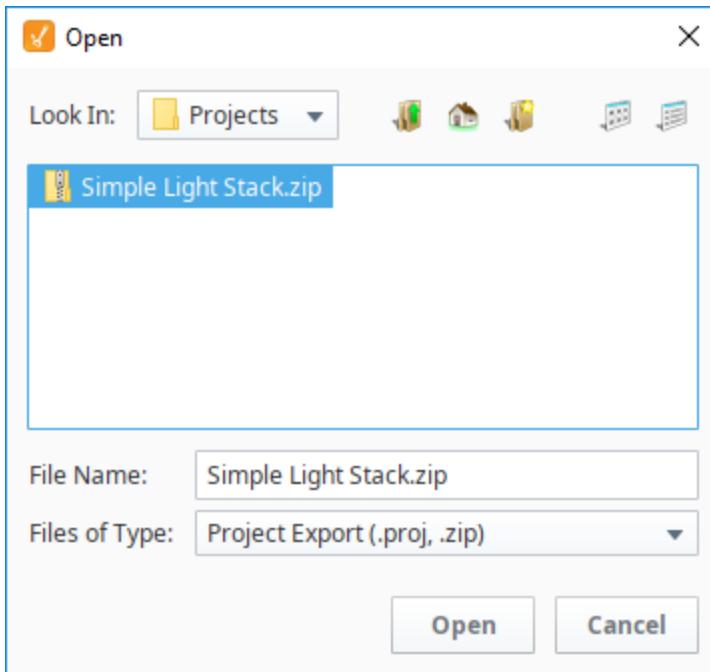
## Import an Ignition Exchange Project Package from the Designer

In this example, we're going to import the Simple Light Stack project that we already downloaded from Ignition Exchange. Note that we also extracted the initial .zip file that was downloaded. This project contains a Perspective view with a light stack graphic. To import this view into a project that is open in the Designer, do the following.

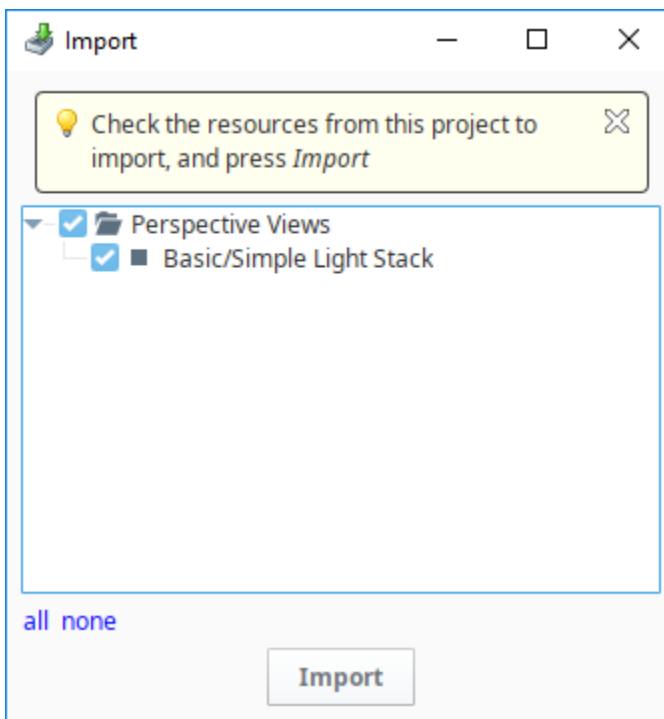
1. In the Designer, click **File > Import**.



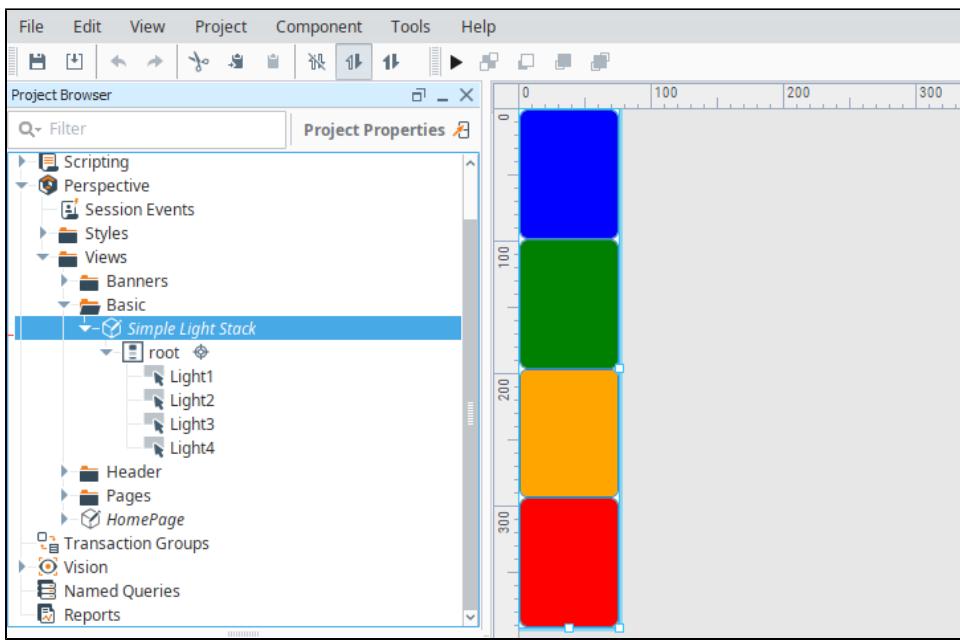
2. Navigate to the project file (.proj or .zip) you want to import, then click **Open**.



3. In the Import popup window, select the resources that you want to import from the project. Click **Import**.



- The view is now part of the current project.



## Restore a Gateway Backup from Ignition Exchange

Ignition Exchange can also have Gateway backup files as resources. After you've downloaded the file from Ignition Exchange, follow the steps for a Gateway Restore in [Gateway Backup and Restore](#).

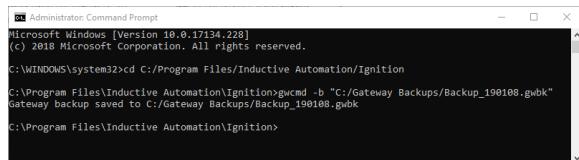
**Caution:** When you perform a Gateway Restore, **ALL** of the server's current configuration will be permanently lost! Restoring a Gateway backup overwrites all of the existing settings including your projects. There is no merge option for a Gateway backup. We recommend you always make a backup of the existing server immediately before performing a Gateway Restore.

# Gateway Command-line Utility - gwcmd

The Gateway Command-line Utility provides a list of commands you can use to perform specific functions in the Gateway. The Gateway Command-line Utility or **gwcmd** provides basic commands, such as resetting the main password, changing the Gateway's port, or restarting the Gateway.

Invoking **gwcmd** can only be done from command line, so you'll need to utilize a command line interface of some sort (Power Shell, Terminal, etc). Because gwcmd is a file sitting in the Gateway's installation directory, these commands can only ever be invoked from where the Gateway is installed. Furthermore, interacting with gwcmd requires administrative privilege.

The gwcmd file sits at the root of the Gateway's installation directory. See the [Installing and Upgrading Ignition](#) page for more details on default installation directories.



```
Administrator: Command Prompt
Microsoft Windows [Version 10.0.17134.228]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>cd C:/Program Files/Inductive Automation/Ignition
C:\Program Files\Inductive Automation\Ignition>gwcmd -b "C:/Gateway Backups/Backup_190108.gwbk"
gateway backup saved to C:/Gateway Backups/Backup_190108.gwbk
C:\Program Files\Inductive Automation\Ignition>
```

## On this page ...

- [Command-line Utility 'gwcmd' Options](#)
- [Gateway Password Reset](#)

## Command-line Utility 'gwcmd' Options

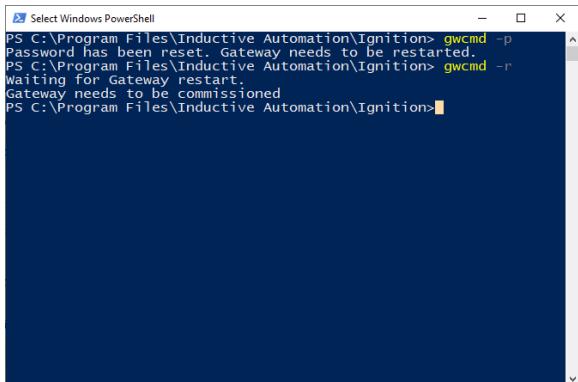
The following table lists all available 'gwcmd' options.

| Options                                           | Description                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -a,--activate <license-key><br>Offline activation | Creates an activation_request.txt file that can be used to request a license.ipl file from the Inductive Automation website. You must specify the <b>license</b> key to use for activation. The activation_request.txt file is saved in the current directory.                                                                                           |
| -b,--backup <new filepath>                        | Downloads a Gateway backup.gwbk file and saves the file to the specified path. The path can be either an absolute path or a relative path.<br><br>If another .gwbk file with the same name already exists, you will be prompted whether it is OK to overwrite the file . You can override with the -y option to force the file to always be overwritten. |
| -c,--clearks                                      | Clears the gateway's SSL / TLS setup. The gateway's SSL / TLS connector will be immediately shut down.                                                                                                                                                                                                                                                   |
| -d, --disabled                                    | Use with the --restore flag to disable all items after gateway restoration and restart.                                                                                                                                                                                                                                                                  |
| -e, --exportks <new filepath>                     | Exports the gateway's SSL key store in PKCS12 format and saves to the specified path.                                                                                                                                                                                                                                                                    |
| -f, --exportpk <new filepath>                     | Exports the private key from the gateway's SSL key store in PEM format and saves to the specified path.                                                                                                                                                                                                                                                  |
| -g,--reloadks                                     | Reloads the Gateway's SSL keystore from disk. Any update to the keystore will be automatically applied to any new connections.                                                                                                                                                                                                                           |
| -h,--help                                         | Shows the usage for this command.                                                                                                                                                                                                                                                                                                                        |
| -i,--info                                         | Retrieves server status and port information from the Gateway if it is running.                                                                                                                                                                                                                                                                          |
| -k,--port <new port>                              | Changes the Gateway http port.                                                                                                                                                                                                                                                                                                                           |
| -l,--sslport <new port>                           | Changes the Gateway https port.                                                                                                                                                                                                                                                                                                                          |
| -n, --nocrypt                                     | Add to the export private key command to not encrypt the private key.                                                                                                                                                                                                                                                                                    |
| -o,--name <new gateway name>                      | Specifies a Gateway name while restoring a backup. Additionally, the -y command now skips prompts asking for a Gateway name override.                                                                                                                                                                                                                    |
| -p,--passwd                                       | Enables a password reset command, which will allow you to create a temporary user that can access the gateway again. Requires a gateway restart to take effect. See <a href="#">Gateway Password Reset</a> below.                                                                                                                                        |
| -r,--restart                                      | Restarts the Gateway.                                                                                                                                                                                                                                                                                                                                    |
| -s,--restore <backup file path>                   | Restores from a Gateway backup, using the file specified at the path.                                                                                                                                                                                                                                                                                    |
| -t,--tdump                                        | Performs a thread dump in the Gateway and prints the dump to the command-line.                                                                                                                                                                                                                                                                           |

|                                         |                                                                                                                                                                                                                                                         |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -u,--unactivate<br>Offline unactivation | Creates an <code>unactivation_message.txt</code> file that you can use to deactivate a license via the Inductive Automation website. The <code>unactivation_message.txt</code> file is saved in the current directory.                                  |
| -w,--uselicense<br><license.ipl path>   | Applies a <code>license.ipl</code> file that was downloaded from the Inductive Automation website. You must supply the location of the <code>license.ipl</code> file. If it is in the current directory, use <code>license.ipl</code> for the location. |
| -y,--promptyes                          | Automatically answers <code>yes</code> to any prompt that may appear in the above commands, such as permission to overwrite an existing file.                                                                                                           |

## Gateway Password Reset

If you can no longer access the Gateway due (due to say a forgotten password), you can use the `-p` command to cause a password reset. During a password reset, instead of just changing the initial user's password, a partial commissioning process will trigger upon the next Gateway restart, allowing you to create a new user that can access the Gateway. From there you'll be able to address any issues that prevented you from using your normal credentials.



```
PS C:\Program Files\Inductive Automation\Ignition> gwcmd -p
Password has been reset. Gateway needs to be restarted.
PS C:\Program Files\Inductive Automation\Ignition> gwcmd -r
Waiting for Gateway restart.
Gateway needs to be commissioned
PS C:\Program Files\Inductive Automation\Ignition>
```



### Password Reset with GWCMD

[Watch the Video](#)

This feature is new in Ignition version **8.1.0**  
[Click here](#) to check out the other new features

However when performing this process, several things will happen to the Gateway:

- During commissioning, you'll be asked to provide a user name and password for a new user.
- A "temp" **user source** is created.
- The user you provided credentials for will be added to the "temp" user source.
- The new user will be assigned the role "Administrator".
- A "temp" Ignition Identity Provider will be created. The "temp" user source will be assigned as the provider backing the Identity Provider.
- On the **General Gateway Security Settings**, the following properties will be changed:
  - **System User Source** will be set to the "temp" user source.
  - **System Identity Provider** will be set to the "temp" identity provider.
  - **Gateway Config Permissions** will be set to the "Administrator" Security Level.

Thus, if you trigger a password reset and are able to use your normal credentials again, you'll want to make sure you change the values on the modified Gateway Security Settings to their property value. Also, you'll likely want to remove the "temp" user source and Identity Providers.

# Projects

## What Is a Project?

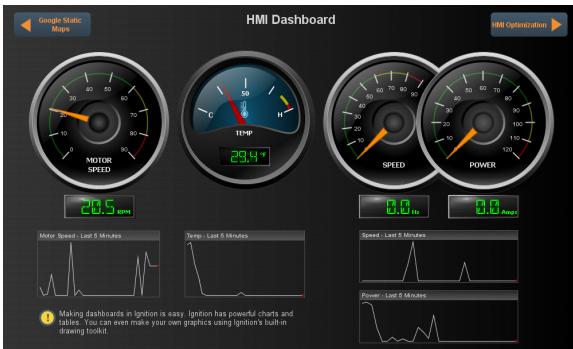
Ignition has two main parts, the Gateway and your projects. The Gateway holds all the shared information like database connections, device connections, Tags, and more. Projects hold all the designed elements that do the real work. Your projects can hold both interactive elements (like controls, charts, reports, entry forms, and more) and persistent elements (like historical loggers, automated reports, etc.).

Projects are predominantly used to create the screens that your users can interact with, the visualization part of Ignition. Here you can create any system you want, from copying existing HMI/SCADA applications to whole new systems with anything you could want to do. The windows in your project can be used for history charts, reports, database forms, alarms, drawing components, scripting, templates and much more.

In Ignition, a project is a unit of configuration that contains:

- **Windows, views, and components:** The HMI and SCADA controls to interact with Tags and databases
- **Transaction Groups:** A bi-directional link between databases and PLCs
- **Templates:** A collection of components that can be re-used and quickly updated
- **Reports:** PDF reports for displaying and recording data
- **Scripts:** Timer and event based scripts used throughout the system
- **General settings and properties:** The settings that control access, resource connections, layout, timing, and more

You use the Designer to configure and create projects. The projects are then viewed in the runtime ([Visio n Clients](#) or [Perspective Sessions](#)). You can create as many projects as you want, and users can easily jump between projects on the fly or open multiple projects at the same time.



## On this page ...

- [What Is a Project?](#)
- [Visualization Systems - Vision and Perspective](#)
  - [When to Use Vision for a Project](#)
  - [When to Use Perspective for a Project](#)
- [Designing a Project](#)
  - [What Is in a Project?](#)
- [Switching Between Projects](#)
- [Project Workflow](#)
- [Project Export and Import](#)
- [Project Versioning and History](#)
- [Project Examples](#)
- [What Is not in a Project?](#)

## Visualization Systems - Vision and Perspective

When starting a new project, there are many things to consider, such as who the users will be, how much data you need, what kind of time and resources you have to work with, visualization needs, and so forth. Deciding whether to use Vision or Perspective really comes down to which module best fits your project at the visualization level.

### When to Use Vision for a Project

Vision is the best choice for traditional industrial plant-floor and desktop screens, standalone HMIs, and the like. If you need a full, production-ready application right now, then it is best to choose Vision. If you're using multi-monitor or multi-desktop workstations, dedicated control panels and applications, desktop-dedicated or dedicated-access applications, terminals, or parallel screens, then Vision is the best way to go.

### When to Use Perspective for a Project

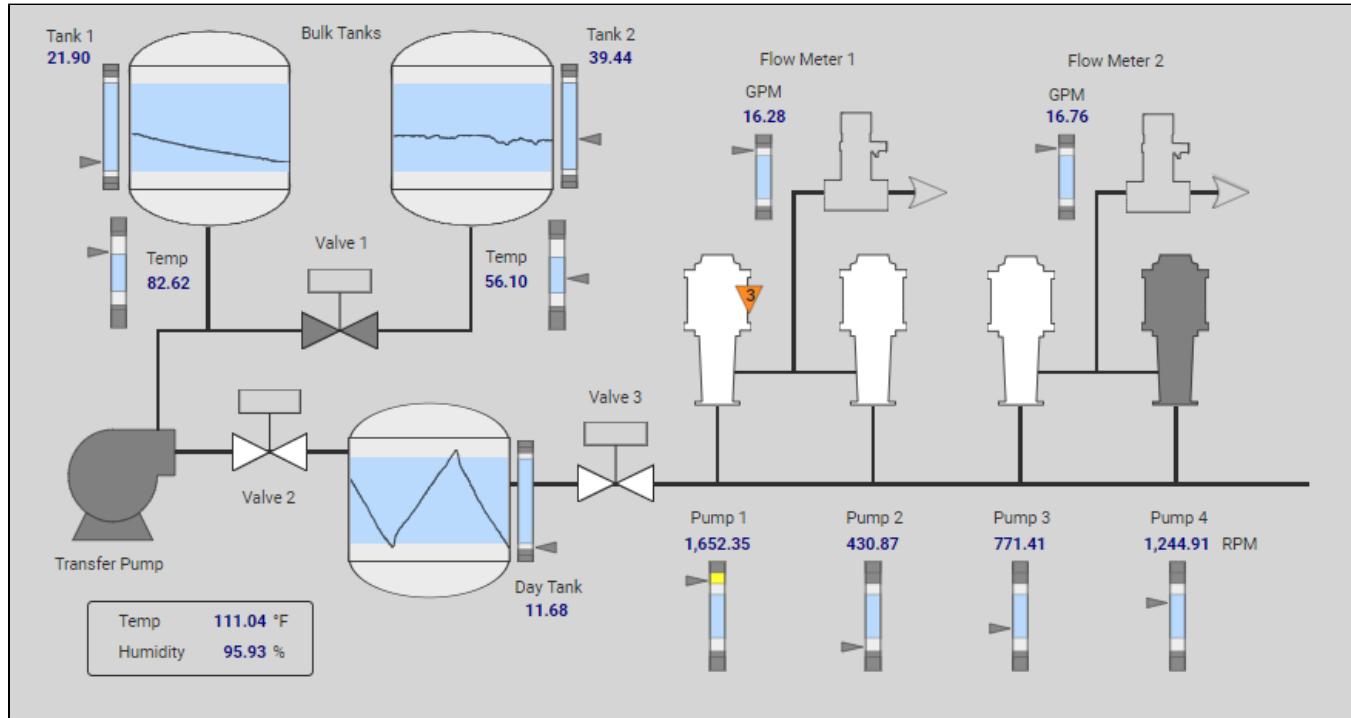
If you need to build mobile-responsive applications, then Perspective is the recommended way to go. If your application needs to run on a mobile OS, namely iOS or Android, then choose Perspective. If you need Two-Factor Authentication or federated identities for the application you're building, choose Perspective.

With Perspective, you can automatically adapt to fit any screen size using mobile-optimized container types. It provides the ability to use your device's sensors and intuitive touch commands, as well as message handling, flexible property bindings, CSS3 styles, and more.

## Designing a Project

When you launch the Designer, you're prompted to select or create a project. The Designer then launches the project and you can set and modify the different types of project settings and resources. In the Designer, you can create any number of projects using either Vision or Perspective. Projects that contain viewable elements, such as Vision Windows and Perspective Pages, will have a launch link on the Gateway homepage. Non-viewable elements such as [Transaction Groups](#), [Named Queries](#), [SFCs](#) and [Reports](#) exist in a project and execute in the Gateway. These resources do not have a runtime, and run independently of any [Vision Clients](#) or [Perspective Sessions](#) being open.

There are no limits to the number of projects that can be created on a Gateway, but each runtime Client, Session, or Designer can operate only on one project at a time.



## What Is in a Project?

You use the different tools in Ignition such as components, shapes, images, Symbol Factory graphics, and Scalable Vector Graphics (SVGs) to create the components. Configuring components is the bulk of the designer's work when designing a project. The basic workflow is to take a component from the palette and drop it into a container on a Vision Window or Perspective View. You can use the **Property Editor** panel to alter the component's properties which changes the component's appearance and behavior.

To make the component do something useful, like display dynamic information or control a device register, you configure property bindings for the component. To make the component react to user interaction, you configure event handlers for it. It is primarily through property bindings that you bring windows to life, and have them do useful things. A property binding simply links one component's property to another on the same window.



## Switching Between Projects

When you launch an Ignition Client or Perspective Session, it opens a single project to display. If you want to open multiple projects you can have multiple clients open on the same computer, or you can use Ignition's [Retargeting](#) system to make seamless transitions between projects. The Retargeting feature allows you to jump from one project to another without closing the client. This allows your users to jump from area to area while still allowing you to keep your designs compartmentalized in multiple projects.

Your projects may all use different authentication sources or role sets for [security](#). This means as your users jump from project to project, they may be able to use some or all of the controls on one project, but only see what is happening on another project.

## Project Workflow

Getting up and running quickly with your project is simple:

1. Open the Designer
2. Choose either Perspective or Vision.
3. Start designing!

The only challenge is figuring out exactly what you want to make with your system. For additional information, see [Creating a Project](#).

## Project Export and Import

In Ignition, a project backup and restore is referred to as Project Export and Import. Projects are exported individually and only include **project-specific** resources such as Perspective Views, Perspective properties, Vision Windows, Vision Templates, client event scripts, alarm pipelines, named queries to name a few. They **do not** include any Gateway resources like database connections and Tag Providers. A project is exported to a **.zip** file, and you can import it to any other Gateway that you have permission to access.

When you import a project from the **.zip** file, it will be merged into the existing Gateway. If a project already exists on the Gateway you are attempting to import it on, you have the option of renaming the project or overwriting the existing project.

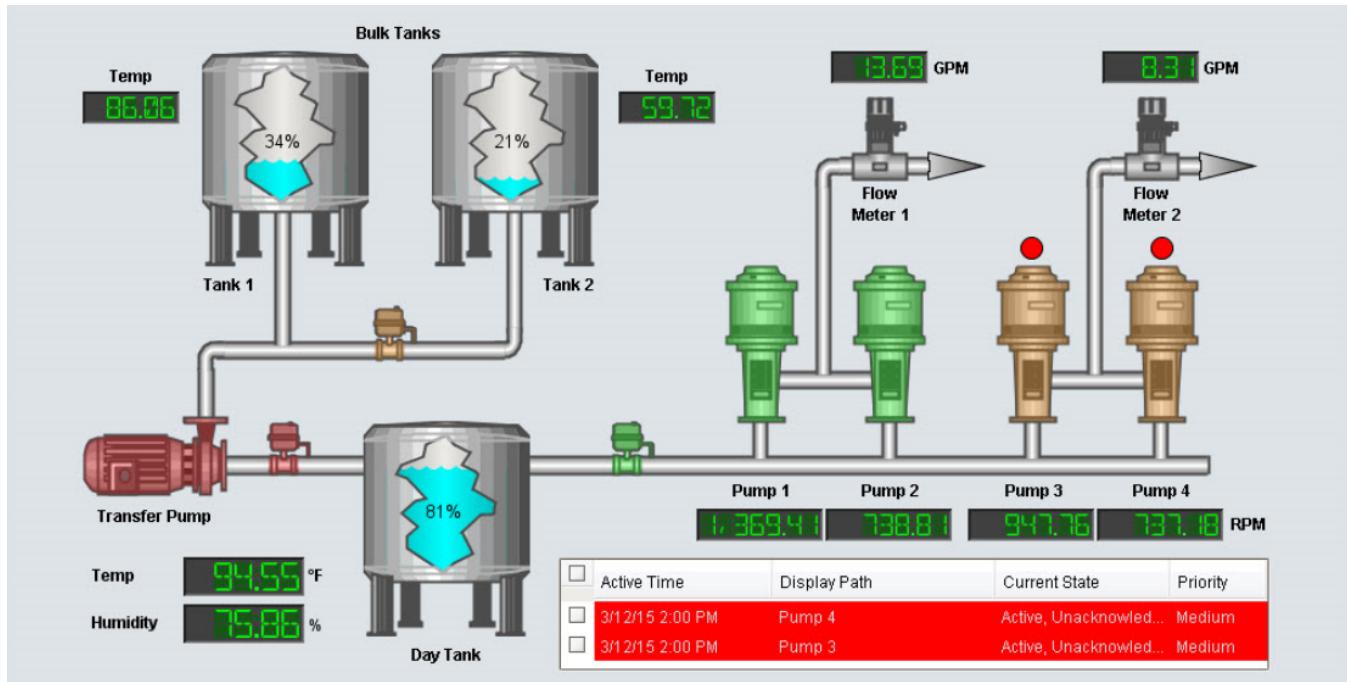
Project Export and Import are covered in detail on the [Project Export and Import](#) page.

## Project Versioning and History

Project versioning is handled outside of Ignition. The file system that stores data in Ignition stores everything as a series of files. You can use any tool you'd like to save or export these files outside of Ignition, including using versioning software to keep track of your changes.

## Project Examples

Ignition is such a diverse application that it can work in any field you can imagine and more. Just a few examples: Oil and gas, food and beverage, automotive, medical, air traffic control, water - waste water, and many more. You can get anything you want set up in Ignition. To see a few live example screens, check out our online demo project examples for [Vision](#) and [Perspective](#). They are packed with samples of the features and functions you might want to use from reporting, to history, to HMI optimization.



## What Is not in a Project?

The Designer allows you to create and modify several types of resources that are shared by ALL projects. Depending on the resource, this means that either they run independently of the projects, or they are available for use by any project. Here are a few of them:

- [Alarm Pipelines](#) - Control alarm notification (runs independently).
- [Sequential Function Charts \(SFC\)](#) - Logic to step through a process (runs independently).
- [Transaction Groups](#) - Perform various actions such as storing data historically, synchronizing database values to OPC, or loading recipe values.
- [Project Library](#) - Blocks of scripting code (available to all projects).
- [Tags](#) - Basic or UDT Tags provide realtime data (available to all projects).
- [Alarming](#) - Alarms exist on Tags, and so are not in a project (available to all projects).

In addition to these resources, the Gateway connections and settings are available to all projects and are set up in the [Gateway](#). These include resources such as [database connections](#), [OPC server and device connections](#), and more.

#### Related Topics ...

- [Designer](#)
- [Perspective Sessions](#)
- [Property Bindings in Perspective](#)
- [Scripting in Perspective](#)
- [Vision Client Launcher](#)
- [Property Bindings in Vision](#)
- [Scripting in Vision](#)
- [Alarming](#)
- [SQL Bridge \(Transaction Groups\)](#)

#### In This Section ...

# Project Inheritance

Project Inheritance allows one project to inherit resources from another project. If you have project resources that you want other projects to use such as views, windows, scripts, templates, or pipelines, you can create an inheritable project allowing other projects to inherit those resources. The project inheriting the resources can also overwrite the resources and let you re-define them specifically for that project.

Project inheritance is extremely flexible in that it allows each project to have a parent project that inherits all the resources of that parent project. The inherited project, in turn, can also be configured to be 'inheritable' and become a parent project itself allowing for complex hierarchies of re-usable resources to be designed. Within each project, inherited resources may be used by other, "local" resources. For example, an inherited Vision template could be embedded in a window, or an inherited script could be executed by a button.

This page demonstrates how project inheritance allows you to share resources across multiple projects as you deem fit by pointing one project to another project, and overriding resources to re-define resources specifically for the project you're working on.

## Configuring Project Inheritance

In order to make a project inheritable, you need to enable project inheritance on the project containing the resources that you want to share.

In this example, we have two projects: one project called 'global' which contains some project resources, and another project that is not inheriting any resources called 'Project\_X.' Since we will be sharing the resources from the 'global' project with Project\_X, let's first configure the 'global' project to be inheritable.

## On this page ...

- Configuring Project Inheritance
  - Configuring Parent Project
  - Configuring Child Project
  - Using Inherited Resources
- Inheritance and "Runnable" Resources
  - "Runnable" Resources
- Overriding Inherited Resources
  - Deleting Inherited Resources
  - Renaming an Inherited Resource
- Inheritable Project Examples
- Project Export



## Project Inheritance

[Watch the Video](#)

## Configuring Parent Project

1. Go to the **Config** tab on the Gateway Webpage, and select **Systems > Projects**. This brings up a list of all your projects. You'll notice that for each project listed, you'll see at a glance if a project is Inheritable, and if so, the name of the Parent Project will be displayed.

A screenshot of the Ignition Gateway Webpage. The left sidebar has tabs for Home, Status, and Config, with Config selected. Under SYSTEM, the Projects tab is highlighted with a red box. The main area shows a table of projects with columns: Name, Description, Enabled, Inheritable, Parent project, and Actions. A red box highlights the 'Inheritable' column for the 'global' project, which is set to true. The 'Parent project' column for 'global' shows 'global'. Other projects like 'Project\_X' and 'Controller1' are shown with their respective settings.

| Name        | Description | Enabled | Inheritable | Parent project | Actions   |
|-------------|-------------|---------|-------------|----------------|-----------|
| global      |             | true    | true        | global         | More Edit |
| Project_X   |             | true    | false       |                | More Edit |
| Controller1 |             | true    | false       | global         | More Edit |

2. Find the project you want to make inheritable, and click the **Edit** next to the project name (i.e., global) to open the Project Settings window.
3. Enable the **Inheritable** property, and click **Save**.

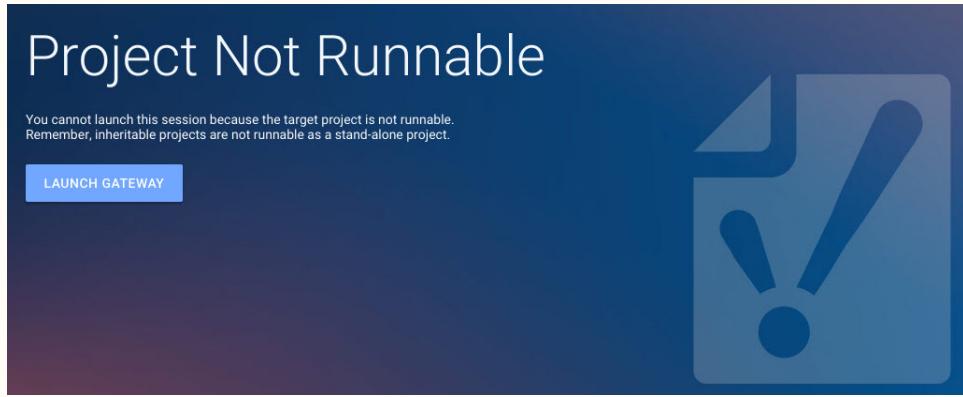
### Allow Overrides

When you make a project inheritable, the Allow Overrides function is set by default on all project resources in the inheritable project. This allows all project resources to be propagated to all inherited projects

| Project Settings |                                                                                                                                                                                  |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name *           | global<br>Choose a name to identify this project.                                                                                                                                |
| Description      | <br><br><br>                                                                                                                                                                     |
| Title            | <br>The title for the project. This can contain more characters than the name (space, etc), and will be used to represent the project to users. If empty, the name will be used. |
| Enabled          | <input checked="" type="checkbox"/> A disabled project will not be active on the Gateway, but will remain editable in the Designer.                                              |
| Inheritable      | <input checked="" type="checkbox"/> Inheritable projects are not runnable as a stand-alone project, but are intended to provide shared resources to one or more child projects.  |
| Parent Project   | -None-                                                                                                                                                                           |

#### Cannot Launch Inheritable Projects

When you have a project that's flagged as inheritable, you can not launch it as a stand-alone project (i.e., Perspective Session or Vision Client). You will get a 'Project Not Runnable' error message. If you have an inheritable project that you want to launch, you must have another project to inherit from it.



## Configuring Child Project

Now that we have an inheritable project, let's setup an existing project (i.e., Project\_X) so it inherits resources from the 'global' project.

1. Under the **Config** tab select **System > Projects** page
2. Find your project and click the **Edit** button.
3. Select the inheritable project from the **Parent Project** dropdown list (i.e. global), and click **Save**.

### Project Settings

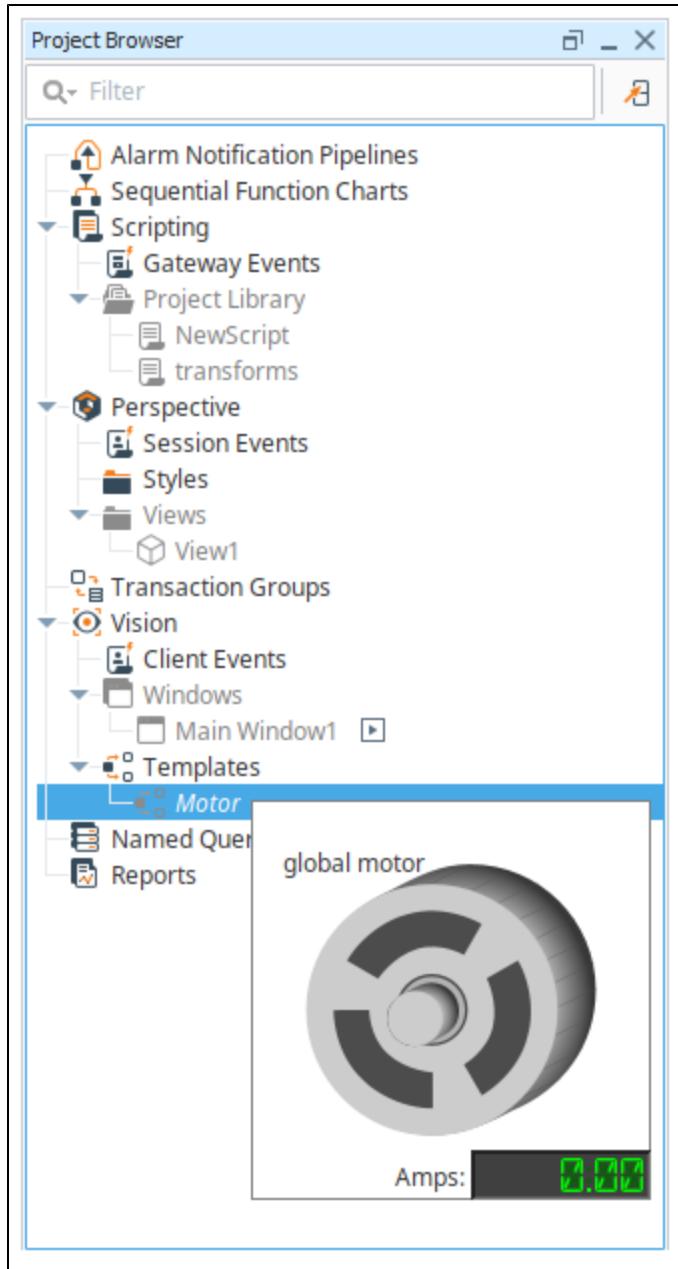
|                |                                                                                                                                                                              |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name *         | Project_X                                                                                                                                                                    |
|                | Choose a name to identify this project.                                                                                                                                      |
| Description    |                                                                                                                                                                              |
| Title          | The title for the project. This can contain more characters than the name (space, etc), and will be used to represent the project to users. If empty, the name will be used. |
| Enabled        | <input checked="" type="checkbox"/> A disabled project will not be active on the Gateway, but will remain editable in the Designer.                                          |
| Inheritable    | <input type="checkbox"/> Inheritable projects are not runnable as a stand-alone project, but are intended to provide shared resources to one or more child projects.         |
| Parent Project | global                                                                                                                                                                       |

## Using Inherited Resources

You can treat an inheritable project as a library of resources for use in other projects. When project resources are changed in the original project, these changes will get passed down to the inherited projects. The same thing is true if new resources are added to the inheritable project. By using inheritable projects, you can create a resource library that will help designers build their projects more quickly, ensure consistency and reusability across all their projects.

To view your inherited resources, go to the Designer and open your inheriting project (i.e., Project\_X). Expand the folders that contain resources, and you'll notice that the inherited project resources are grayed out, including the Perspective Views and Vision Windows folders. Grayed out resources mean that those resources are inherited, and can only be edited from their original / parent project. Anytime a new resource is added or an existing resource is changed in the inheritable / parent project, it will propagate down to the inherited project and will appear grayed out unless that resource is overridden.

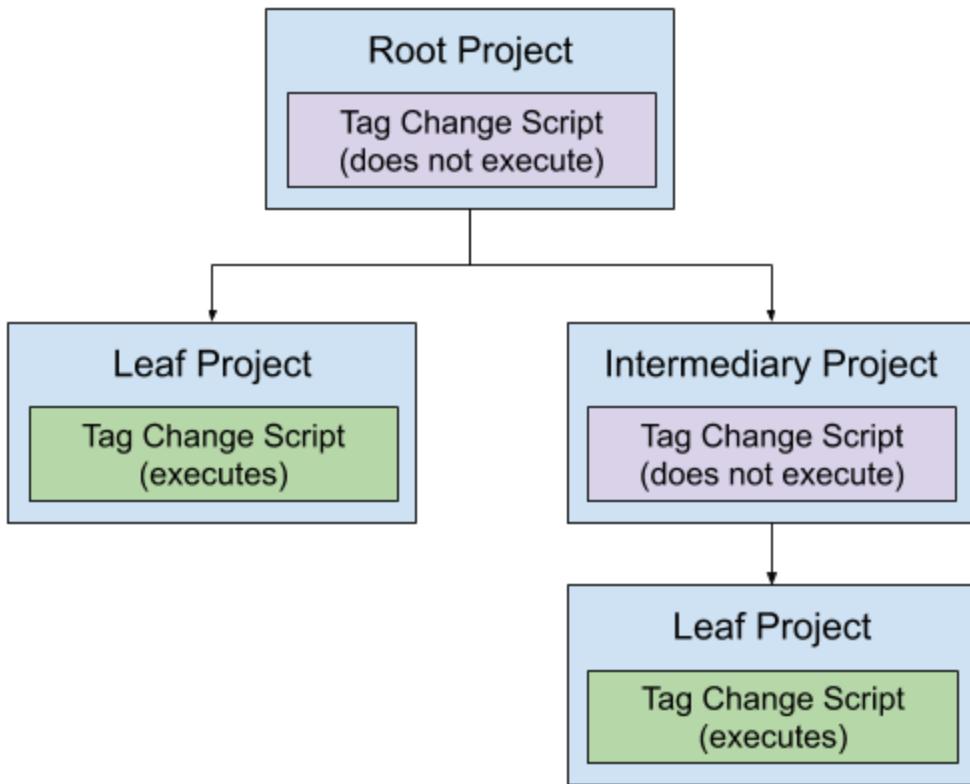
You can view a grayed out resource by either selecting the **Open read-only** option or hovering your mouse over the resource name in the Project Browser. Each resource displays a little differently: hover over the resource using your mouse, or click on the resource name to open it.



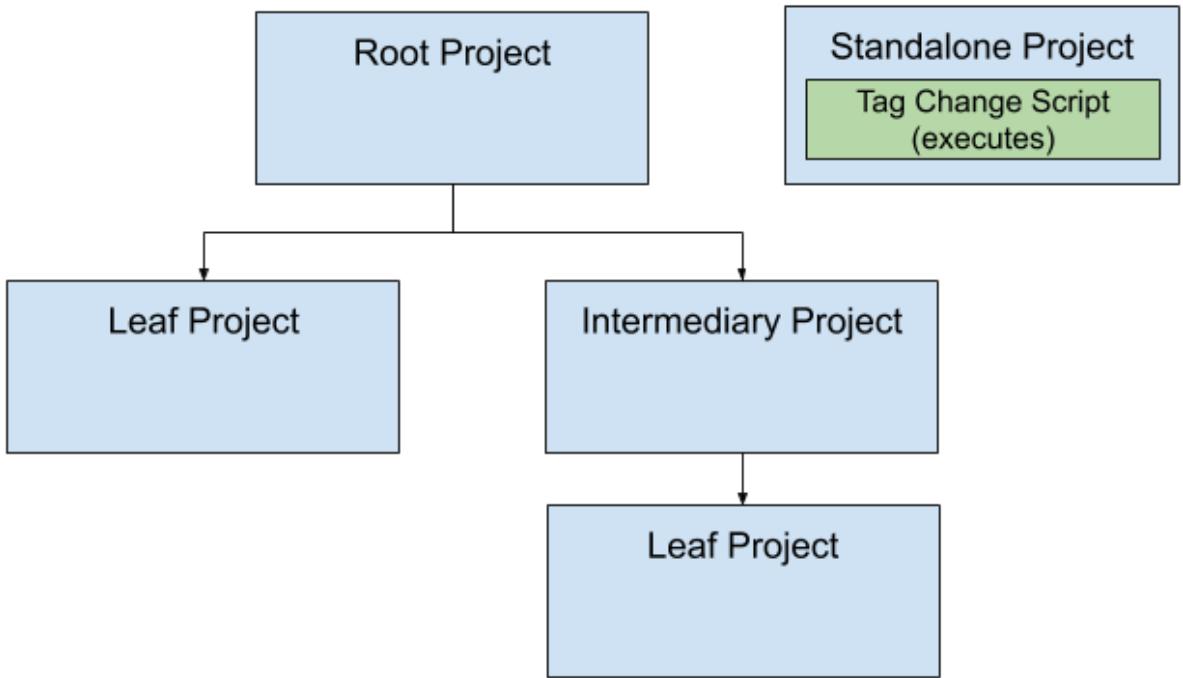
## Inheritance and "Runnable" Resources

Some resources in a project "run" or execute in every leaf project (that is, a project that is **not** inherited by any other project) in the inheritance chain. Thus, if multiple projects inherit from the same parent project, then each leaf project will contain runnable resources, potentially resulting in duplicate executions.

The diagram below represents an inheritance hierarchy on a single gateway. A "Root" project contains a Gateway Tag Change script. Two projects inherit from the Root, so they'll inherit the script. In both cases, the inheritance chain leads to leaf projects. In this single gateway, two running instances of the same tag change script exist, meaning there will be duplicate script executions.



In the case of resources that "run", it is highly advised that they exist in a leaf project, or a standalone project (a project that does not participate in inheritance at all). In regards to the diagram above, we could prevent duplicate execution of our Tag Change Script easily by moving the Tag Change Script to a separate, standalone project:



## "Runnable" Resources

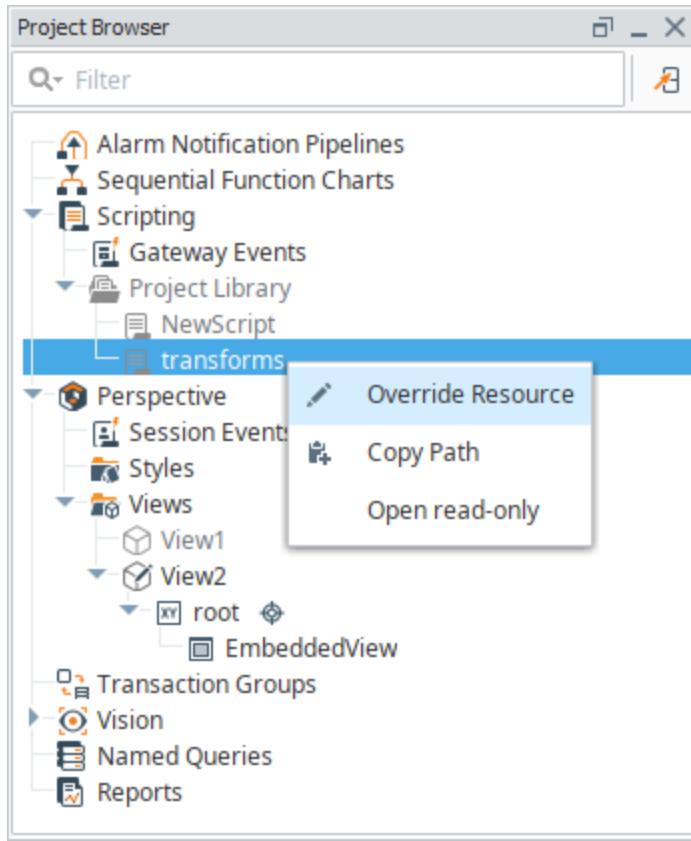
The following resources are considered "runnable":

- [Gateway Event Scripts](#)
- [Alarm Notification Pipelines](#)
- [Sequential Function Charts](#)
- [Transaction Groups](#)

## Overriding Inherited Resources

To edit a resource in an inherited project, you need to override the resource by right clicking the resource and selecting **Override Resource**. By overriding the inherited resource, the resource is recreated in the inherited project, and any future changes made to the original project resource will *not* propagate down to the inherited resource.

If new resources are added in the inheritable / parent project, they will automatically propagate down to inherited projects. New resources that are added in the inherited project will be displayed as grayed out. You will need to override each new resource to edit it.

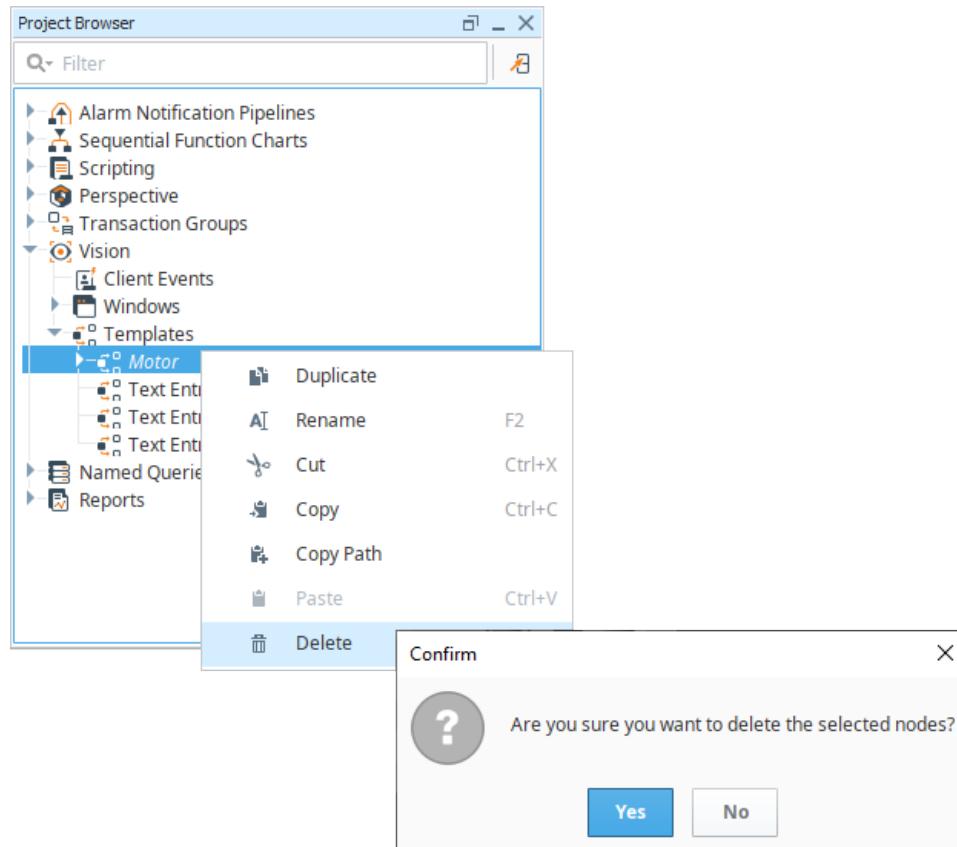


## Deleting Inherited Resources

Inherited resources that have been overridden can be deleted from an inherited project. When you delete an inherited resource, it doesn't delete the resource from the inheritable / parent project, it deletes the 'Override' you previously placed on the inherited resource. The inherited project resource will return to the version that is currently in the inheritable / parent project (without your edits), and the resource becomes grayed out in the Project Browser.

1. To delete the override on an inherited resource, right click on the resource and select **Delete**.

2. A dialog box will popup confirming you want to delete the selected node, click **Yes**. The resource will immediately be grayed out preventing designers from editing that resource.



## Renaming an Inherited Resource

You can easily rename an inherited resource, but beware that when you rename a resource, the inheritable project will propagate the original resource to the inherited project. For example, say you have an inheritable project resource named 'Map\_Transform' and you renamed it to 'CA\_Map\_Transform.' Ignition knows that the original project resource is no longer there, and because the project is flagged as inheritable, it will propagate that original resource to the inherited project. Now you have both the renamed 'CA\_Map\_Transform' and the original inheritable resource 'Map\_Transform.'

## Inheritable Project Examples

There are many ways how you might want to configure and organize your inheritable projects. It's whatever works best for your organization and design projects. Here are a couple of common ways to organize your shareable resources.

- You can create one inheritable project that contains many project different resources: scripts, pipelines, views, templates, windows, SFCs, etc. This is one inheritable project containing all your inheritable project resources.
- Another option is to create several inheritable projects. You can have one inheritable project dedicated for each type of resource: one for scripts, one for views, one for templates, one for pipelines, etc.

## Project Export

When a [project is exported](#), you don't get any inherited resources with your export. However, if a project resource was overridden and edited, that essentially becomes a new resource and will be included in a project export. Resources that are inherited and not overridden will have to be included as part of an inheritable project export. Once a new project is imported into a Gateway, you can always configure that project to inherit from another project.

### Related Topics ...

- [Project Inheritance - Upgraded Features in Ignition 8](#)
- [Project Export and Import](#)



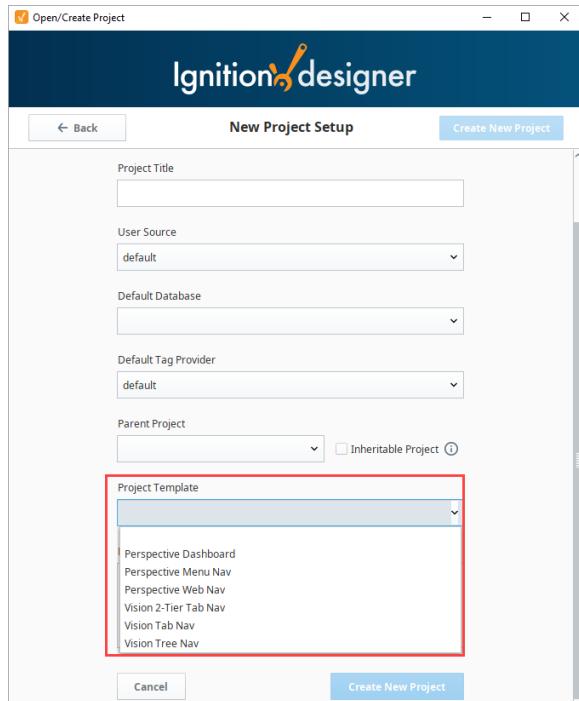
# Project Templates

When you [launch the Designer](#), you will be presented with the Open/Create Project window. This window lets you hit the ground running almost immediately by populating a few fields, the most important ones being your project Name and Title. You can use the defaults in the remaining fields and change them in the **Config > Project** page later, but don't overlook the **Project Template** field. Ignition provides several project templates for you to choose from to help you quickly get started developing your project in either Perspective or Vision. The templates get you started with a basic navigation structure and let you add more items as your project matures.

**Note:** You must be connecting to the Internet in order to see the templates available in the Project Template list.

## On this page ...

- [Perspective Project Templates](#)
  - [Web Nav](#)
  - [Perspective Menu Nav](#)
  - [Editing Properties and Page Configuration Settings](#)
  - [Widget Dashboard](#)
- [Vision Project Templates](#)
  - [Tab Nav](#)
  - [2-Tier Tab Nav](#)
  - [Tree Nav](#)
  - [Adding Windows to the Navigation](#)



## Perspective Project Templates

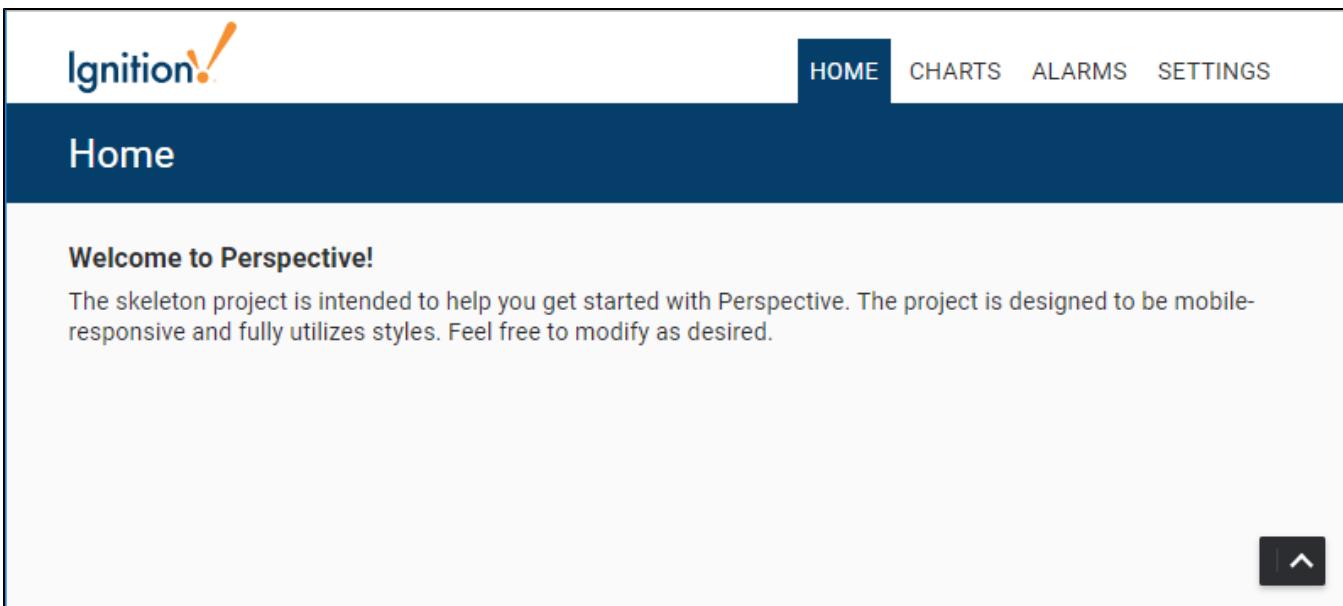
Here are two Perspective Project Templates you can choose from to get you off to a quick start: **Menu Nav** and **Web Nav**.

The Perspective Menu Nav and Web Nav templates contain several pre-defined views: Home, Charts, Alarms, and Settings. These views can easily be edited by selecting the view in the Project Browser and editing its Props to anything you want them to be. You can also go to the [Page Configuration](#) and edit the page configuration settings and [docked view](#) properties.

The images below show what the Menu Nav and Web Nav look like in a Perspective Session.

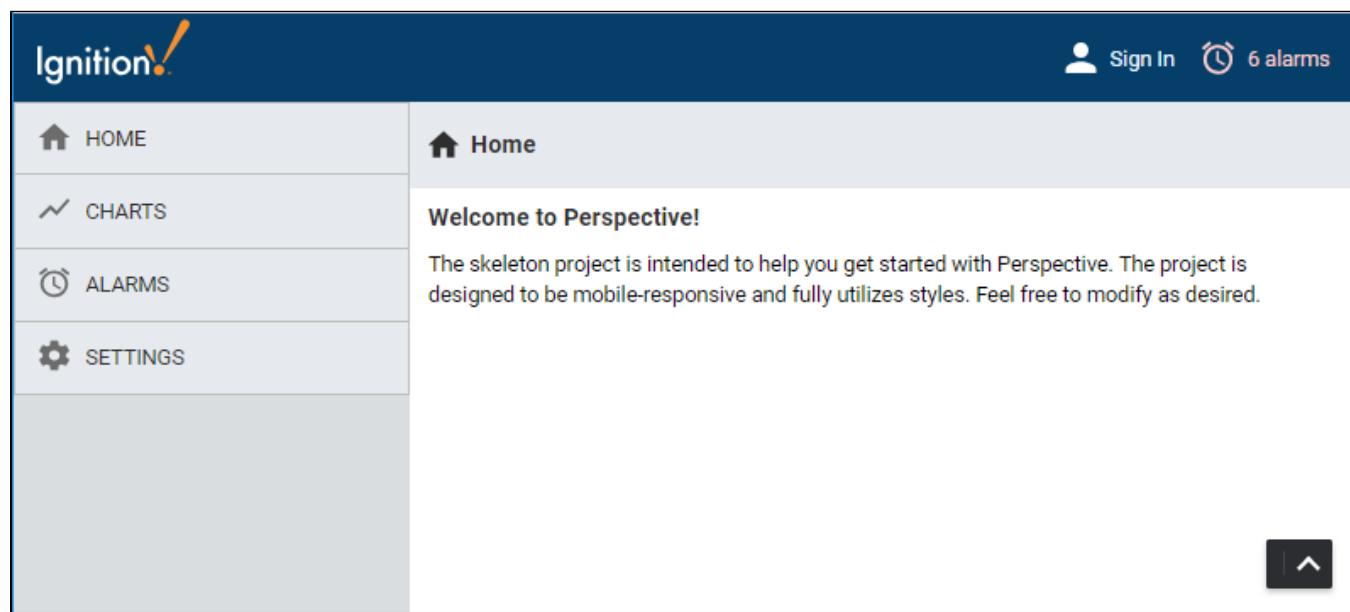
### Web Nav

The Web Nav is good for small size project structures where you only have a few main Views. It allows you to navigate the areas of your project using the tabs at the top of the screen. It has a docked view that contains tabs that are always open to do navigation, and the main view which fills the rest of the space. It is a flat structure similar to the what you see on many webpages.



## Perspective Menu Nav

The Menu Nav template is a hierarchical view of groups of information that can be configured to expand submenu branches and menu items and is docked on the left side of the screen. The Menu Nav is good for medium and large project structures because you can expose important information at a glance and allow users to navigate and expand submenus if any exist. The menu automatically hides itself on smaller screens devices.



## Editing Properties and Page Configuration Settings

To edit the Menu Nav and Web Nav menus, first you have to have pages configured in your project. Once you have pages configured, you can go to the Navigation view in the Project Browser, select the component and change the corresponding component props in the Perspective Property Editor to add, remove, or update the menu items.

### Page Configuration Settings

### Page Configuration

**Shared settings**

- / → Page/Home
- /alarms → Page/Alarms
- /charts → Page/Charts
- /settings → Page/Settings

**Header BP Large**

**Corner Priority**

**left-right** **top-bottom**

**Menu**

**Configure Docked View**

**View**: Docks/Menu

**Display**: auto, **Resizable?**: false

**Content**: push, **Modal?**: false

**Size**: 260, **Auto Breakpoint**: 768

**Dock ID**: menu, **Handle**: hide

**Handle Icon**: (empty)

**View Parameters**: + Add Object Member...

### Project Browser and Project Editor

**File Edit View Project Component Tools Help**

**Project Browser**

**Perspective Property Editor**

**Perspective Components**

**Home**

Welcome to Perspective!

The skeleton project is intended to help you get started with Perspective. The project is designed to be mobile-responsive and fully utilizes styles. Feel free to modify as desired.

**Views**

- Banners
- Header
- Pages
- Alarms
- Charts
- Home
- root
- Container
- Banner
- Spacer Banner
- Content
- Spacer Footer
- Settings

**PERSPECTIVE PROPERTY EDITOR**

**PROPS**

- path : Banners/Ti...
- params (1)
- title : Home
- useDefaultViewWidth: false
- useDefaultViewHeight: false
- style (1)
- classes :

**POSITION**

- basis : auto
- grow : 0
- shrink : 0

**CUSTOM**

+ Add Custom Property...

**META**

- name : Banner
- visible : true
- rotate (2)
- anchor : 50% 50%
- angle : 0

## Widget Dashboard

The Widget Dashboard template allows you to configure a dashboard for individual users. A dashboard can be added and configured in such a way that only a particular user like an administrator or even a guest can view it when logged into the session. It has built-in widgets included with the template that you can access to design your dashboard.

To get your project working you must first set a valid default [database connection](#) under **Config > Project Settings** on the Gateway Webpage. You don't need to edit any of the views in Designer. Just open a session and login since the project requires an authenticated user to add and edit a dashboard.

The screenshot shows a dashboard interface with two identical panels. Each panel has a dark blue header bar with the text "Welcome" and a "light-cool" color palette selector. Below the header is a large "Add Dashboard" button with a plus sign icon. The main body of each panel displays the message "No dashboards exist. Click add to create a new dashboard." At the bottom of each panel are three icons: a plus sign for "Add Dashboard", a horizontal ellipsis for "Reorder", and a user profile icon labeled "Guest". The "Guest" icon is highlighted with a red border. The entire interface is set against a light gray background.

Move your mouse over the dashboard and you'll see a plus icon appear. A dropdown list of built-in widgets will be displayed. Select your widget and press **Add**. The widget will appear on your dashboard. To edit the widget, click the edit icon on the widget, and when you're finished, click **Save**. Add as many widgets as you want.

PROJECTONE

## Edit Dashboard

DETAILS WIDGETS

Breakpoints  
0px

Gauge

Hand

Off

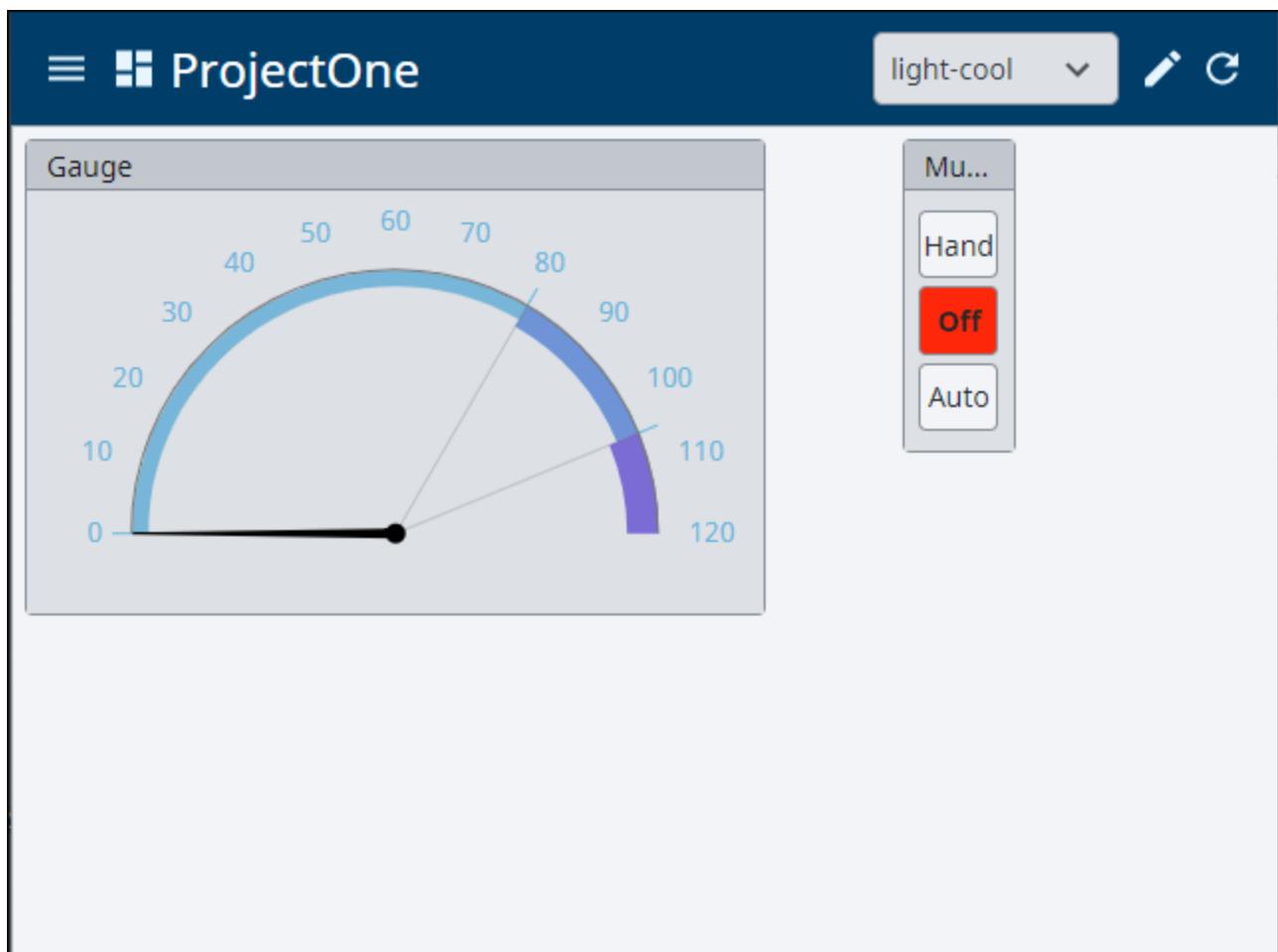
Auto

Multi-State ...

SAVE DELETE

Add Dashboard Reorder admin1

Once you save, your Widget Dashboard navigation screen will be ready to use.



## Vision Project Templates

There are three Vision Project Templates to choose from to help kick start your project: **2-Tier Tab Nav**, **Tab Nav** and **Tree Nav**.

The Vision templates, just like the Perspective templates contain several pre-defined menu objects. These objects can easily be edited by selecting the object in the Project Browser by editing its properties and changing them to anything you want them to be.

The images below show what each of the Vision project templates look like in a Vision Client.

### Tab Nav

The Tab Nav is good for small size project structures where you only have a few main windows. It allows you to navigate the areas of your project using the tabs. The Tab Nav project template has a docked window that contains tabs that are always open to do navigation, and the main window which fills the rest of the space.

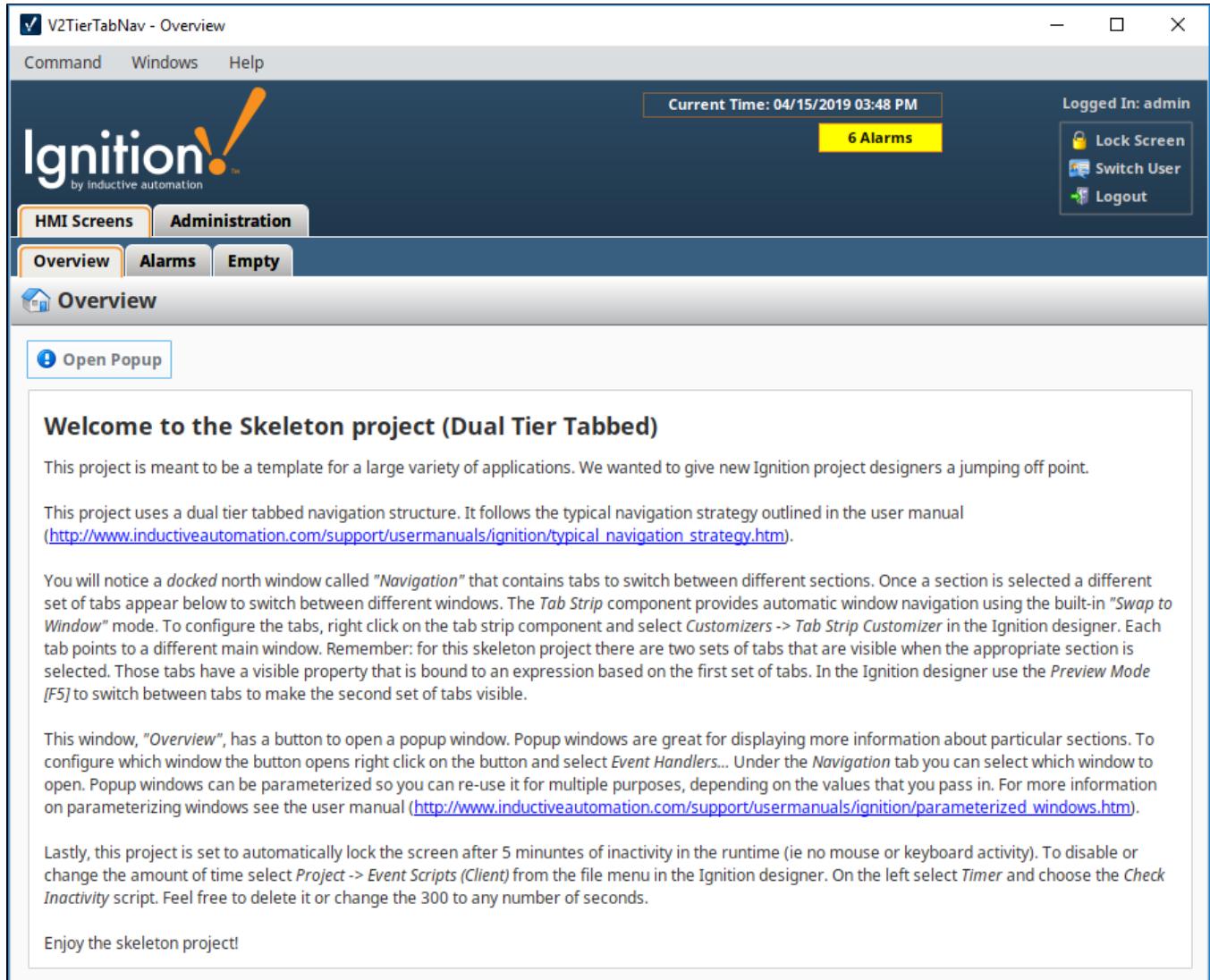
The screenshot shows the Ignition VTabNav - Alarms application window. The title bar says "VTabNav - Alarms". The menu bar includes "Command", "Windows", and "Help". The top right corner shows "Logged In: admin" with options to "Lock Screen", "Switch User", and "Logout". The main area has tabs "Overview", "Alarms" (which is selected and highlighted in orange), and "Empty". Below the tabs is a section titled "Alarms" with a warning icon. A table lists 15 alarms:

| Active Time       | Display Path                                | Current State           | Priority |
|-------------------|---------------------------------------------|-------------------------|----------|
| 4/12/19, 12:22 PM | Turbine Number 200 located at Livermore, CA | Active, Unacknowledged  | High     |
| 4/12/19, 12:22 PM | Turbine Number 100 located at Folsom, CA    | Active, Unacknowledged  | High     |
| 4/12/19, 12:22 PM | Turbine Number 150 located at Folsom, CA    | Active, Unacknowledged  | High     |
| 4/12/19, 12:22 PM | Turbine Number 300 located at Fresno        | Active, Unacknowledged  | High     |
| 4/12/19, 12:22 PM | F Temp/Alarm                                | Active, Unacknowledged  | Low      |
| 4/15/19, 4:31 PM  | VFD Motors/VFD Motor 1/Amps/Below Setpoint  | Active, Unacknowledged  | Low      |
| 4/15/19, 4:29 PM  | VFD Motors/VFD Motor 1/Amps/Below Setpoint  | Cleared, Unacknowledged | Low      |
| 4/15/19, 4:30 PM  | VFD Motors/VFD Motor 1/Amps/Below Setpoint  | Cleared, Unacknowledged | Low      |
| 4/15/19, 4:30 PM  | VFD Motors/VFD Motor 1/Amps/Below Setpoint  | Cleared, Unacknowledged | Low      |
| 4/15/19, 4:31 PM  | VFD Motors/VFD Motor 1/Amps/Below Setpoint  | Cleared, Unacknowledged | Low      |
| 4/12/19, 12:22 PM | Turbine Number 400 located at San Diego     | Cleared, Acknowledged   | High     |
| 4/12/19, 12:22 PM | Turbine Number 10 located at North          | Cleared, Acknowledged   | High     |
| 4/12/19, 12:22 PM | Turbine Number 155 located at Folsom, CA    | Cleared, Acknowledged   | High     |
| 4/12/19, 12:22 PM | Test/Boolean Tag/Above Normal               | Cleared, Acknowledged   | Low      |

At the bottom left are buttons for "Acknowledge" and "Shelve". On the far right are standard window control icons.

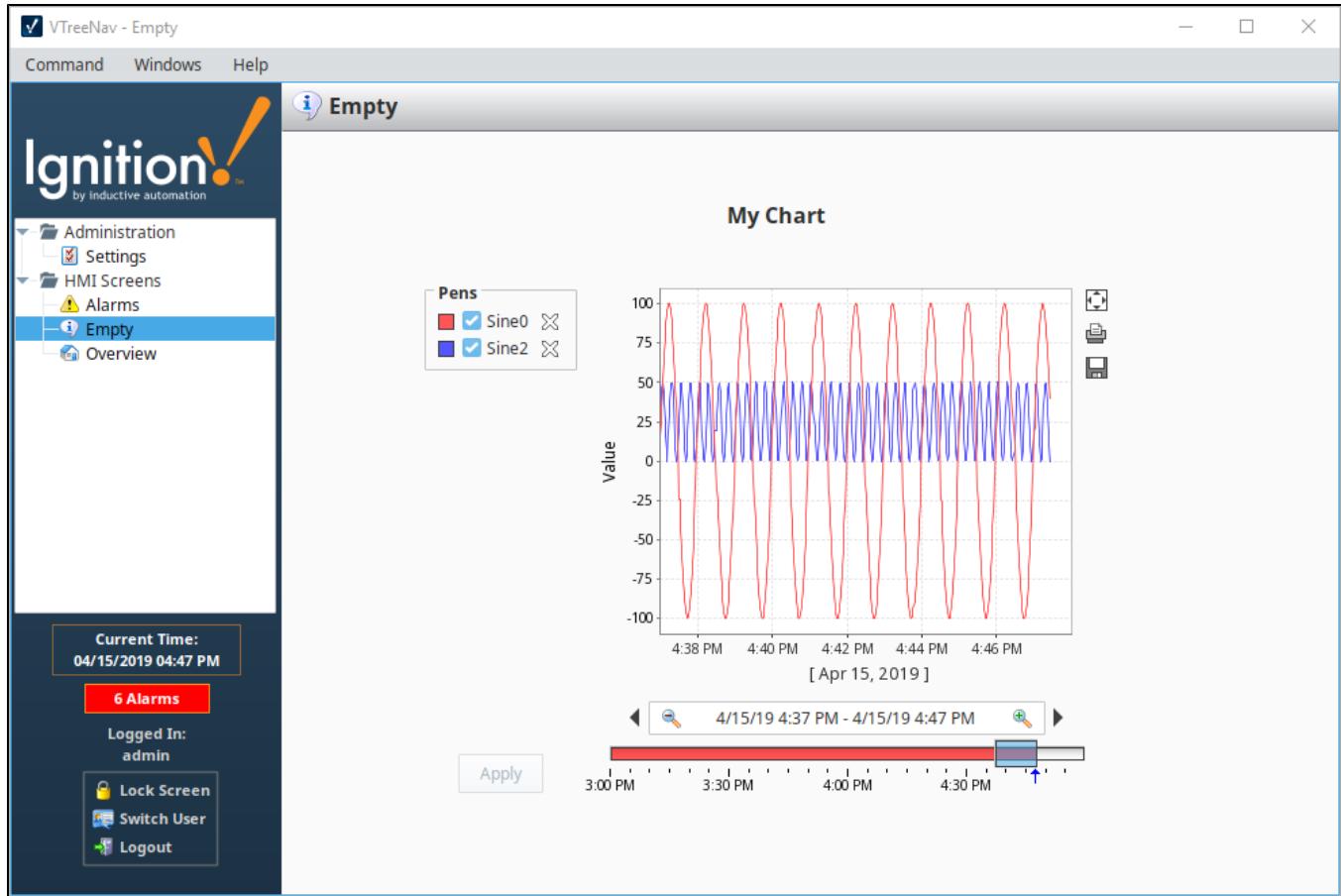
## 2-Tier Tab Nav

2-Tier Tab is good for small and regular size project structures where windows are grouped. The Tab Nav project template is similar to the Tab Nav template only it has a second tier of tabs added. It contains a second level of tabs allowing you to navigate around various areas of your project. The 2-Tier Tab Nav project template has a docked window that contains tabs that show and hide based on selection that are always open to do navigation, and the main window which fills the rest of the space.



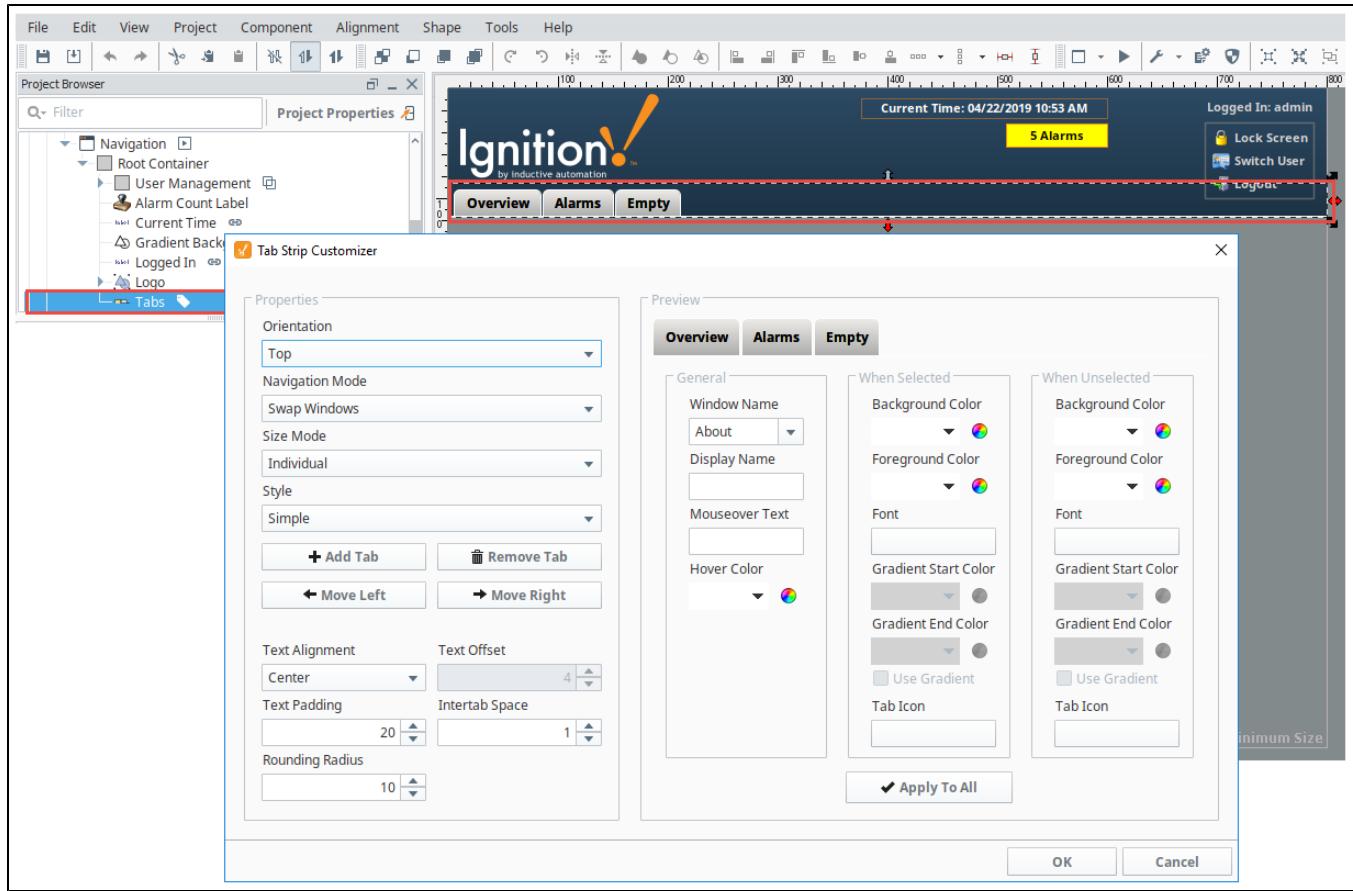
## Tree Nav

The Tree Nav project template is a hierarchical view of groups of information that can be configured to expand submenu branches and menu items and is docked on the left side of the screen. It is great for medium and large project structures because you can view the entire project structure at a glance allowing you to navigate to any structure within the tree view. The tree structure uses folders to group main windows, and can be as many levels deep as you need.



## Adding Windows to the Navigation

To edit the Tab Nav and Tree Nav menus, you just need to edit the properties of the navigation components. You can go to the Navigation window in the Project Browser, select the Tab Strip, and open the Tab Strip Customizer to change the corresponding component props to add, remove, or update the menu items.



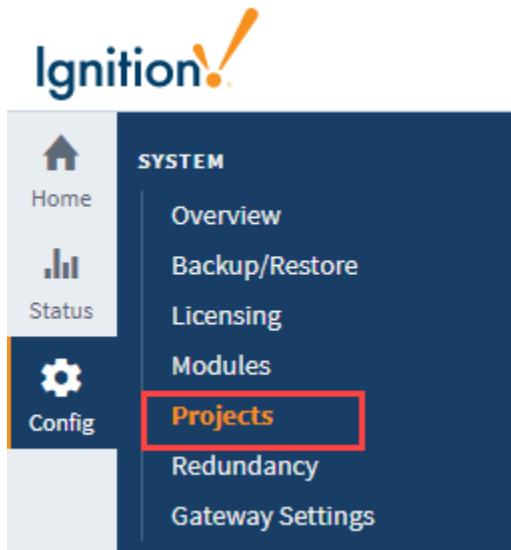
#### Related Topics ...

- [Quick Start Guide](#)
- [Designer](#)
- [Pages in Perspective](#)
- [Navigation Strategies in Vision](#)

# Project Settings

## Project Settings

When you create a new project, the Open/Create Project window captures most of the project settings. See [Creating a Project in the Designer](#). If you want to view or edit your project settings once your project is saved, go to the Config section on the Gateway Webpage and select **System > Projects**.



## On this page ...

- Project Settings
  - Project Settings Table
- Managing Projects
  - Viewing the Details of a Project
  - Editing a Project
  - Deleting a Project
  - Copying a Project
  - Renaming a Project
  - Exporting a Project

Click on the **Edit** to the right of the project name.

The screenshot shows a table titled 'Config > System > Projects'. The table has columns: Name, Description, Enabled, Inheritable, Parent project, and Actions. There are three rows of data:

| Name             | Description             | Enabled | Inheritable | Parent project | Actions                                     |
|------------------|-------------------------|---------|-------------|----------------|---------------------------------------------|
| P_Class_Test_SJP |                         | true    | false       |                | <button>More</button> <button>Edit</button> |
| Parent_Project   |                         | true    | true        |                | <button>More</button> <button>Edit</button> |
| Project_East_A   | East plant test project | true    | false       |                | <button>More</button> <button>Edit</button> |

This opens up the Project Settings page.

The screenshot shows the Ignition Config interface in Trial Mode at 1:49:33. The left sidebar has a dark blue background with white text and icons. It includes sections for SYSTEM (Overview, Backup/Restore, Licensing, Modules, Projects selected), NETWORKING (Web Server, Gateway Network, Email Settings), SECURITY (Auditing, Users, Roles, Service Security, Identity Providers, Security Levels, Security Zones), DATABASES (Connections, Drivers, Store and Forward), and ALARMING (General, Journal, Notification, On-Call Rosters, Schedules). A search bar at the bottom of the sidebar contains the placeholder "Search...". The main content area has a light gray background. At the top, it shows the path: Config > System > Projects > Project\_East\_A - Edit. Below that is a green banner with "Trial Mode 1:49:33" and a "Activate Ignition" button. The main form is titled "Project Settings". It has several fields: "Name \*" with "Project\_East\_A" and a note "Choose a name to identify this project"; "Description" with "East plant test project"; "Title" (empty); "Enabled" with a checked checkbox and a note "A disabled project will not be active on the Gateway, but will remain editable in the Designer"; "Inheritable" with an unchecked checkbox and a note "Inheritable projects are not runnable as a stand-alone project, but are intended to provide shared resources to one or more child projects"; "Parent Project" with a dropdown menu set to "Project\_West\_Templates"; and a "Connections" section with "User Source" set to "default", "Default Database" set to "DB", and "Default Tag Provider" set to "default".

## Project Settings Table

| Project Settings |                                                                                                                                                                                                                                                                               |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Property         | Description                                                                                                                                                                                                                                                                   |
| Name             | Name of the project (read only).                                                                                                                                                                                                                                              |
| Description      | Brief description of the project (optional). This description can be viewed on the Open/Create Project screen when you hover over the <b>Information</b> icon.                                                                                                                |
| Title            | Title for the project (optional). This is the name that will be displayed on the launch page of the Gateway and in the runtime Client or Session. There are no restrictions to special characters or spaces. If no title is specified, the project name will be used instead. |
| Enabled          | A disabled project will not be active on the Gateway, but will remain editable in the Designer.                                                                                                                                                                               |
| Inheritable      | Inheritable projects are not runnable as a stand-alone project, but are intended to provide shared resources to one or more child projects.                                                                                                                                   |
| Parent           | Each project can have a parent project, and will inherit all of the resources of that parent project.                                                                                                                                                                         |

| Project              |                                                                                                                                                                     |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Connections</b>   |                                                                                                                                                                     |
| User Source          | A group of users with their associated roles. Security policies are defined in terms of these roles.                                                                |
| Default Database     | Database to be used for historical data logging, reporting, storing alarm logs, and Tags storage. You can also query existing data and update data in the database. |
| Default Tag Provider | Identifies a Tag database (a collection of Tags) and a name.                                                                                                        |

## Managing Projects

Once you have a project or two (or twenty) setup, you might want to change some of the base settings. You can manage the projects from the Config section of Gateway by going to **System > Projects**. The Projects window displays all your projects. To the right of the project name, click the **More** button, and here you can Edit, Delete, view Details, Copy, Rename or Export your project.

**Note:** You can manage many of these settings in the Designer. See the [Project Properties](#) page for more information.

| Name        | Description | Enabled | Inheritable | Parent project | Actions                                                          |
|-------------|-------------|---------|-------------|----------------|------------------------------------------------------------------|
| Compressor  |             | true    | false       |                | <a href="#">More</a> <a href="#">Edit</a>                        |
| Controller  |             | true    |             |                | <a href="#">Delete</a> <a href="#">More</a> <a href="#">Edit</a> |
| Controller1 |             | true    |             |                | <a href="#">More</a> <a href="#">Edit</a>                        |
| ExportTags  |             | true    |             |                | <a href="#">Copy</a> <a href="#">More</a> <a href="#">Edit</a>   |
| NewProject  |             | true    |             |                | <a href="#">Rename</a> <a href="#">More</a> <a href="#">Edit</a> |
| NewProject1 |             | true    |             |                | <a href="#">Export</a> <a href="#">More</a> <a href="#">Edit</a> |
| NewProject2 |             | true    | false       | global         | <a href="#">More</a> <a href="#">Edit</a>                        |

## Viewing the Details of a Project

To view the project details, go to the Config section of the Gateway webpage, and select **System > Projects**. Find your project, press the **More** button to the right of the project name, and select **Details**. The Details link on the Project window takes you to the Project details for '**<Project Name>**' page where you can choose to view the [Project Settings](#).

## Editing a Project

To edit some of the project settings, go to the Config section of Gateway, and then to **System > Projects**. You will see a list of all your projects. Click **Edit** to the right of project name in the list. The Project - Edit page is displayed. You can now change some of the project settings such as project Description, Title, Enabled, etc. You can also change connections to the User Source, Default Database, and Default Tag Provider.

### Caution: Recommend Changing the Title, not the Project Name

It is not advisable to change the Project Name after it's been created, instead, change the Title property if you want to change how the project appears. Shortcuts that refer to the project will no longer work if the project name is changed.

Many of these settings can be modified in the Designer too, but it is important to note that you cannot change any of these project settings from the Gateway if the project is currently open in a Designer.

## Deleting a Project

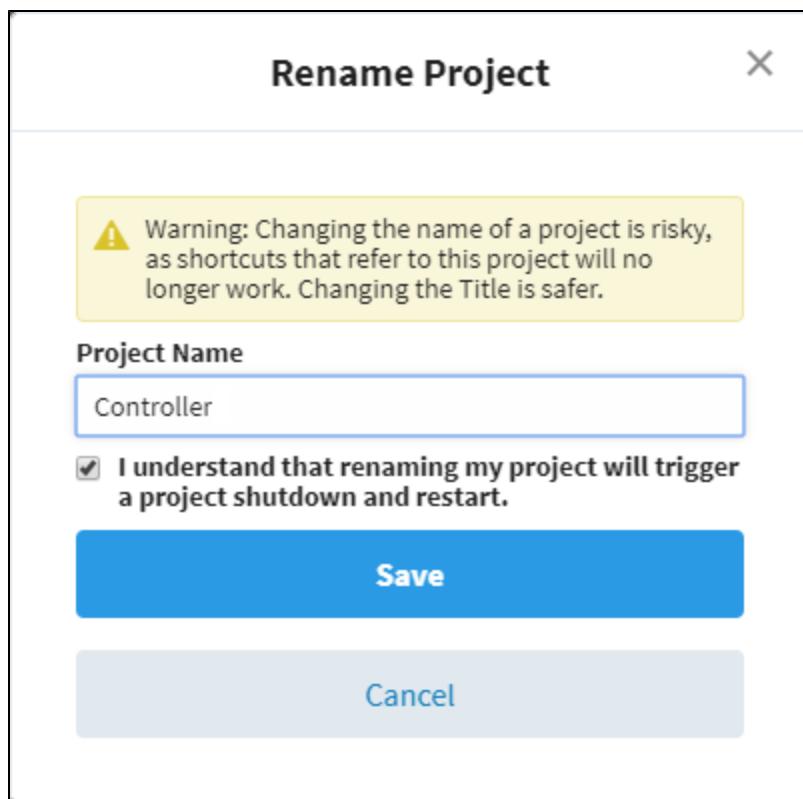
Be aware that once you delete a project, it cannot be undone, a deleted project is gone forever (unless it can be recovered from a [project export](#), [Gateway backup](#) or a [Gateway scheduled backup](#)). Always make a [project export](#) or [Gateway Backup](#) before deleting a project. To delete a project, go to the Config section of Gateway, and then to **System > Projects**. You will now see a list of all your projects. To the right of the project name in the list, look for **Delete** and click on it. This deletes your project.

## Copying a Project

Copying your project is useful when you need a *snapshot* of a project before starting major changes, or for creating a starting point for a new project based on an old one. To copy a project, go to the Config section of Gateway, and then to **System > Projects**. You will now see a list of all your projects. To the right of the project name in the list, click **Copy**. This creates a copy of your project.

## Renaming a Project

Changing the name of a project is risky. Shortcuts that refer to the project will no longer work. It is advisable to change the Title which is much safer. If you decide to rename a project, go to the Config section of Gateway and then to **System > Projects**. To the right of the project name in the list, click **Rename**. This will open a Rename Project window. Read it carefully, and if you want to proceed, enter a new project name, mark the checkbox acknowledging that the project will shutdown and restart, then click **Save**.



**Note:** Renaming a project triggers a project shutdown and restart.

## Exporting a Project

Project Export is a project backup. It takes less time than a Gateway backup and it's smaller. This exports your project as a **.zip** file. Once you have an exported file of your project, you can take it to any other Gateway and merge it in with other projects. Refer to the [Project Export and Import](#) page to learn exactly what is included in a project export.

Related Topics ...

- [Project Properties](#)

- Project Export and Import

# Ignition Redundancy

Ignition redundancy supports a 2-node system, meaning there are two copies of the Gateway running. One node is the Master Gateway and the other is the Backup Gateway or backup node. All projects, Gateway settings, etc., are shared between nodes. The master node manages the configuration then replicates it to the backup node.

The screenshot shows the Ignition Gateway Status Overview page. In the top right corner, under the 'Redundancy' section, it says 'Redundancy' with a status of 'Active, Connected'. Below this, the 'Gateway Network' section shows 1 active connection and 2 remote gateways. The 'Systems' section provides performance metrics like CPU usage (8% CPU | 320mb), redundancy status (Active, Connected), and module counts (25 installed, 120 total). The 'Connections' section lists various network components: Designer Sessions (1 open), Databases (0/8 connected), OPC Connections (1/1 connected), Store & Forward (0 stores quarantined), Devices (1 enabled), and Vision Clients (0 open).

## On this page ...

- Node Communication
- Configuration Synchronization
- Runtime State Synchronization
- Status Monitoring
- System Activity
- Historical Logging
- Client Failover
  - Vision Clients
  - Perspective Sessions



## How Redundancy Works

[Watch the Video](#)



## Updating or Patching a Redundant Ignition Pair

Learn about updating redundant servers and how to make the process a success.

[Link to Knowledge Base Article](#)

When you have redundant systems in place, you can get detailed status information by going to Gateway webpage and selecting **Status > Redundancy** to view the system's status and events.

## Node Communication

The master and backup nodes communicate over TCP/IP. Therefore, they must be able to see each other over the network, through any firewalls that might be in place. All communication goes from the backup to the master node over the gateway network (default **port 8088** without SSL, **port 8060** with SSL). Therefore, that port must allow TCP listening on the master machine.

## Configuration Synchronization

The master node maintains the official version of the system configuration. You must make all changes to the system on the master Gateway, the backup Gateway does not allow you to edit properties. Similarly, the Designer only connects to the master node.

When changes are made on the master, they are queued up to be sent to the backup node. When the backup connects, it retrieves these updates, or downloads a full system backup if it is too far out of date.

If the master node has modules that aren't present on the backup, they are sent across. Both types of backup transfers, **data only** and **full**, will trigger the Gateway to perform a soft reboot.

## Runtime State Synchronization

Information that is only relevant to the running state, such as current alarm states, is shared between nodes on a differential basis so that the backup can take over with the same state that the master had.

On first connection or if the backup node falls too far out of sync, a full state transfer is performed. This information is light-weight and does not trigger a Gateway restart.

## Status Monitoring

Once connected, the nodes begin monitoring each other for liveness and configuration changes. While the master is up, the backup runs according to the **stand by activity level** in the settings.

When the master cannot be contacted by the backup for the specified amount of time, it is determined to be down and the backup assumes responsibility. When the master becomes available again, responsibility is dictated by the recovery mode and the master either takes over immediately or waits for user interaction.

## System Activity

When a node is active, it runs fully, connecting to any configured OPC servers, and communicating with devices. When it is not active, its activity level is dictated by the settings, either **warm** or **cold**.

- In **warm** standby, the system runs as if it were active, with the exception of logging data or writing to devices, allowing for faster fail-over.
- In **cold** standby, the system connects to all OPC servers but does not subscribe to Tag values. The Ignition OPC UA server does not communicate with any device, but third party OPC UA servers may still have device connections. This allows the system to standby without putting additional load on the devices and network. Failover takes slightly longer, as Tags must be subscribed and initialized.

## Historical Logging

Historical data presents a unique challenge when working with redundancy because it is never possible for the backup node to know whether the master is truly down or simply unreachable. If the master was running, but unreachable due to a network failure, the backup node becomes active and begins to log history at the same time as the master, who is still active.

In some cases this is OK because the immediate availability of the data is more important than the fact that duplicate entries are logged. But in other cases, it's desirable to avoid duplicates, even at the cost of not having the data available until information about the master state is available.

Ignition redundancy provides for both of these cases, with the **backup history level**, which can be either **Partial** or **Full**.

- In **Full** mode, the backup node logs data directly to the database.
- In **Partial** mode, however, all historical data is cached until a connection is reestablished with the master. At that time, the backup and master communicate about the uptime of the master, and only the data that was collected while the master was truly down is forwarded to the database.

## Client Failover

### Vision Clients

All Vision clients connect to the active node. When this system fails and is no longer available, they automatically re-target to the other node. The reconnection and session establishment procedures are handled automatically, but the user is notified that they have been transferred to a different node so that they can notify the system administrator that the system may need attention.

### Perspective Sessions

Like Vision clients, Perspective sessions connect to the active node. When connection to the active node is lost, or the activity level of the Gateway changes from **active**, the session will simultaneously attempt to:

1. Re-establish the connection to the Gateway it was connected to, and check to make sure its activity level is **active**.
2. Monitor the backup Gateway. If the backup Gateway becomes reachable and **active** before the connection to the active Gateway can be re-established, the Perspective session navigates in the browser to the same project and page on the backup Gateway.

[In This Section ...](#)

# Setting Up Redundancy

In redundancy, both nodes will share the exact same configuration state. When a Backup node connects to a Master node, the Backup will attempt to synchronize itself with the Master. Therefore, before you set up for redundancy the following should be considered:

## 1. Start with a fresh install for the Backup node.

Because the current configuration of the Backup node will be overwritten, make sure that it does not contain anything valuable. It is a good idea to export any projects that are unique to the Backup before enabling redundancy.

## 2. All system configurations relative to the Master node must also resolve on the Backup node.

For example, OPC UA connections and database connections must use addresses that resolve from both nodes, or any OPC-COM servers must be installed and configured identically on both nodes. This means using "localhost" in any of the database connections won't work. You should use the IP address of the computer instead.

## 3. Configure firewalls between the redundancy nodes.

Redundant systems need TCP connectivity between each other on the default Gateway network ports. Turning off software firewalls or adding special exception rules for each others' addresses is required. The default Gateway Network port is **port 8088** (without SSL), and **port 8060** (with SSL), and the Backup node must be able to send outgoing data on that port. The port can be changed from Gateway Network settings.

**Note:** Two [Edge Gateways](#) can be set up with redundancy. An Edge Gateway can only failover to another Edge Gateway (not a standard Ignition Gateway). Also, an Edge Gateway cannot be used as backup to a Standard Ignition Gateway.

### Note:

While the OS platform (i.e., Windows, OS X, Linux) for the Master and Backup can differ, it is recommended to have similar OS platforms. If the OS platforms do differ, the Windows machine should be the master system or else the Force Failover option will not work.

However, different versions of the same operating system such as Windows 10 and Windows 8 or OSX 10 and OSX 11 have full functionality.

## On this page ...

- [On the Master Gateway](#)
- [On the Backup Gateway](#)
- [On the Master Gateway](#)
- [Redundancy Settings](#)
- [Troubleshooting](#)
  - [Redundancy Connectivity](#)
  - [Advanced Troubleshooting](#)



INDUCTIVE  
UNIVERSITY

## Setting Up Redundancy

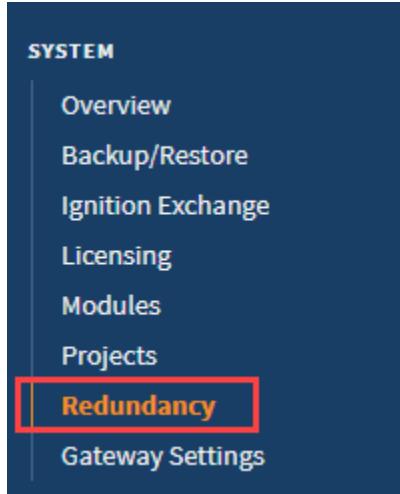
[Watch the Video](#)

## On the Master Gateway

### 1. Go to the [Config](#) section of the Master Gateway Webpage.

### 2. Select [System > Redundancy](#).

The Redundancy and Network Configuration page is displayed showing different sections and settings. See the table below for a description of all settings.



3. Change the following settings:
- UnderRedundancy Settings, set Mode to **Master**.
  - Optionally, configure any desired settings underMaster Node Settings.

| Redundancy Settings          |                                                                                                                                                                                                                                                                                      |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode                         | <input type="button" value="Master"/><br>Independent<br>Backup<br><b>Master</b> <span style="background-color: #ffffcc; border: 1px solid #ccc; padding: 2px;"> </span>                                                                                                              |
| Standby Activity Level       | <input type="button" value="Cold"/><br>How the node should run when it is not currently the active node. If <code>cold</code> , the node will perform minimal operations until it becomes active. If <code>warm</code> , the node will run at a high level, reducing failover times. |
| Failover Timeout             | <input type="text" value="10000"/> <span style="font-size: small;">[<input ]<="" span="" type="button" value="..."/><br/>           The time of inactivity, in milliseconds, before the backup assumes responsibility.<br/>           (default: 10000)         </span>               |
| Startup Connection Allowance | <input type="text" value="30000"/><br>The time in milliseconds that the system will wait at startup for a connection before making a decision on the node's responsibility level.<br>(default: 30000)                                                                                |

4. Click **Save Changes**. The Confirm change to Redundancy Settings page is displayed.

**Confirm Change to Redundancy Settings**

Altering redundancy settings can potentially have a large impact on the system, and may require a restart. Are you sure you want to continue?

**Confirm**

**Cancel**

5. Click **Confirm** to apply your settings.  
 6. Go to the Config tab and select **System > Redundancy** to ensure the redundancy mode and state is properly set.

## On the Backup Gateway

Do the exact same steps 1-6 above on the Backup Gateway Webpage, except replace step 3 with the following:

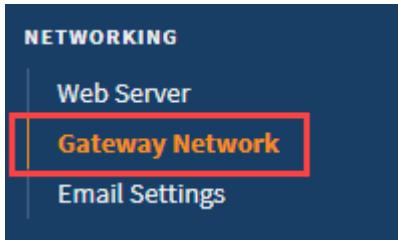
- Under Redundancy Settings, set **Mode to Backup**.
- Under Backup Node Settings, configure the Master Node Address and Port to point to the Master Gateway. The Master Node address should be a hostname or IP address. The Port setting (assuming default configurations) should be **8060** if using SSL,

otherwise **8088**.

The screenshot shows the 'Redundancy Settings' configuration page. The 'Mode' dropdown is set to 'Backup', which is highlighted with a red box. Other options in the dropdown are 'Master', 'Independent', and 'Master'. Below the dropdown, there is a note: 'Only one master node can run this node's role. There should be one master and one backup. Selecting independent turns off redundancy.' The 'Standby Activity Level' is set to 'Cold'. The 'Failover Timeout' is set to '10000'. The 'Startup Connection Allowance' is set to '30000'.

## On the Master Gateway

1. Return to the Config section of the Master Gateway Webpage.
2. Select **Networking > Gateway Network**.



3. Navigate to the Incoming Connections tab. You should see a new incoming connection from the Backup Gateway. Find the connection, select **More**.
4. Select **approve**.

The screenshot shows the 'Incoming Connections' tab of the 'Gateway Network Settings' page. It lists a connection from 'ignition-tr-0690157-sb [be44105d-'. The 'Status' column shows 'PendingApproval'. The 'More' button next to the connection is highlighted with a red box. Below the table, there are 'approve' and 'delete' buttons, with 'approve' also highlighted with a red box.

5. To verify the redundancy setup, that is, to ensure the Master and the Backup Gateways are connected, go the Status tab of the Gateway Webpage and click on **System > Redundancy**. The Redundancy page will show the connected nodes and their current states.

After approving the connection, the Backup connects to the Master and downloads a system backup, then restarts. Once the restart is complete, the Backup node is synchronized and in communication with the Master.

## Redundancy Settings

All redundancy settings are configured in the Gateway Webpage under the Config tab, **Systems > Redundancy**. Most settings are used by both the Master and Backup nodes, with their individual settings broken out into separate categories.

It is important to know that while the full system configuration is shared between nodes, redundancy settings are not shared between nodes. Therefore, it is perfectly acceptable to have different values for the same settings on the two nodes. For example, it is possible to have a different Standby Activity Level on both nodes, and, of course, the network settings will often be different.

**Note:** The Master node shares all configuration with the Backup node, and this means that changes cannot be made to your project from the Backup. In fact, the Designer can never be opened from a Backup node, even if the Master is currently offline.

| Redundancy Settings          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode                         | <p>Enable or disable redundancy, and specify this node's role. There should be one master and one backup node per redundant pair. Independent turns off redundancy.</p> <p><b>Independent</b> - Redundancy is not enabled and this Ignition system runs as an independent node.</p> <p><b>Master</b> - This is the Master node, who listens for a connection from the Backup node, and is in charge of managing system synchronization.</p> <p><b>Backup</b> - This is the Backup node, who will connect to the Master and receive system updates.</p>                                                                                                                                                                                                           |
| Standby Activity Level       | <p>How the node should run when it is not currently the <b>Active</b> node.</p> <p><b>Cold</b> - The node performs minimal operations until it becomes active. The purpose is to minimize the load on the network and on devices.</p> <p><b>Warm</b> - The node runs at a high level, reducing failover times.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Failover Timeout             | The time of inactivity, in milliseconds, before the backup assumes responsibility.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Startup Connection Allowance | <p>The time in milliseconds that the system will wait at startup for a connection before making a decision on the node's responsibility level. This is used to prevent unnecessary switch over caused by a node starting as active, only to connect and find that the other node is active, resulting in one of the nodes being deactivated.</p> <p><b>Note:</b></p> <p>It is important to notice that this setting can interfere with the Master Recovery mode:</p> <ul style="list-style-type: none"><li>• If the Master is active, it will always request the Backup to de-activate.</li><li>• If this setting is low, or 0, the Master will always become active before connecting to the Backup, and thus "manual recovery" will not be possible.</li></ul> |

| Network Settings              |                                                                                                                                                                                                                                                                                      |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Auto Detect Network Interface | If true, the system will automatically select which network interface to use. Most commonly disabled on systems with multiple network cards, in order to explicitly specify which interface to use. If false, the system will bind itself to the interface of the specified address. |
| Network Bind Interface        | The IP address of the network interface to use for redundancy. Only used if "Auto Detect" is false.                                                                                                                                                                                  |

| Master Node Settings |                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recovery Mode        | <p>How the Master node resumes responsibility after starting again.</p> <p>Automatic - The Master automatically takes back responsibility, and becomes active. The Backup node goes to standby.</p> <p>Manual - The Backup node is allowed to stay active. The Master will become active if the Backup node fails, or if the user requests a switchover from the Gateway configuration page.</p> |
|                      |                                                                                                                                                                                                                                                                                                                                                                                                  |

|                            |                                                                                                                                                                                                                                                                                                           |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Runtime Update Buffer Size | How many "runtime state" updates can be queued in memory before the system stops tracking and a full transfer is performed. These updates represent information that the other node should have in order to have the same running state as the Master when it's forced to take over.                      |
|                            | This is most often the values of static Tags and the current alarm state. Given that the update buffer is only used once the nodes are connected, the default value is usually fine, and only needs to be increased on systems that may have many alarms that change together, or many static Tag writes. |
| Config Update Queue Size   | The maximum size (in megabytes) of config updates allowed before a full transfer is performed.                                                                                                                                                                                                            |

| Backup Node Settings |                                                                                                                                                                                                                                                                                                      |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Master Node Address  | The address of the Master Ignition system.                                                                                                                                                                                                                                                           |
| Port                 | The Gateway Network port used by the Master to listen on. For the Backup, the port to connect to on the Master.                                                                                                                                                                                      |
| Use SSL              | Use SSL to connect to the remote machine.                                                                                                                                                                                                                                                            |
| Ping Rate            | How often, in milliseconds, to send a message from the Backup to the Master.                                                                                                                                                                                                                         |
| Ping Timeout         | The maximum time, in milliseconds, allowed for a ping response. Pings that time out are counted as missed pings.                                                                                                                                                                                     |
| Ping Max Missed      | The amount of missed pings that will force the connection to the master to be considered faulted.                                                                                                                                                                                                    |
| Websocket Timeout    | The maximum time, in milliseconds, allowed for a new web socket to connect to the Master.                                                                                                                                                                                                            |
| HTTP Connect Timeout | The maximum time, in milliseconds, allowed to establish an HTTP connection to the Master.                                                                                                                                                                                                            |
| HTTP Read Timeout    | The maximum time, in milliseconds, allowed to read or send HTTP data to the Master.                                                                                                                                                                                                                  |
| History Mode         | How history is treated by the Backup system. If <b>Full</b> , history will be stored normally, as it would be on the Master system. If <b>Partial</b> , history will be cached until the Master is available again and the Backup node is able to determine the exact time that the Master was down. |

## Troubleshooting

### Redundancy Connectivity

When the two redundant nodes are connected, you will be able to see their state details in the [Status](#) section of the Gateway Webpage. There are also various other places where the redundancy state is shown as **connected**.

If the two nodes cannot connect, check the following:

- Verify that the Master address is correct in the Backup. Try to ping the Master machine from the Backup machine, and verify that you're using the correct address for the network card that the Master is connected through.
- If using system names (or domain names), verify that the name is resolving to the correct address by performing a ping.
- Verify that the firewall on the Master is set to allow TCP traffic to the designated port.
- Verify that the Backup is not connecting and then immediately disconnected for some reason.
- Viewing the error log in the Gateway console section should show this. If errors are occurring at regular intervals, look at the message for an indication of what is happening. An example of a potential problem is when the failover time is set too low for the given network, which results in many socket read timeout exceptions, which in turn leads to many disconnect/reconnect attempts.
- If errors are occurring, but the cause isn't clear, contact [Inductive Automation Support](#).

### Advanced Troubleshooting

A variety of loggers can be found under the Gateway console section by going to "Levels" and searching for "Redundancy". By setting these loggers to a finer level, more information will be logged to the console. This is generally only useful under the guidance of Inductive Automation support personnel, though more advanced users may find the additional logged information helpful.

[Related Topics ...](#)

- Database Considerations

# Database Considerations

## Ignition Database Requirements

Given that many parts of the Ignition system interact with the database, it's important to give some thought as to how it will be used when redundancy is turned on, and the different database architectures that are possible.

When evaluating database architectures for use with Ignition, it's important to look carefully at how the system will use the database. Which pieces are critical? Which pieces are "optional" so that the system continues to function while the database is down? Which pieces can operate in "read-only" mode if necessary?

Ignition uses the database for many purposes. Here are some common areas where they are used, and how availability can impact the system:

### Tags

**Tags** rely on the database for Tags that execute queries. These Tags will error out if the database is unavailable, but the status and control functionality of the system will function on the whole.

### History - Tags and Other

All history in Ignition goes through the [Store-and-Forward](#) system, meaning that it will be cached until the database is available. However, while the data is cached, it will be unavailable to view or analyze on the clients. Therefore, when looking at how the database should be set up, it is necessary to determine how crucial rapid-availability of the data is.

### Alarming

The alarm status system does not reside in the database, so it will continue to function if the connection is down. [Alarm Journal](#) information will go through the [Store-and-Forward](#) system as history data.

### Project Screens

Almost all projects use database access for providing information on screens. These queries will error out as long as the database is unavailable. Screens that only use Tags (in an internal provider) will continue to function, so it would be beneficial to make a distinction between status screens and history screens, if a failover database is not used.

## On this page ...

- [Ignition Database Requirements](#)
  - [Tags](#)
  - [History - Tags and Other](#)
  - [Alarming](#)
  - [Project Screens](#)
- [Database Architectures](#)
  - [Single Shared Server](#)
  - [Clustered/Replicated Database Servers](#)
- [Pertinent Settings](#)
  - [Database Connection Settings - Failover Datasource](#)
  - [Clustering Settings - History Mode](#)



## Database Considerations

[Watch the Video](#)

## Database Architectures

### Single Shared Server

A single database server is used. Any Ignition Gateways will use it, so it is expected to be available even when one of the nodes is not. For that reason, it almost always resides externally, on a separate server machine. This arrangement is the easiest to use with Ignition. A single database connection configured on the master will be replicated to the backup, and both nodes will use the connection as necessary.

### Clustered/Replicated Database Servers

There is a wide variety of capabilities supported by the different brands of database servers. To obtain fault-tolerance on the database front, it is usually necessary to have some sort of cluster/replication system in place. However, it can be very import to examine how Ignition is using the databases, and what capabilities the clustering solution provides.

For example, in many replication scenarios, the master database copies data to the backup. The backup can be used for read purposes, but new data inserted will not be replicated back to the master. Therefore, it is possible to have a failover connection to the backup database, so that clients will continue to receive data, but it would be necessary to run in partial history mode, so that the historical data was cached and inserted only to the master database. The failover connection would be set to standard mode, so the primary connection would be used when possible.

In a more complete cluster environment, where writes to either node would be replicated, a sticky failover connection could be used with full history mode.

### Pertinent Settings

When working with various database architectures, there are a few settings in various parts of the system that are important.

## Database Connection Settings - Failover Datasource

Any database connection can have a failover datasource. If the main connection is unavailable, any queries executed on it will pass through to the secondary connection. In this way, a secondary database can be used when the first is not available, and the system will continue to function. It is important to note that everything passed through to the failover will function normally- no special considerations will be made. For example, the system won't cache data for the primary connection, it will forward it to the secondary. In cases where you want to allow reading from the secondary database, but not writing, you can set up another connection directly to the first database, with no failover, and set all of your write operations to use that.

## Clustering Settings - History Mode

The history mode dictates how history will be treated when the node is not active. If partial, the data will be cached, and only forwarded when the master node is available. This mode can be used to prevent data from being inserted into a backup database in some cases. This setting can be found on the **Redundancy** page under the [Config](#) section of the Gateway.

Related Topics ...

- [Redundant Licensing](#)
- [Setting Up Redundancy](#)

# Redundant Licensing

## Types of Redundant Licensing

When working with Redundancy, both nodes will require a license. However, there are two approaches that are detailed below. In both cases, the license for the Backup node generally contains most, if not all, the same modules as the Master node. For example, if the Master is storing history with the SQL Bridge module, then the Backup would also require the module in the event a failover occurs, otherwise, data would be lost.

However, non-critical modules do not need to be added to the Backup License. The Master license could make use of the Symbol Factory module, and since the Designer only connects to the Master node, there is no reason to add this module to the Backup node.

## On this page ...

- Types of Redundant Licensing
  - Two Standard Licenses - Classic Redundancy
  - Backup-Only Licenses

### Two Standard Licenses - Classic Redundancy

Traditionally, Redundancy involves two standard licenses: one license will be applied to the Master Gateway, and the other license will be applied to the Backup Gateway. Since two standard licenses are being used, this approach allows users to disable Redundancy, and set both Gateways to independent modes.

### Backup-Only Licenses

Backup-Only licenses are available for purchase. This license forces the Gateway into a Backup mode, and the mode can not be changed while the license is applied. The benefit of this type of license is that they come at a discounted price. For more details, contact your Account Representative.



### Redundant Licensing

[Watch the Video](#)

If using a Backup only license, the Mode property on the Backup Gateway's Redundancy page will look like the image below.

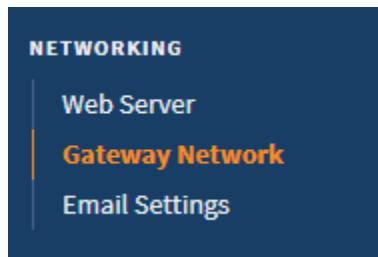
| Redundancy Settings          |                                                                                                                                                                                                                                                                                                                       |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode                         | <input type="button" value="Backup"/> Enable or disable redundancy, and specify this node's role. There should be one master and one backup node per redundant pair. <input type="button" value="Independent"/> turns off redundancy.                                                                                 |
| Standby Activity Level       | <input type="button" value="Cold"/> How the node should run when it is not currently the active node. If <input type="button" value="cold"/> , the node will perform minimal operations until it becomes active. If <input type="button" value="warm"/> , the node will run at a high level, reducing failover times. |
| Failover Timeout             | <input type="text" value="10000"/> The time of inactivity, in milliseconds, before the backup assumes responsibility. (default: 10000)                                                                                                                                                                                |
| Startup Connection Allowance | <input type="text" value="30000"/> The time in milliseconds that the system will wait at startup for a connection before making a decision on the node's responsibility level. (default: 30000)                                                                                                                       |

Instead of the dropdown list that normally appears on this property, the license forced this Gateway into a Backup mode.

If you would like to change the mode of this Gateway, the backup-only license must first be unactivated. Once unactivated, a new license will need to be applied, otherwise, the Gateway will operate in 2 hour trial mode.

# Gateway Network

The Gateway Network allows you to connect multiple Gateways together over a wide area network, and opens up many distributed features between Gateways.



The Gateway Network provides the following features:

- A dedicated HTTP data channel that can handle multiple streams of message data.
- The ability to set up a node to act as a proxy for another node.
- Security settings that restrict incoming connections based on a white list or on manual approval of the connection. Incoming connections can also be disabled entirely.
- An available SSL mode. When enabled, connections must send SSL certificates to prove their identity. A connection will not be accepted until its SSL certificate is approved.

## Gateway Network Features

The Gateway Network opens up certain services for use that make managing multiple Gateways and having them effectively communicate with each other a snap. It also has special security that can restrict certain services from happening in certain zones of the Gateway Network.

## Enterprise Administration

The [Enterprise Administration Module](#) (EAM) uses the Gateway Network for message and file transfer, and can monitor network connections for availability. The EAM reports whenever communications are lost via alarm events and system Tags.

## Distributed Services

Distributed services included the following:

- Remote Providers: Remote [Realtime](#) and [Historical](#) Tag providers make remotely controlling and storing Tag data even easier.
- Remote Alarming: [Remote Alarming](#) makes notifying all Gateways in the network possible, to quickly and effortlessly track down issues.

## Security Zones and Service Security

[Security Zones](#) can be setup to lock down or prevent access to certain parts of Gateways within the Gateway Network.

## On this page ...

- [Gateway Network Features](#)
  - [Enterprise Administration](#)
  - [Distributed Services](#)
  - [Security Zones and Service Security](#)
- [Outgoing vs. Incoming Connections](#)
  - [Connections and Servers](#)
  - [Which Server Should I Configure the Outgoing Connection On?](#)
  - [General Settings](#)
  - [Main](#)
  - [Security](#)
- [Setting Up a Gateway Network Connection](#)
  - [Main](#)
  - [Ping](#)
  - [Timeouts](#)
  - [Gateway Network Connection Example](#)
- [Deleting Connections](#)
- [Certificates and SSL](#)
  - [Requiring a Certificate](#)
  - [Denying a Certificate](#)
- [Gateway Network Diagnostics](#)
- [Gateway Network Queue Management](#)
  - [Queue Settings](#)



## Gateway Network Overview

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## Outgoing vs. Incoming Connections

When using the Gateway Network, you will be working with two type of connections.

- **Outgoing Connections:** To establish communications, create an outgoing connection on the local machine. The outgoing connection always begins the connection process to a remote machine. After the outgoing connection is created, the local machine will attempt to use the connection to establish communications with the remote machine.
- **Incoming Connections:** On the remote machine, an incoming connection will automatically be created when the new connection attempt is detected. For connections where security settings require manual approval, you will need to approve the incoming connection before it can be used. If no security controls have been set, the incoming connection will automatically accept the connection from the local machine and begin sharing data.

## Connections and Servers

Every machine on the Gateway Network is known as a Server. When you establish a connection to a remote machine, the remote Server sends data about itself and also sends data about any other Servers known to that machine. For example, assume your local machine is GatewayA. The remote

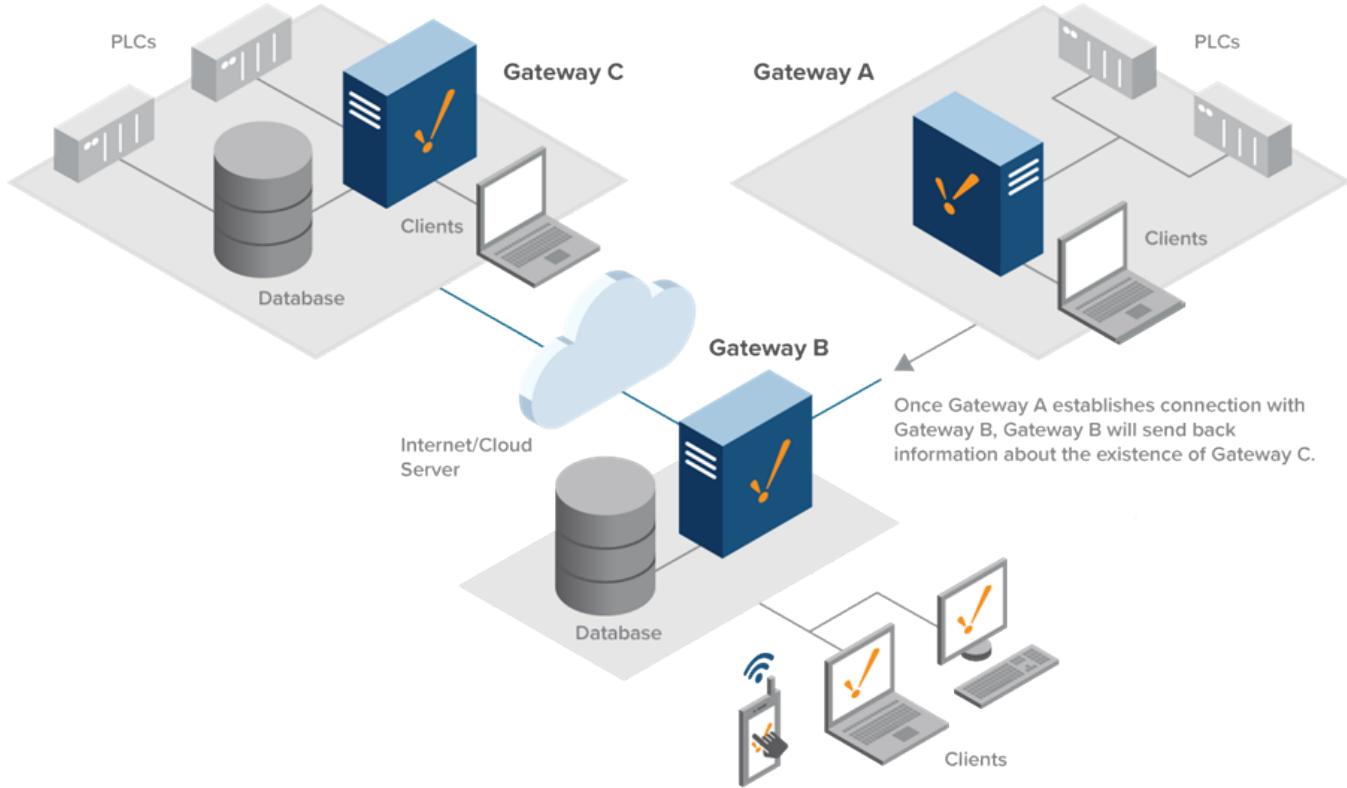
machine is known as GatewayB. GatewayB also knows about another remote machine named GatewayC. As soon as your local GatewayA establishes a connection with GatewayB, GatewayB also sends information about the existence of GatewayC.

Modules such as the Enterprise Administration Module (EAM) are aware of this relationship and allow communication between GatewayA and GatewayC, even though there is no direct connection from the local machine to GatewayC.

If you are cloning Gateways to then be connected via Gateway Network, it is important to notice that there is a Gateway unique identifier in %IgnitionInstallationDirectory%/data/.uuid. No two Gateways connected via Gateway Network should share a .uuid. Generally, Gateways are cloned by restoring the same Gateway backup on multiple servers. Since Gateway backups carry their .uuid with them, restoring the same Gateway on multiple servers will result in multiple Gateways having the same .uuid. To get around this, you must stop your Ignition service, delete %IgnitionInstallationDirectory%/data/.uuid, then start your Ignition service so that a new, unique .uuid is generated. Doing this before connecting two cloned Gateways will prevent any .uuid collisions.

## Which Server Should I Configure the Outgoing Connection On?

In regards to connecting multiple Gateways over the Gateway Network, there is little difference between an Outgoing and Incoming connection: these terms simply indicate which server the connection was configured on, and are mostly ignored by the rest of Ignition. Thus, assuming GatewayA and GatewayB, configuring an outgoing connection from A to B is equivalent to configuring an outgoing connection from B to A. When connecting two Gateways, only a single connection is required between them.



## General Settings

### Main

The Gateway Network General Settings set the basic rules for the system. By default, these settings are lenient to allow for easy setup, but can be set for security.

| Setting | Description                                                                                                                                    |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Enabled | Uncheck this checkbox to disable using the Gateway Network.                                                                                    |
|         | If true, only connections that use SSL to encrypt traffic will be allowed. This setting only applies to incoming connections. Default is true. |

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Require SSL            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Require Two Way Auth   | <p>Enforces two-way SSL authentication. If true, you will need to install the remote machine's certificate on this machine, in addition to manual approval of this machine's certificate on the remote machine.</p> <p>If you check this setting, you will need to provide the remote machine's certificate. To do this, manually export a certificate from the remote machine's metro keystore, located in &lt;installdir&gt;/webserver/metro-keystore. Default keystore password is <b>metro</b>, and the alias is <b>metro-key</b>. Then place the certificate on the local machine, in data/certificates/gateway_network.</p> |
| Send Thread            | The maximum number of threads that will be used to upload messages. Applies to outgoing connections. Default is 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Send Buffer Limit      | The number of outstanding messages that can be waiting for acknowledgement at a time. Default is 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Receive Threads        | The maximum number of threads that will be used to download messages. Applies to outgoing connections. Default is 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Processing Queue Limit | Number of received messages that can be held until they are processed by the local system. When this capacity is exceeded, new messages are rejected and errors are reported to the remote Gateway. Applies to incoming connections.                                                                                                                                                                                                                                                                                                                                                                                              |
| Websocket Idle Timeout | <p>This feature is new in Ignition version <b>8.1.3</b><br/> <a href="#">Click here</a> to check out the other new features</p> <p>The maximum number of milliseconds that a websocket is allowed to remain idle before it is closed. This value should always be set higher than outgoing connection ping rates to avoid premature connection termination.</p>                                                                                                                                                                                                                                                                   |

## Security

By default, the security level for incoming connections is set to "Unrestricted", meaning that every remote machine that attempts to connect to the local machine will be accepted without question. You have several options to control security from the Gateway Network settings.

**Note:** These settings are independent of SSL mode, which is detailed below. To change security settings, go to the Gateway Webpage and navigate to **Config -> Networking -> Gateway Network** and select the **General Settings** tab.

| Setting                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Allow Incoming Connections | If false, only outward connections defined on this gateway will be allowed. Uncheck this checkbox to disable all remote machines from being able to establish an incoming connection. To establish any connections with remote machines, you will need to create outgoing connections from this machine. Default is true.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Connection Policy          | Dictates what connections are allowed. Options as follows: <ul style="list-style-type: none"> <li><b>Unrestricted</b> - Default mode, allows all incoming connections unless the Allow Incoming Connections checkbox is unchecked.</li> <li><b>ApprovedOnly</b> - Incoming connections are created, but cannot be used to send or receive data until you approve the connection under Gateway Network -&gt; Incoming Connections tab. To approve an incoming connection, click the Approve link on the right side of the connection. You can also deny a previously approved connection by clicking the deny link. The approve and deny links will appear next to a connection only if you have enabled the ApproveOnly setting.</li> <li><b>SpecifiedList</b> - An incoming connection will only be allowed if its server name is on this list. Separate server names with a comma.</li> </ul> |
| Specified List             | Connections with a Gateway Name in this list are automatically allowed if the security mode is set to SpecifiedList. Separate Gateway names with a comma.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Allow Proxying             | If enabled, this Gateway will be allowed to act as a proxy, and forward requests between Gateways that do not have direct connections. Default is false.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## Setting Up a Gateway Network Connection

When you create a new outgoing Gateway Network connection, you need to specify the address for the remote server. There are also settings for ping rates and timeouts. The defaults can be used for these fields. The following are all the available settings for setting up an outgoing Gateway Network.

## Main

| Main    |                                                                                                  |
|---------|--------------------------------------------------------------------------------------------------|
| Host    | <input type="text"/> The address of the remote server, not including the port.                   |
| Port    | <input type="text" value="8060"/> The port of the remote server.<br>(default: 8,060)             |
| Enabled | <input checked="" type="checkbox"/> (default: true)                                              |
| Use SSL | <input checked="" type="checkbox"/> Use SSL to connect to the remote machine.<br>(default: true) |

| Setting | Description                                                                |
|---------|----------------------------------------------------------------------------|
| Host    | The address of the remote server, not including the port. Example: 1.2.3.4 |
| Port    | The port of the remote server. Default is 8060.                            |
| Enabled | Whether this connection is enabled. Default is true.                       |
| Use SSL | Use SSL to connect to the remote machine. Default is true.                 |

## Ping

| Ping         |                                                                                                                                                                     |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ping Rate    | <input type="text" value="1000"/> How often, in milliseconds, to send a ping to a remote machine.<br>(default: 1,000)                                               |
| Ping Timeout | <input type="text" value="300"/> The maximum time, in milliseconds, allowed for a ping response. Pings that time out are counted as missed pings.<br>(default: 300) |
| Missed Pings | <input type="text" value="30"/> The amount of missed pings that will force the connection to be considered faulted.<br>(default: 30)                                |

| Setting      | Description                                                                                                                      |
|--------------|----------------------------------------------------------------------------------------------------------------------------------|
| Ping Rate    | How often, in milliseconds, to send a ping to a remote machine. Default is 1,000.                                                |
| Ping Timeout | The maximum time, in milliseconds, allowed for a ping response. Pings that time out are counted as missed pings. Default is 300. |
| Missed Pings | The amount of missed pings that will force the connection to be considered faulted. Default is 30.                               |

## Timeouts

| Timeouts                  |                                                                                                                                                         |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Websocket Connect Timeout | <input type="text" value="10000"/> The maximum time, in milliseconds, allowed for a new web socket to connect to a remote machine.<br>(default: 10,000) |
| Http Connect Timeout      | <input type="text" value="10000"/> The maximum time, in milliseconds, allowed to establish an HTTP connection to a remote machine.<br>(default: 10,000) |
| HTTP Read Timeout         | <input type="text" value="60000"/> The maximum time, in milliseconds, allowed to read or send HTTP data to a remote machine.<br>(default: 60,000)       |

| Setting                   | Description                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------------------|
| Websocket Connect Timeout | The maximum time, in milliseconds, allowed for a new web socket to connect to a remote machine. Default is 10,000. |
| HTTP Connect Timeout      | The maximum time, in milliseconds, allowed to establish an HTTP connection to a remote machine. Default is 10,000. |
| HTTP Read Timeout         | The maximum time, in milliseconds, allowed to read or send HTTP data to a remote machine. Default is 60,000.       |

## Setting up a Gateway Network Connection

[Watch the Video](#)

## Gateway Network Connection Example

To establish a basic communication link between two Gateways, first log into the Gateway where you want to establish the outgoing connection. For this example, we use an SSL connection.

1. On the Gateway Webpage, navigate to **Config -> Networking -> Gateway Network**.
2. Click on the **Outgoing Connections** tab. Click the **Create new Outgoing Gateway Connection** link.

The screenshot shows the Ignition configuration interface. The left sidebar has sections for SYSTEM, NETWORKING, and SECURITY. Under NETWORKING, 'Gateway Network' is selected. The main panel shows 'Gateway Network Settings' with tabs for General Settings, Outgoing Connections (which is active and highlighted with a red box), Incoming Connections, Diagnostics, and Queue Management. Below the tabs is a table with columns Host, Port, Enabled, Gateway Name, Redundancy Role, and Status. One row is present: Host 10.10.65.49, Port 8060, Enabled true, Gateway Name Gateway B, Redundancy Role Independent, Status Running. At the bottom is a button labeled 'Create new Outgoing Gateway Connection...' with a red box around it.

3. In the **Host** field, enter the network address of the remote server.
4. In the **Port** field, enter the SSL port used by the remote server. By default, this is set to **8060** (which is defined /data/gateway.xml).

**Note:** This port is different from the default SSL port an Ignition Gateway would use when communicating to a client (default port 8043).

5. Check the **Use SSL** checkbox.

The screenshot shows the 'Main' configuration section of the Ignition configuration interface. The left sidebar shows 'Gateway Network' selected under NETWORKING. The main panel shows fields for Host (http://10.10.110.52) and Port (8088). There is a 'Enabled' checkbox which is checked. Below these is a 'Use SSL' section with a checkbox labeled 'Use SSL to connect to the remote machine.' (default: true), which is also checked and highlighted with a red box.

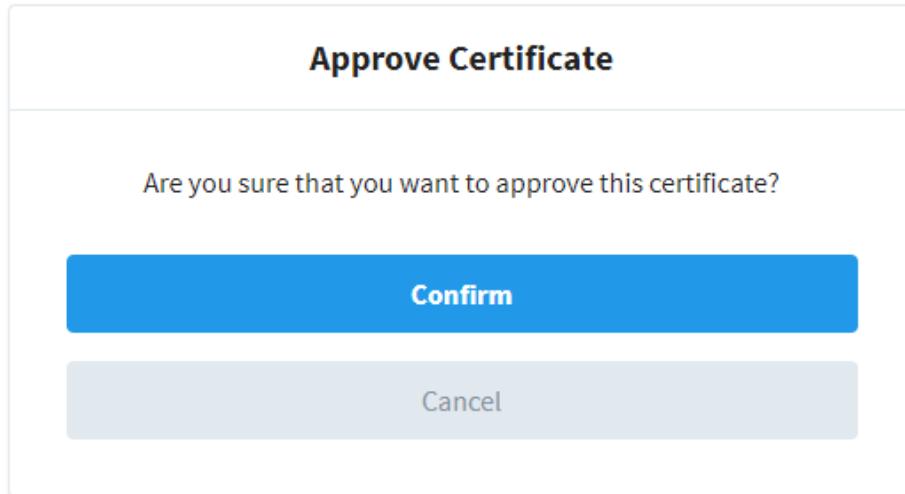
6. Use the default settings in the **Ping** section and **Timeouts** section of the page.
7. Click the **Create New Outgoing Gateway Connection** button at the bottom of the page.
8. You'll see a confirmation message that the connection was created.

The screenshot shows the Ignition configuration interface after creating a new connection. The left sidebar shows 'Gateway Network' selected. The main panel shows the 'Outgoing Connections' tab selected. A green success message box is displayed with the text 'Successfully created new Outgoing Gateway Connection "http://10.10.110.52"' with a checkmark icon. Below this is a table with columns Host, Port, Enabled, Gateway Name, Redundancy Role, and Status. One row is present: Host http://10.10.110.52, Port 8088, Enabled true, Gateway Name Unknown, Redundancy Role Unknown, Status Connecting. At the bottom is a button labeled 'Create new Outgoing Gateway Connection...'.

- At this point, your Gateway transmitted its certificate to the connected Gateway, but the incoming connection is not yet allowed. The Gateway's connection will not show up under the Incoming Connections tab until after the certificate has been approved.
- Log into the other Gateway. Navigate to **Config > Networking -> Gateway Network**.
- Click on the **Incoming Connections** tab. The first Gateway's certificate should be present. The certificate Common Name field holds the network address of the machine that transmitted the certificate. The Serial field holds a numeric string that is automatically generated when the certificate is created, and is unique to every certificate.

| Common Name | Serial              | Issuer | Status       |
|-------------|---------------------|--------|--------------|
| backup:8060 | 8830218834790436753 | Self   | Not Approved |

- Click the **approve** button to accept the certificate. You'll see a confirmation message. Click the **Confirm** button.



## Deleting Connections

Outgoing and incoming connections can be deleted for cases when the connection no longer exists on the other side.

- To delete a connection, navigate to **Config -> Networking -> Gateway Network**.
- Click on either the **Outgoing Connections** tab or the **Incoming Connections** tab.
- Click **More**, and then select **Delete** next to the connection.

**Note:** For incoming connections, if a remote machine is still connected to the local machine with an outgoing connection, a new incoming connection will be created after deletion. For these cases, you must log into the remote Gateway and delete the outgoing connection. Then you can delete the local incoming connection.

The screenshot shows the Ignition configuration interface. The left sidebar has 'Config' selected under 'SYSTEM'. The main area is titled 'Config > Network > Gateway Network Settings'. The 'Outgoing Connections' tab is active. A table lists a single connection: Host 10.10.115.3, Port 8060, Enabled true, Gateway Name Ignition-ignition8-ubuntu-64bit, Redundancy Role Independent, Status Running. Below the table is a link to 'Create new Outgoing Gateway Connection...' and a 'More' dropdown with 'edit' and 'delete' options. The 'delete' button is highlighted with a red box.

## Certificates and SSL

When a remote machine establishes an incoming connection, its Gateway server name is transmitted and appears in the Server Name field under **Gateway Network -> Incoming Connections**. However, there is no identity authentication is performed when the connection is created. The local system accepts the remote system id without question. To perform identity authentication on a connection, you must use Secure Socket Layer (SSL) and certificates. By default, SSL is enabled.

**Note:** When using the Gateway Network and Redundancy, SSL Certificates are automatically pushed from the redundant Master to the Backup.

### Requiring a Certificate

1. To require all incoming Gateways to use SSL, navigate to **Config -> Networking -> Gateway Network**.
2. Select the **General Settings** tab, and check the **Require SSL** checkbox.
3. Click the **Save Changes** button.

## Denying a Certificate

You can deny a certificate under the Certificates tab by clicking the deny link to the right of the certificate. The connection that has been using that certificate will no longer be allowed to connect. You can delete certificates that are no longer in use. Keep in mind that if you delete a certificate, and a remote machine is still using that certificate, it will reappear on the Certificates page. In this case, you must navigate to the remote Gateway and delete its outgoing connection. Then you can permanently delete the certificate from the [Certificates page](#).

## Gateway Network Diagnostics

The Diagnostics tab on the Gateway Network Settings page gives you insight to the Gateway and and remote server response times.

1. To test the response time of a remote server, select the server name from the **Server** dropdown list.
2. Click the **Submit** button.

General Settings    Outgoing Connections    Incoming Connections    **Diagnostics**    Queue Management

## Gateway Network Diagnostics

### Gateway Network Port

This server is listening on port **8060** for incoming SSL certificates/connections.

### Test Remote Server Response

| Server                                                                       | Submit        |
|------------------------------------------------------------------------------|---------------|
| <input type="button" value="Choose One"/><br><b>Choose One</b><br>Controller | <b>Submit</b> |
| Ignition-dartmouth-backup                                                    |               |
| Ignition-dartmouth-backup-B                                                  |               |
| Ignition-mrob-lt4                                                            |               |
| ignition8-ubuntu-64bit:8060                                                  | Serial        |
|                                                                              | Issuer        |
| 5585666939040193040                                                          | Self          |

- The results will be displayed indicating if the call to the remote server was successful, what the response time was, and if there were any errors.

General Settings    Outgoing Connections    Incoming Connections    **Diagnostics**    Queue Management

## Gateway Network Diagnostics

### Gateway Network Port

This server is listening on port **8060** for incoming SSL certificates/connections.

### Test Remote Server Response

| Server     | Submit        |
|------------|---------------|
| Controller | <b>Submit</b> |

### Results

|               |                |
|---------------|----------------|
| Call Result   | <b>SUCCESS</b> |
| Response Time | 24 ms          |
| Error         | None           |

### Local Certificate Information

| Common Name                 | Serial              | Issuer |
|-----------------------------|---------------------|--------|
| ignition8-ubuntu-64bit:8060 | 5585666939040193040 | Self   |

## Gateway Network Queue Management

Ignition's Gateway Network system shares information across Gateways using a configurable number of send and receive threads. Ignition's Gateway Network also has a queue associated with each Ignition sub system. These queues enable Ignition to prioritize which subsystem should have access to a send or receive thread at any given time. For example, there are two Gateways, Gateway A and Gateway B, connected via Gateway Network. Gateway A is sending a lot of Tag History queries to Gateway B per the Outgoing Tasks list of Gateway A. If Gateway B takes a long time to return a query result for each query request, Gateway B could potentially starve the send or receive threads for the connection. Starving the send or receive threads for the connection could potentially affect other Ignition sub-systems aside from Tag History. A solution is to limit the Max Active setting on the Call Results Queue configuration in Gateway A to 3. This will make sure that no more than three send or receive threads are used for the Tag History requests coming from Gateway A. Doing this will slow down the Tag History requests and therefore the Tag History queries but it will allow for other Ignition sub systems to gracefully send and receive messages without interruption. The Queue Management tab allows users to manage how a queue should behave for a specific Ignition subsystem. The queue settings for each type of outgoing queue are displayed on this page along with each queue's description.

| Gateway Network Settings |                                                                   |                      |                      |                  |            |                         |
|--------------------------|-------------------------------------------------------------------|----------------------|----------------------|------------------|------------|-------------------------|
| General Settings         | Outgoing Connections                                              | Incoming Connections | Diagnostics          | Queue Management |            |                         |
| Queue Name               | Description                                                       |                      | Synchronous Delivery | Priority         | Max Active | Settings Overridden?    |
| Call Results Queue       | Handles results for remote service calls over the Gateway Network | false                | Highest              | Unlimited        | false      | <button>modify</button> |
| Default Queue            | Generic Gateway Network queue                                     | false                | Normal               | Unlimited        | false      | <button>modify</button> |
| Long Wait Queue          | Handles messages that take up to an hour to deliver               | false                | Low                  | Unlimited        | false      | <button>modify</button> |
| Proxy Queue              | Fowards requests through a proxy Gateway                          | false                | AboveNormal          | Unlimited        | false      | <button>modify</button> |
| Tag Value Publishing     | Handles tag value change events                                   | true                 | Normal               | 1                | false      | <button>modify</button> |

Clicking the Modify button for one of these queues will bring up the Queue Settings page as below:

| Queue Settings                                      |                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Queue Name                                          | Call Results Queue                                                                                                                                                                                                                                                                                                                         |
| Description                                         | Handles results for remote service calls over the Gateway Network                                                                                                                                                                                                                                                                          |
| Synchronous Delivery                                | <input type="checkbox"/> This setting is configured by the queue and is unchangeable. If true, the queue will not dispatch another task until the current active task has completed. Note that when a queue uses synchronous delivery, the maximum number of allowed active tasks is fixed at 1 and cannot be changed.<br>(default: false) |
| Max Active                                          | -1<br>The maximum number of active tasks allowed at a time. A task is considered active when it has been dispatched to the Gateway Network connection. You can set a limit to ensure that the Gateway Network connection will not become overloaded. Set this value to -1 to not enforce a limit on active tasks.<br>(default: -1)         |
| Priority                                            | Highest<br>Determines the queue's priority in relation to other queues. A lower priority may result in messages in this queue taking longer to send, but can help prevent a Gateway Network connection from being overloaded.<br>(default: Normal)                                                                                         |
| <button>Create New Queue Override Settings</button> |                                                                                                                                                                                                                                                                                                                                            |

## Queue Settings

| Settings             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Queue Name           | Name of the queue you are modifying (read only).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Description          | Description for the queue you are modifying (read only).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Synchronous Delivery | This setting is configured by the queue and is unchangeable. If true, the queue will not dispatch another task until the current active task has completed. When a queue uses synchronous delivery, the maximum number of allowed active tasks is fixed at 1 and cannot be changed. Default is false.<br><br><b>Note:</b> Some queues are hard-coded as "Synchronous Delivery" queues, for example the Tag Value Update queue. For these queues, the Max Active setting is fixed at 1 and cannot be changed by the user. The user can only change the priority of the queue. |
| Max Active           | The maximum number of active tasks allowed at a time. A task is considered active when it has been dispatched to the Gateway                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|          |                                                                                                                                                                                                                    |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | Network connection. You can set a limit to ensure that the Gateway Network connection will not become overloaded. Set this value to -1 to not enforce a limit on active tasks. Default is -1.                      |
| Priority | Determines the queue's priority in relation to other queues. A lower priority may result in messages in this queue taking longer to send, but can help prevent a Gateway Network connection from being overloaded. |

# Database Connections

## How Are Databases Used in Ignition?

While connecting to a database is not required for basic status and control functionality, it can dramatically increase the possibilities that the system offers. There are a few places where databases are used in Ignition, such as historical data logging, reporting, storing alarm logs, and as your Tags storage.

### Historical Data Logging

Logging data for historical analysis, either through [Tags Historian](#) or with the [SQL Bridge module](#), require s a database connection. Databases are great at handling historical data, and by using a standard relational database your data is stored in an open format that can be used in many ways.

### Reports, Graphs, and Charts

The Vision module makes it easy to present data stored in databases in a variety of ways. You can quickly create charts that show performance over time, locate anomalies, detect trends, and more. Furthermore, it's important to remember that it is possible to pull data from any database that Ignition is connected to, even if the data wasn't placed there by Ignition. This means you can tie in data from other sources or areas of your company, such as pulling in inventory and staff information, as well.

### Storing Alarm Logs

[Store alarm information historically](#) and examine it later for patterns or trouble spots.

## Getting Started with Databases

The first step in using a database with Ignition is to identify a database server. Many companies already have database servers maintained by their IT departments. If you do not, or wish to set up your own database server for Ignition, the [Supported Databases](#) section below offers some advice on choosing a database vendor.

Once you've identified a server, all you need to do is [create a connection](#) to that server to get up and running.

## On this page ...

- [How Are Databases Used in Ignition?](#)
  - [Historical Data Logging](#)
  - [Reports, Graphs, and Charts](#)
  - [Storing Alarm Logs](#)
- [Getting Started with Databases](#)
  - [Supported Databases in Ignition](#)
  - [Database](#)
  - [Version](#)
  - [Choosing other Databases](#)
  - [Installing and Connecting to a Database](#)
- [Database Drivers and Translators](#)
  - [What Is JDBC?](#)
  - [JDBC in Ignition](#)
- [Monitoring Connection Status](#)

The screenshot shows the Ignition software's configuration interface. The left sidebar is organized into several sections: Home, Status, Config (which is currently selected), System, Networking, Security, and Databases. Under Databases, the 'Connections' tab is active. The main content area displays a list of supported databases, each with a brief description. A green banner at the top indicates 'Trial Mode' with a duration of 0:26:45 and a message about testing the software. A 'Activate Ignition' button is located in the top right corner.

## Supported Databases in Ignition

Ignition has been tested with the following databases, and can connect to them directly after installation. You can connect to other databases by installing additional JDBC drivers (the Java database connection specification), which are often provided by database vendors.

| Database               | Version                                                                                                                                                                                                                                                                                                                 |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Full Support</b>    |                                                                                                                                                                                                                                                                                                                         |
| MySQL                  | 5.0+ for full support. Ignition can connect to 4.x, but many features such as Tags are not tested.                                                                                                                                                                                                                      |
| Microsoft SQL Server   | 2005, 2008, 2012, 2014, 2016, 2017 (full and express editions). Ignition can connect to 2000, but has not been fully tested.                                                                                                                                                                                            |
| Oracle                 | 10g, 11g, 12c (full and express). The letters stand for "grid" and "cloud"                                                                                                                                                                                                                                              |
| PostgreSQL             | 8.0+                                                                                                                                                                                                                                                                                                                    |
| Firebird               | All versions.                                                                                                                                                                                                                                                                                                           |
| IBM DB2                | 9.5+                                                                                                                                                                                                                                                                                                                    |
| SQLite                 | A driver for the popular embedded database system. This can be used to connect to an existing SQLite database, or create a new database: setting the connect URL property to a file that doesn't exist will result in the driver attempting to create the database.                                                     |
| <b>Limited support</b> |                                                                                                                                                                                                                                                                                                                         |
| Other JDBC drivers     | Due to variances in databases, some features may not work fully through other non-tested JDBC drivers. However, it is usually possible to get full functionality through the careful use of the database translator feature.<br><br>For example, the JDBC driver for MariaDB could be downloaded and added to Ignition. |

## Choosing other Databases

If you are new to working with SQL databases and are trying to choose a vendor, you need to consider the following three factors:

## **1- Existing company usage**

Many companies already use SQL databases for other purposes, and thus most IT departments already have a defined standard. Going along with your company's existing standard is usually recommended, as there will already be staff available who are knowledgeable about the system. Furthermore, you may be able to tie into your company's existing database system instead of maintaining your own.

## **2 - Price and Features**

The fully supported databases shown above vary dramatically in price. Some systems can cost thousands of dollars, but may have a free "express" edition that will work perfectly well for your requirements. Others offer advanced features such as redundancy, which are either not offered or difficult to configure in the other systems. It is therefore important to clearly define the features and capabilities that you need.

## **3 - Most common among Inductive Automation users**

Choosing a database that is commonly used by Inductive Automation users means that you are more likely to find examples and help in the [Forum](#), among other benefits. The supported database list above is sorted according to our current user install base.

### **Installing and Connecting to a Database**

Once you've identified a server, all you need to do is create a connection to that server to get up and running. See the [Installing Databases](#) and [Connecting to Databases](#) sections for details about how to install and connect to different databases through Ignition.

If we don't already have a connector for your database type, you can [simply add it in](#) yourself.

### **Database Drivers and Translators**

#### **What Is JDBC?**

JDBC stands for the Java DataBase Connectivity API. It is a standardized way for Java-based applications to interact with a wide range of databases and data sources. A JDBC Driver enables Ignition to connect to, and use data from, a particular database system.

#### **JDBC in Ignition**

Ignition, being a Java-based application, leverages JDBC in order to connect to a variety of data sources. This enables Ignition to offer a standardized set of functionality on a wide range of different systems and databases. This includes not only commonly-used databases such as MySQL, Microsoft SQL Server, and Oracle, but additionally other lesser-known systems as well, provided the manufacturer offers a JDBC driver for the system.

The screenshot shows the Ignition configuration interface. The left sidebar has sections for Home, Status, and Config. Under Config, there are tabs for Overview, Backup/Restore, Ignition Exchange, Licensing, Modules, Projects, Redundancy, and Gateway Settings. Below these are sections for Networking (Web Server, Gateway Network, Email Settings), Security (Auditing, Users, Roles, Service Security, Identity Providers, Security Levels, Security Zones), and Databases (Connections, Drivers). The 'Drivers' tab is highlighted with a red box. The main content area shows a table of JDBC drivers:

| Name                | Driver Type          | Default Translator | Status                                                              | Actions                                     |
|---------------------|----------------------|--------------------|---------------------------------------------------------------------|---------------------------------------------|
| MariaDB             | MySQL                | MYSQL              | Installed                                                           | <a href="#">delete</a> <a href="#">edit</a> |
| Microsoft SQLServer | Microsoft SQL Server | MSSQL              | Installed                                                           | <a href="#">delete</a> <a href="#">edit</a> |
| MySQL               | MySQL                | MYSQL              | Installed                                                           | <a href="#">delete</a> <a href="#">edit</a> |
| Oracle Database     | Oracle               | ORACLE             | Error - either required files are missing or classname is incorrect | <a href="#">delete</a> <a href="#">edit</a> |
| PostgreSQL          | PostgreSQL           | POSTGRES           | Installed                                                           | <a href="#">delete</a> <a href="#">edit</a> |

Below the table is a link to 'Create new JDBC Driver...' and a note: 'Note: Please see [this help page](#) for information about installing driver files that are not able to be bundled with Ignition.'

## Monitoring Connection Status

The state or status of a database can be monitored from the **Status** section of the Gateway Webpage, under **Connections > Databases**. The status panels show the current state and a fault message, if applicable, or throughput statistics if the connection is active.

When a connection is not available, it is re-tested every 10 seconds, and the status is updated.

The screenshot shows the Ignition configuration interface. The left sidebar has sections for Home, Status, and Config. Under Config, there are tabs for Overview, Backup/Restore, Ignition Exchange, Licensing, Modules, Projects, Redundancy, and Gateway Settings. Below these are sections for Networking (Web Server, Gateway Network, Email Settings), Security (Auditing, Users, Roles, Service Security, Identity Providers, Security Levels, Security Zones), and Databases (Connections, Drivers). The 'Connections' tab is highlighted with a red box. The main content area shows a table of database connections:

| Name      | Description | JDBC Driver         | Translator | Status       | Actions                                     |
|-----------|-------------|---------------------|------------|--------------|---------------------------------------------|
| DB        |             | MariaDB             | MYSQL      | Faulted      | <a href="#">delete</a> <a href="#">edit</a> |
| MSSQL     |             | MySQL               | MYSQL      | Valid        | <a href="#">delete</a> <a href="#">edit</a> |
| SQLServer |             | Microsoft SQLServer | MSSQL      | Reconnecting | <a href="#">delete</a> <a href="#">edit</a> |

Below the table is a link to 'Create new Database Connection...' and a note: 'Note: For details about a connection's status, see the [Database Connection Status](#) page.'

[Related Topics ...](#)

- [SQL in Ignition](#)
- [JDBC Drivers and Translators](#)

[In This Section ...](#)

# Installing Databases

## Why Install a Database?

A lot of additional functionality becomes simple or is only accessible when Ignition is connected to a database. Storing Historical data, storing notes or files, and creating dynamic lists to name a few. It is important to note that Ignition does not install any databases for you. There are many types that you can connect to, but you need to choose the database that is best for you. Installing your own database means you have complete control over it, anything Ignition adds to it can be accessed by another program easily.

You can install as many database systems as you like, and each of them allow you to create as many schemas (or groups of data) as you want. You get to decide where your database is installed, or where you want to install all of them.

## On this page ...

- [Why Install a Database?](#)
- [Which Database Should You Use?](#)
- [Where to Install a Database](#)

## Which Database Should You Use?

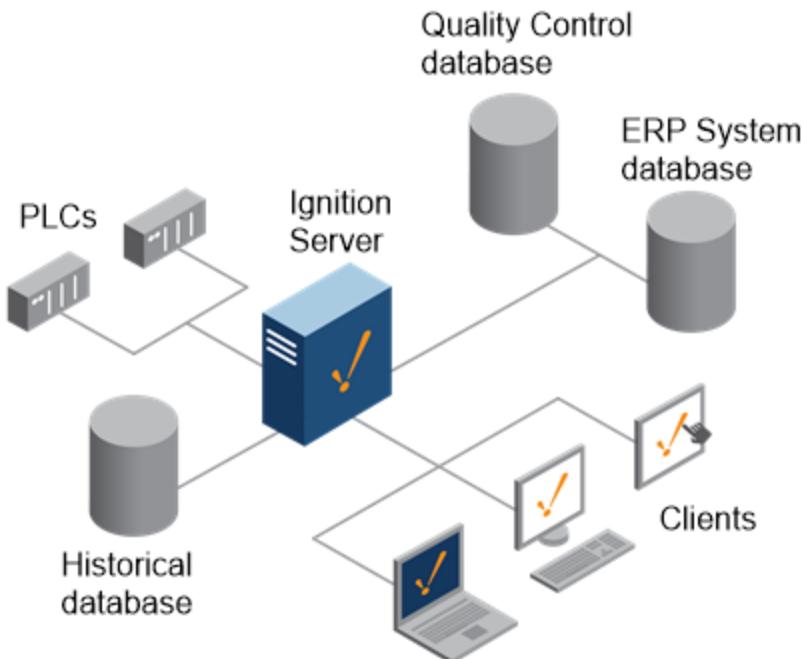
There is a lot of debate on this subject but the short answer to this question is 'whichever database your IT department already uses.' Modern relational database all have the same basic functionality, but slightly different ways of doing things. If your IT department already supports Microsoft SQL Server (MSSQL), then they already have the tools and knowledge to manage those databases. Because they are so similar (and Ignition takes care of so much for you), it is almost always easier to learn to use an existing database than to add IT support for a second type. Not to mention that adding a second type might mean hiring new personnel in the IT department.

If your company does not already have a database preference, then it's up to you to decide which is best based on your needs. They all have a free version, but different limitations. For example: MSSQL has a cap on how much data can be stored in their free version. MySQL does not have a cap like this, but also does not allow phone support for their free version.

## Where to Install a Database

You can install your database anywhere that Ignition has access to through the network. There are two main options for installing your database: one is on the computer that Ignition is installed on, and the other is installed on a different server in your network. Technically, there is a third option to connect Ignition to a database that is in a remote location using a VPN or some other way to access it. This third option will work, but because of latency and the data being physically very far away, it is not recommended for storing data that will be accessed often like Tag History.

For production systems, we recommend that your database is on its own server, not installed on the computer with Ignition. This is helpful for many reasons, but mostly because databases can potentially take up a lot of resources on a computer. If the database is on its own computer, you don't have to worry about other programs starving for memory or CPU. If you do this and install your database on another computer, just make sure to adjust your firewalls and pay attention to the database connection security. Most databases don't allow the default username to connect remotely.



[In This Section ...](#)

# Installing MySQL

## Install MySQL Server and MySQL Workbench

The goal of this page is to demonstrate how to install MySQL Server, and a helpful tool called MySQL workbench. This guide is not an exhaustive listing of all of the various installation steps or scenarios for MySQL. For more information, take a look at MySQL's documentation: [MySQL Documentation](#).

1. Go to the MySQL website at <https://dev.mysql.com/downloads/mysql/>
2. Scroll-down to **Windows (x86, 32-bit), MSI Installer**. You will notice multiple download options. Both allow you to install MySQL

**Note:** MySQL Installer is 32-bit, but will allow you to install the 64-bit version of MySQL.

The screenshot shows the MySQL Community Downloads page. Under the "MySQL Installer 8.0.20" section, there are two download options: "Windows (x86, 32-bit), MSI Installer" and "Windows (x86, 32-bit), MSI Installer". The first option is highlighted with a red box. Both options have "Download" buttons. Below the download buttons, there is a note: "We suggest that you use the MD5 checksums and GnuPG signatures to verify the integrity of the packages you download."

## On this page ...

- [Install MySQL Server and MySQL Workbench](#)
- [Running the Installer](#)

The image features the Inductive University logo (IU) and the text "INDUCTIVE UNIVERSITY". Below it are two sections: "Installing MySQL" and "Watch the Video".

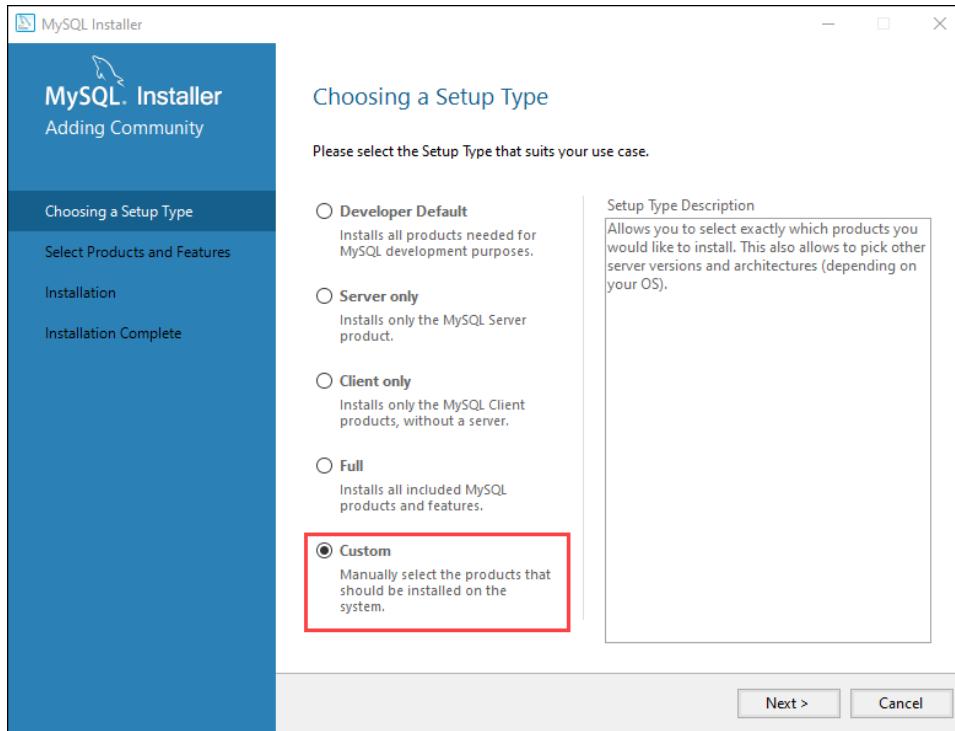
3. Click on the **Download** button.
4. On the next page, you can login or create an account if you'd like. Otherwise click **No thanks, just start my download**.

The screenshot shows the MySQL Community Downloads page for a specific file. It includes a "Login Now or Sign Up for a free account" section, a list of advantages for Oracle Web Account users, and two prominent "Login" and "Sign Up" buttons. At the bottom, there is a link: "No thanks, just start my download."

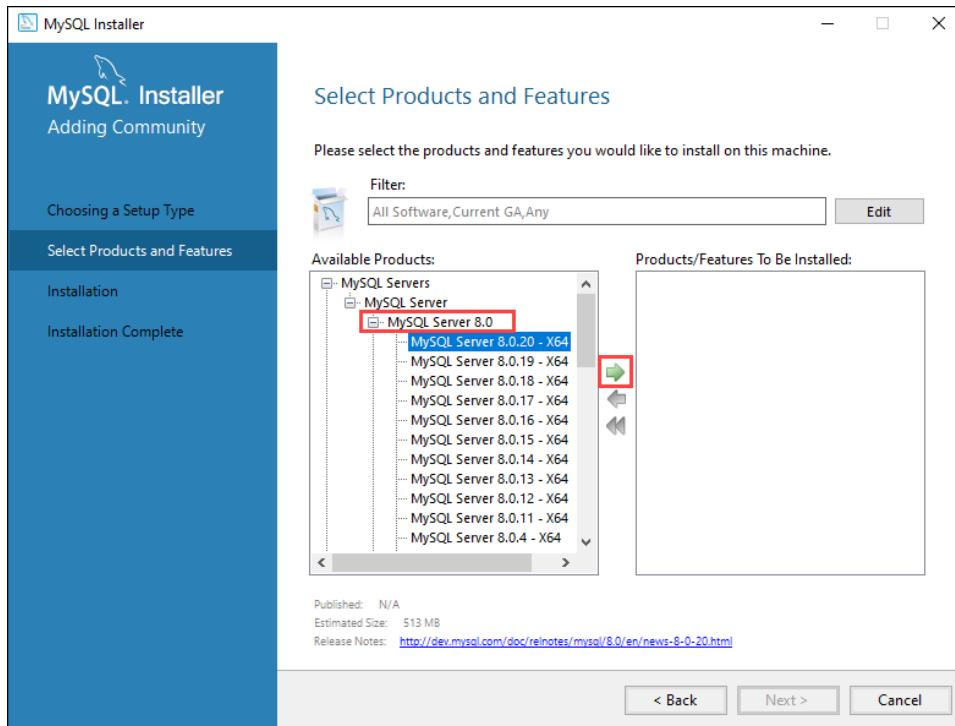
## Running the Installer

1. Once the **.msi** file is downloaded, run the file to begin the installation process.
2. The **Welcome** window is displayed. Select the **Install MySQL Products** action.
3. On the Choosing a Setup Type page, select **Custom** and click **Next**. While you can select one of the other options, at minimum you'll want to install both the server (the actual database) and MySQL Workbench (an application that allows you to quickly and easily interact with the database, without using a command-line client). Any other items beyond these two are generally unnecessary in most environments.

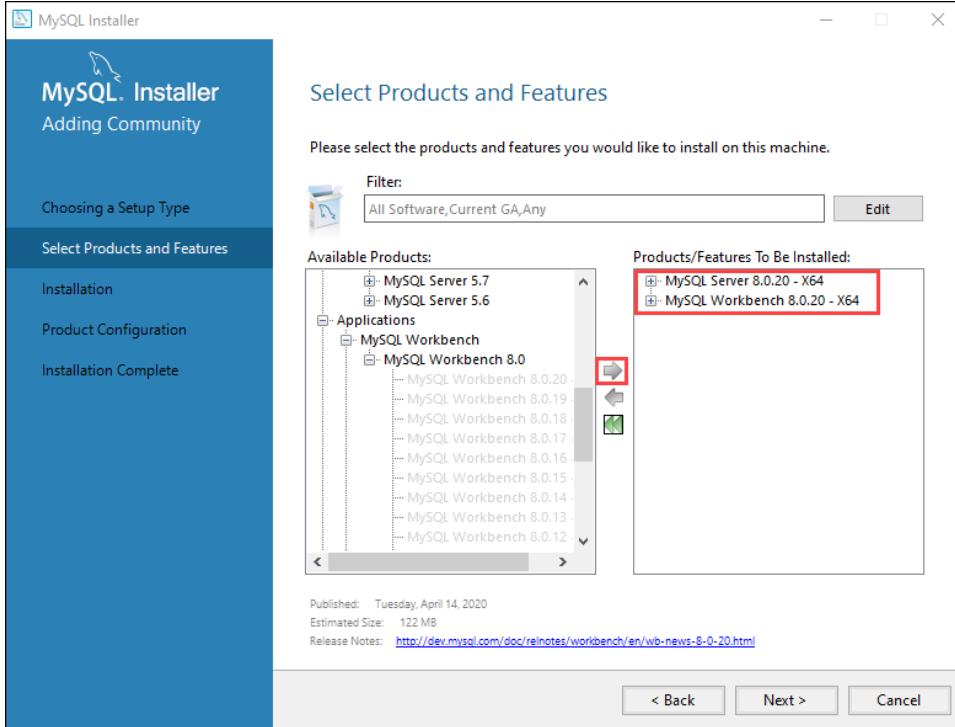
If you want to learn more, MySQL does have some additional information on their documentation if you're curious about the other options: [MySQL Docs](#). This example will continue with a Custom installation.



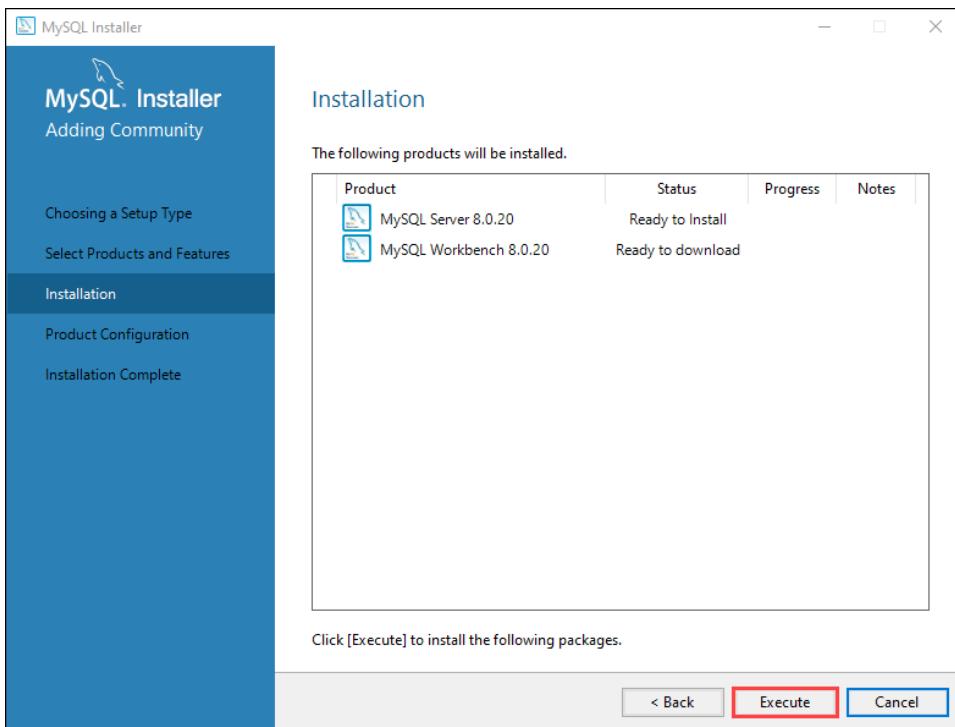
4. On the Select Products and Features page, scroll down to choose **MySQL Server 8.0**. Click the right arrow to move it to the "Products /Features To Be Installed" column.



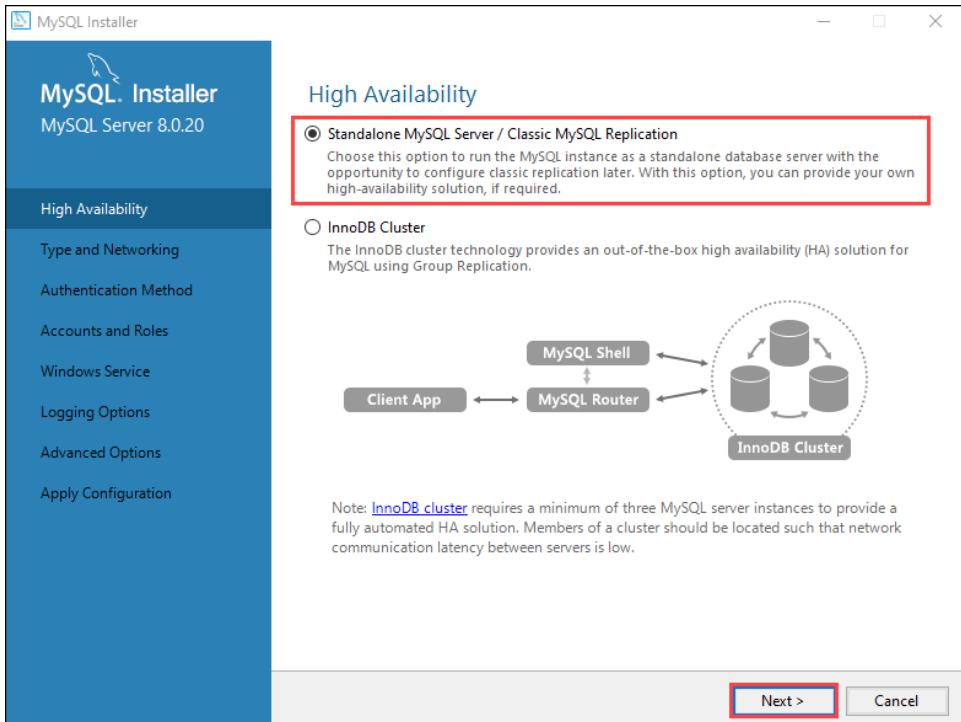
5. Scroll down to MySQL Workbench, select a version, and click the right arrow to move it to the "Products/Features To Be Installed" column.
6. Click **Next**.



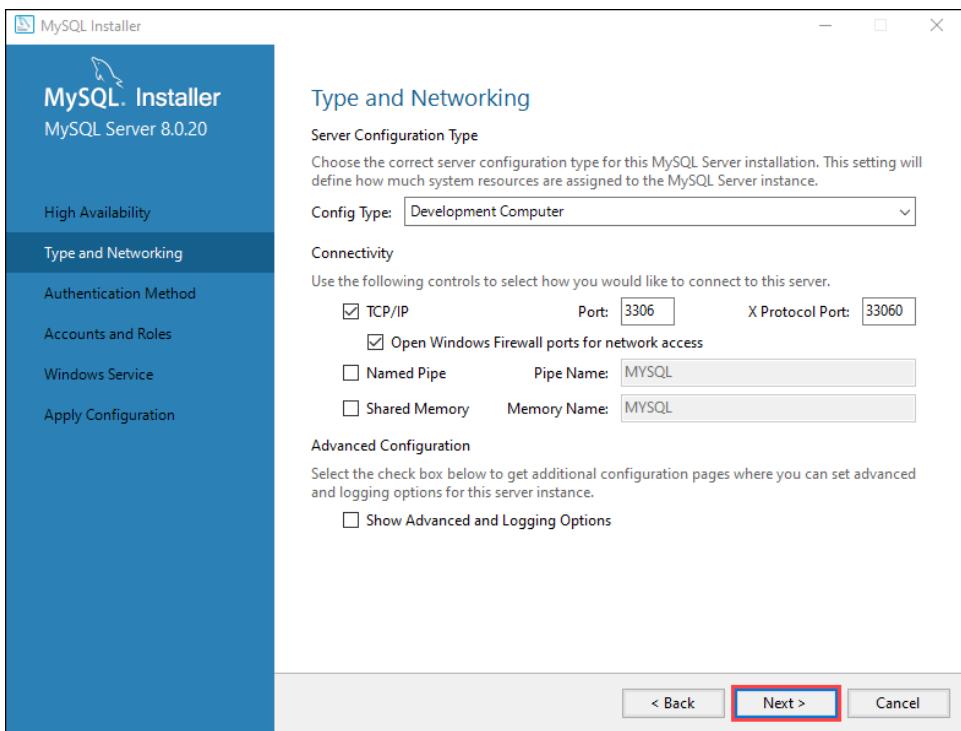
7. On the Installation screen, click **Execute**.



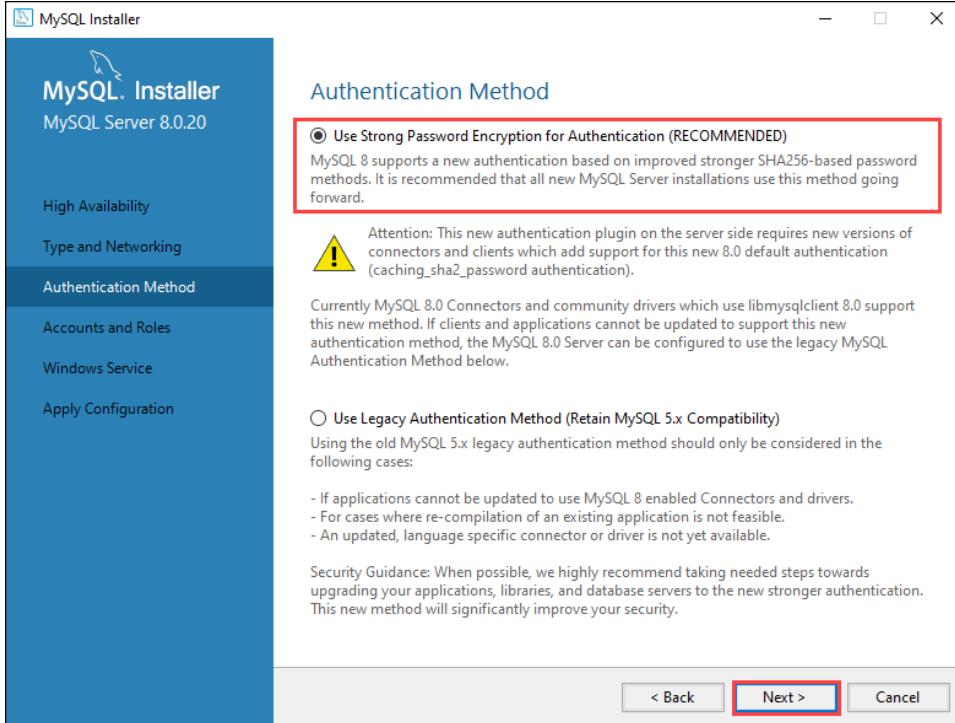
8. After these are downloaded and installed, you see the Product Configuration page. Click **Next**.  
9. In this guide, we're going to use a standalone server. On the High Availability page, select **Standalone MySQL Server / Classic MySQL Replication**, and click **Next**.



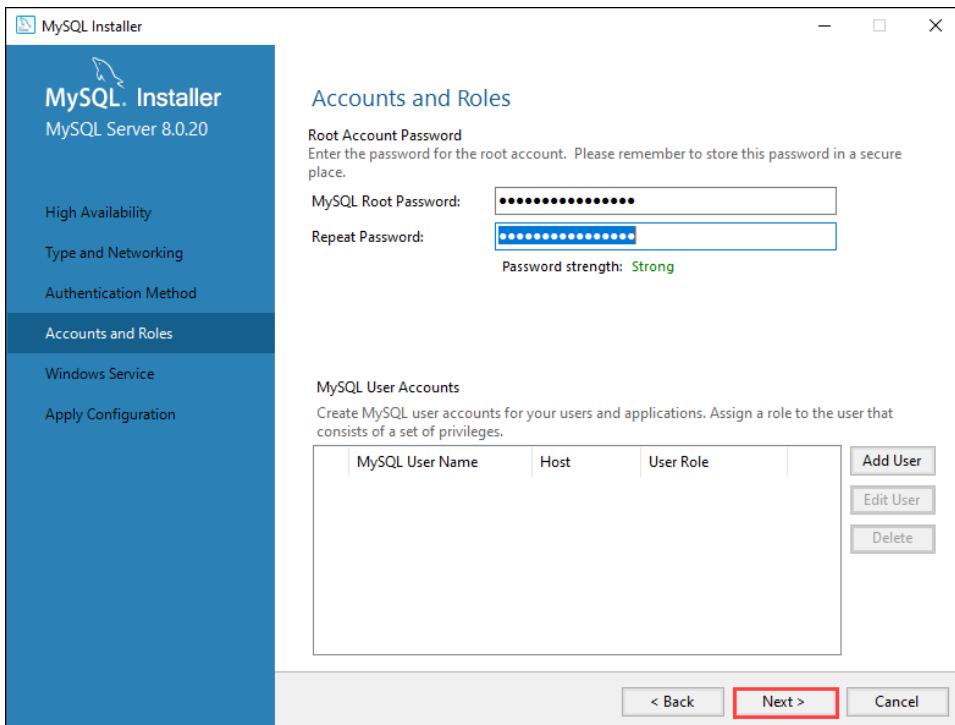
10. Leave the default settings on the Type and Networking page. Click **Next**.



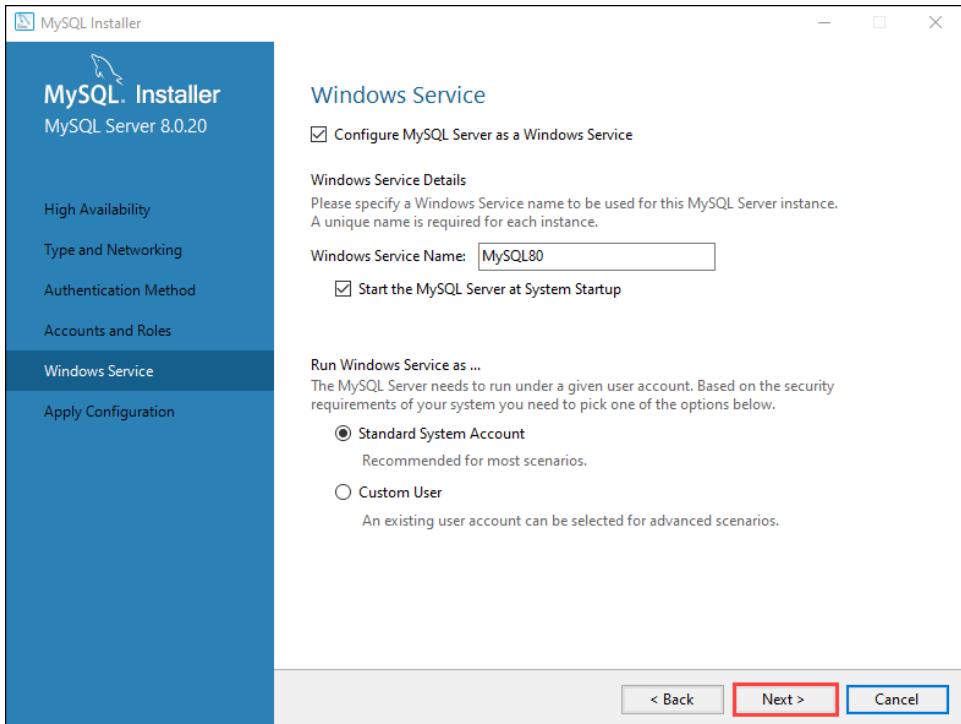
11. On the Authentication Method page, choose **Use Strong Password Encryption for Authentication**. Click **Next**.



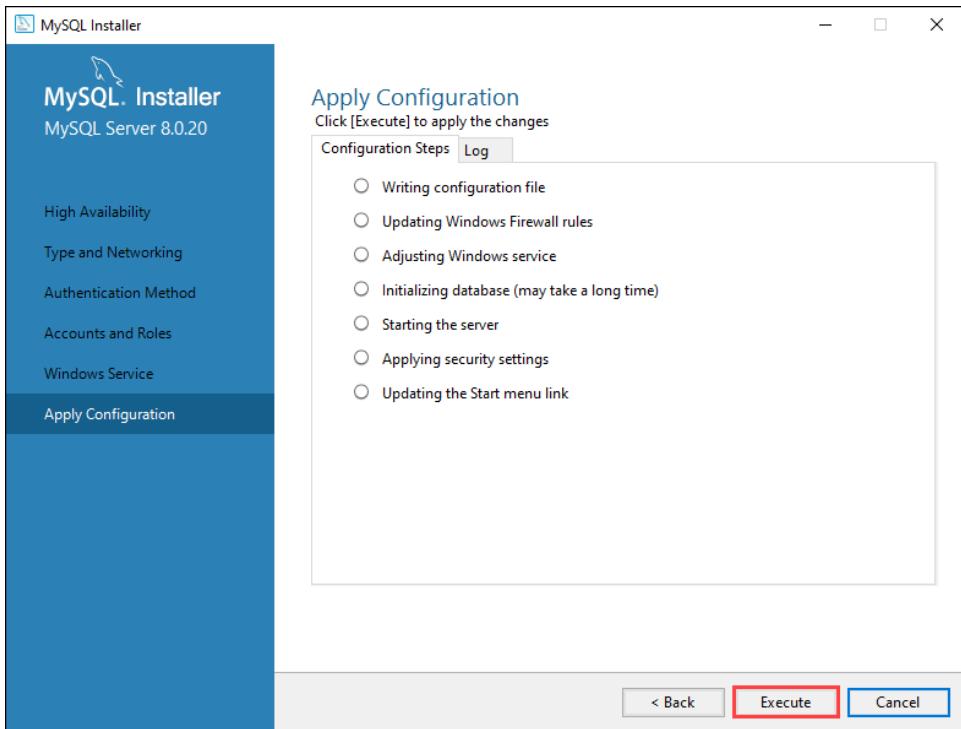
12. Create a strong password and click **Next**.



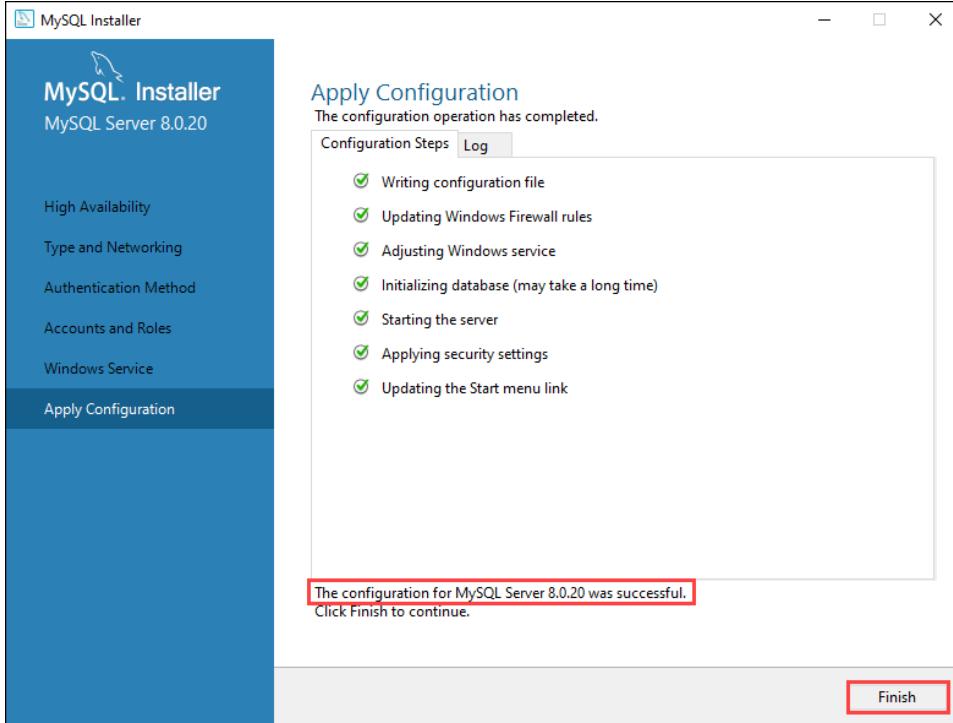
13. On the Windows Service page, leave the default settings and click **Next**.



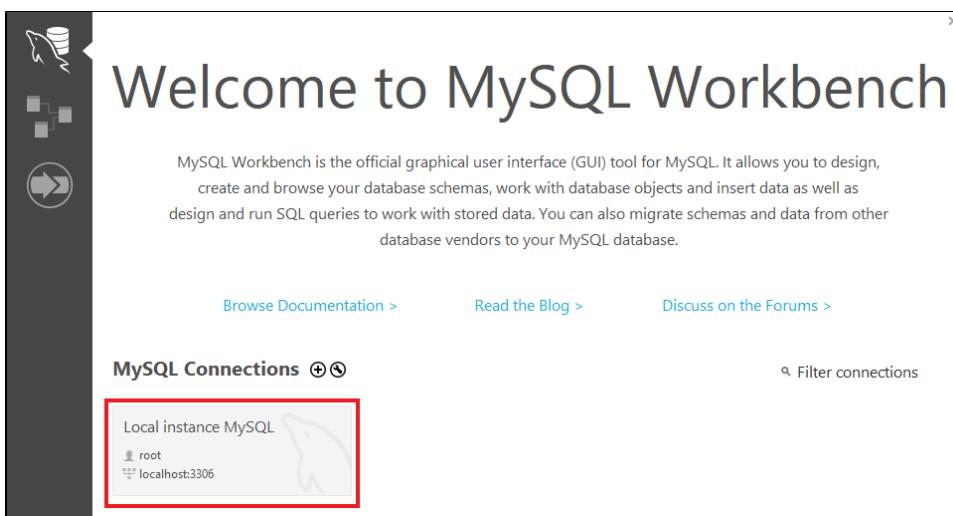
14. On the Apply Configuration page, click Execute.



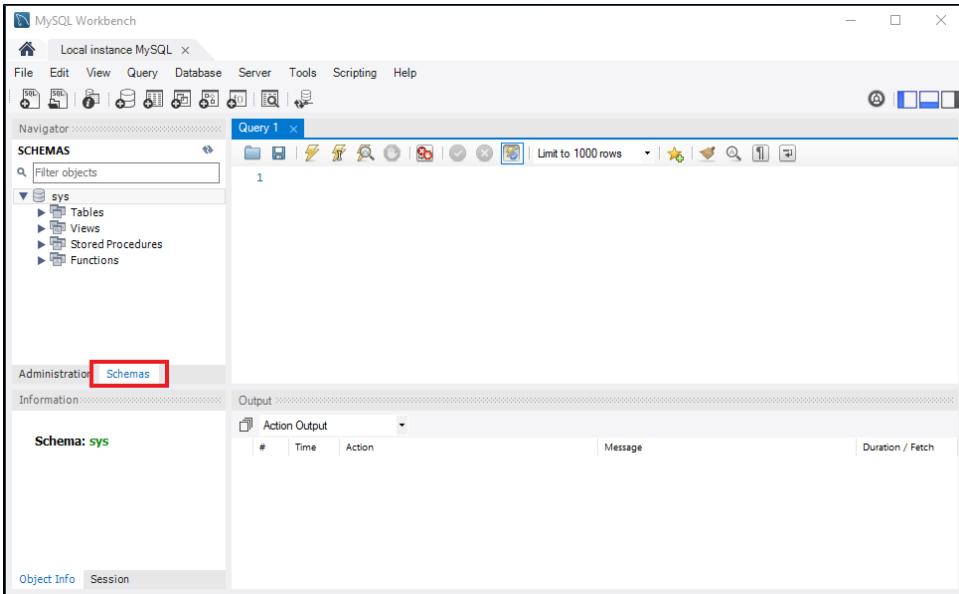
15. Once the configuration is applied and the database is initialized, you'll see a confirmation message. Click **Finish** to complete the install process.



16. The **MySQL Workbench** window is displayed. MySQL Workbench lets you to administrate the MySQL server.
17. Click on **Local instance MySQL** to connect to the newly installed MySQL server.

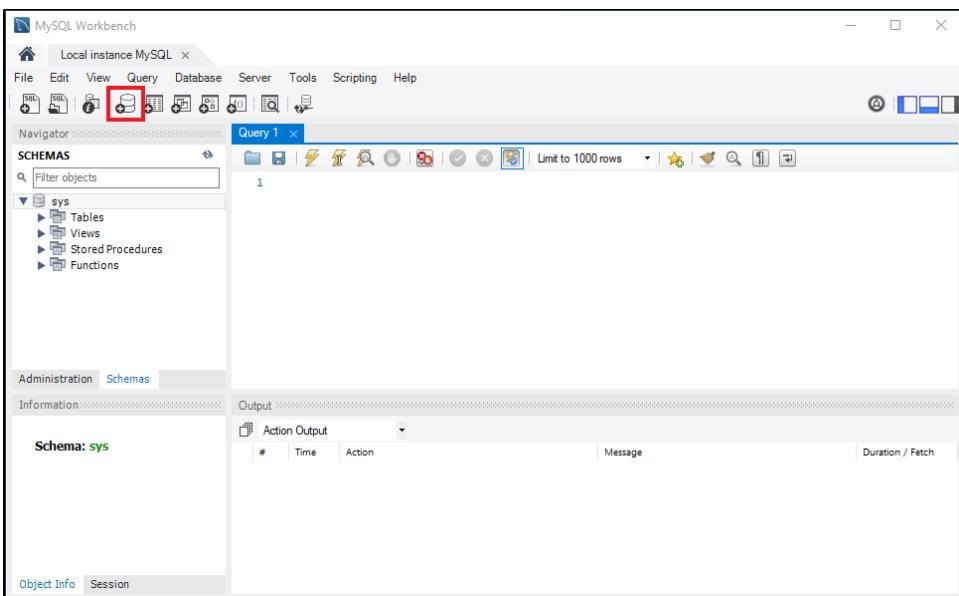


18. Enter the root **password** you earlier entered into the installer and click **OK**.
19. You are now connected and can see, in the Navigator, the default **sys** schema. Click on the **Schemas** tab to see a listing of schemas

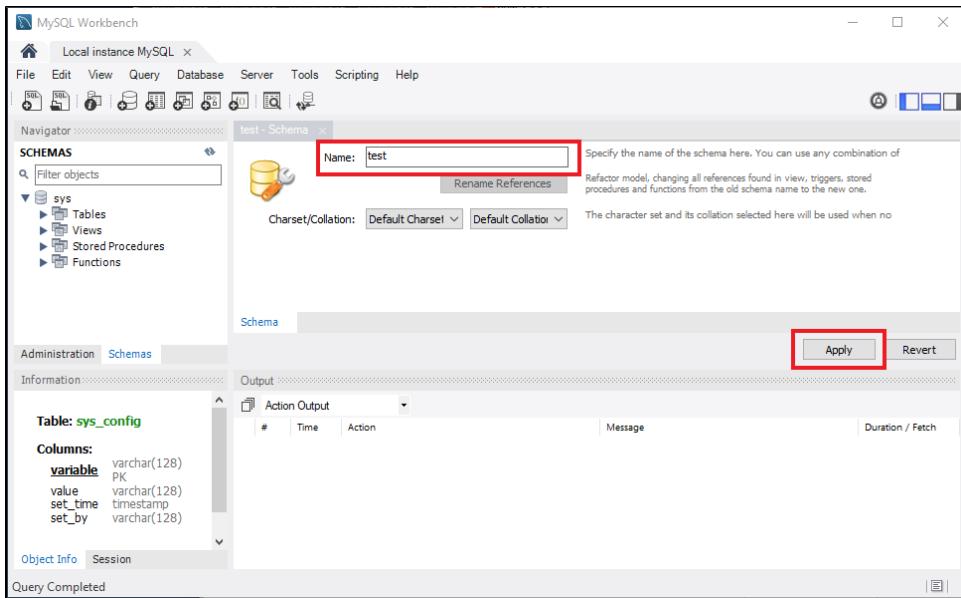


20. A "schema" is a collection of tables and other database objects. Ignition needs a schema to connect to. Instead of using the **sys** schema, we can create a schema dedicated to Ignition.

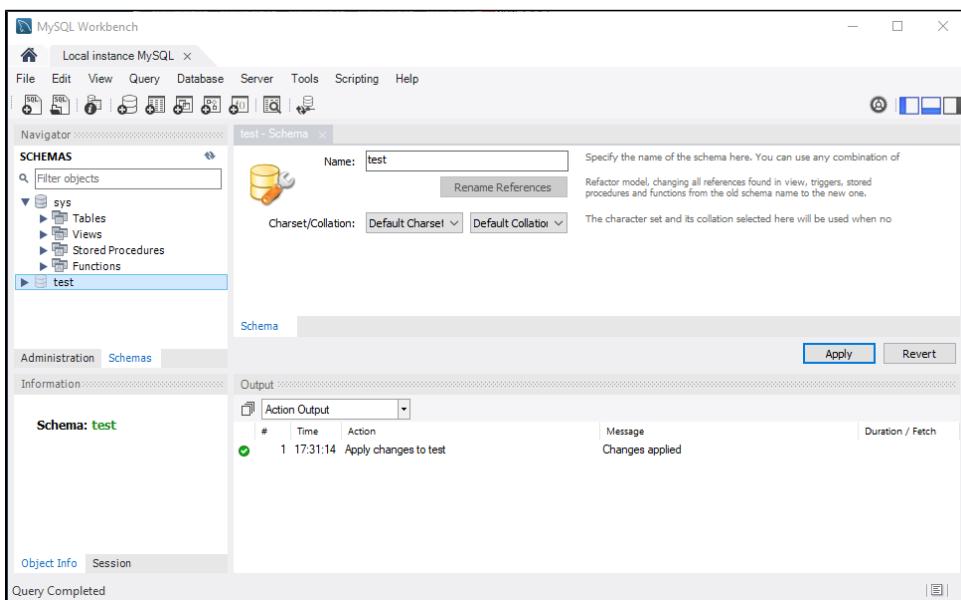
To create the schema, click the **Create New Schema** icon.



21. You'll see the Schema creation tab. This allows you to make a new **Schema**. Type in **test** as the name, and click **Apply**. Technically you can call the schema anything the database allows, but the default MySQL connection in Ignition assumes a schema named "test". If you name the schema something else here, you'll need to remember the name when creating the database connection in Ignition later.



22. You'll see the **Apply SQL Script to Database** window. Click **Apply**.
23. If there was an issue, the following window will state the issue. Go back and address the issue. Otherwise, click the **Finish** button. You should now see the **test** schema in the Navigator.



Now that the database is installed, you can connect Ignition to it. Learn more here: [Connecting to MySQL](#).

# Installing Microsoft SQL Server Express

You need to download and install both the **SQL Server Express** and the **SQL Management Studio** before you connect to the database.

## To Download SQL Server Express

This section walks through the process of installing a new instance of SQL Server Express.

1. Go to <https://www.microsoft.com/en-us/sql-server/sql-server-downloads>
2. Look for the link/button to download the **Express Edition**.
3. Run the installer
4. When given a choice between installation type, select **Custom**.
5. Select an installation directory. If you don't have a preference, simply use the default.
6. The installer will unpack and download required files.
7. Once the installer is ready, the **SQL Server Installation Center** window will appear. Select the **I nstallation** heading on the side bar, and click on the **New SQL Server stand-alone installation or add features to an existing installation** link.
8. On the **License Terms** window, choose **I accept the license terms** and click **Next**.
9. On the **Product Updates** window, click **Next** to start installing the SQL Server.
10. On the **Feature Selection** window, stay with the default selections and click **Next**. Technically you can uncheck many of the options, like the optional R and Python installations. The Server and SQL Server Management Studio are the main tools you'll need when interacting with an Ignition installation. You can always remove additional components from the SQL Server installer later if you choose so.
11. The **Instance Configuration** window shows **Named instance: SQL Express**, you can keep it or change it if you like. Click **Next**.
12. When asked about a JRE to use, you can use the provided JRE. Click **Next**.
13. On the **Server Configuration** window, choose **Automatic** from the dropdown under **Startup Type** for the **SQL Server Browser** service, and click **Next**.
14. On the **Database Engine Configuration** window, for **Authentication Mode** choose **Mixed Mode**, enter a **password** for the SA account. Note that you can use a Windows Authentication Mode with Ignition, but it does require some [additional configuration](#) when connecting later on. In either case, click **Next**.
15. On the next few windows, continue clicking **Next** until it shows installation is **Complete**. **SQL Server Express** is now installed.

## To Download SQL Management Studio

1. Go to <http://www.microsoft.com/en-us/download/details.aspx?id=8961>
2. Click on the **Download** button.
3. Click on the **SQLManagementStudio\_x64\_ENU.exe** file to run the executable.
4. On the **SQL Server Installation Center** window, click on the **New SQL Server stand-alone installation or add features to an existing installation** link.
5. On the **Installation Type**, keep the defaults and click **Next**.
6. On the **License Terms** window, choose **I accept the license terms** and click **Next**.
7. On the **Product Updates** window, click **Next** to start installing the SQL Server.
8. On the **Feature Selection** window, stay with the default selection of **Management Tools** and click **Next**.

## On this page ...

- [To Download SQL Server Express](#)
- [To Download SQL Management Studio](#)



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## Installing Microsoft SQL Server Express

[Watch the Video](#)

9. On the **Database Engine Configuration** window, for **Authentication Mode** choose **Mixed Mode**, enter a **password**, and click **Next**.
10. On the next few windows, continue clicking **Next** until it shows installation is **Complete**.  
The **Management Tools** is now installed.
11. To run the program, go to **Start > Programs > Microsoft SQL Server > SQL Server Management Studio**.
12. Click on **Connect** to connect to the Microsoft SQL Server.
13. In **Object Explorer**, you can now see some databases under **Databases > System Databases**.
14. Right-click on **Databases** and select **New Databases....**  
The **New Databases** window is displayed.
15. In **Database name**, enter **test**, click **Add**, and then **OK**.  
Now you can see the **test** database in the **Databases** folder and can connect Ignition to it, see [C onnecting to Microsoft SQL Server Express](#).

# Installing PostgreSQL

## To Install the PostgreSQL Database

1. Go to the **PostgreSQL** website at <http://www.postgresql.org>
2. Click on **Downloads**, look for and click on the **Windows** link.
3. On the **Windows installers** page, find the **Download** link and click on it, and on the next page select the installer you are interested in.  
For example, you can select the **Wins x86-32**.
4. From your Download folder on your computer, click on the Postgre .exe file to install the database.
5. Go through all the windows of the **Install Wizard** until installation is complete.
6. From the Windows **Start** menu, open the **PostgreSQL pgAdmin** database.
7. In the **Object browser** of the **pgAdmin** window, right-click on **PostgreSQL**, select **Connect**, enter your **password** to connect to the Server, and click **OK**.  
You will now see the **Databases** folder in the Object browser.

## On this page ...

- [To Install the PostgreSQL Database](#)



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## Installing PostgreSQL

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# Connecting to Databases

## Connect Once

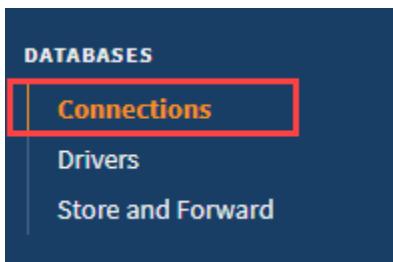
Many of the advanced features of Ignition, such as the Transaction Groups and Tags Historian require a connection to an external database and most databases require special permissions for each computer that wants to connect. Fortunately, Ignition takes care of all of this for us. You can create a connection to your database once and every system in Ignition will use that central connection. There's no need to worry about updating your database settings to add another client.

This central database connection also makes it easy to swap between databases or schemas. You can tell every query to use the default connection, then just change the default to update everything. Alternatively, you can force specific queries or systems to use a particular connection. Create as many database connections as you want and start designing using all of them.

## Add a Database Connection

Now that we've installed your database, let's connect to it. You can find detailed descriptions for many database connections in this User Manual, however, they all include the same steps:

1. On the Gateway Webpage, go to the Gateway **Config** tab. Scroll down to the **Databases > Connections** section.



2. On at the Database Connections page, click on the **Create new Database Connection...** link at the bottom of the table.

A screenshot of the Ignition Gateway Webpage under the 'Config' tab. The left sidebar shows 'SYSTEM' with 'Overview', 'Backup/Restore', 'Ignition Exchange', 'Licensing', 'Modules', 'Projects', 'Redundancy', and 'Gateway Settings'. Under 'NETWORKING', it shows 'Web Server', 'Gateway Network', and 'Email Settings'. Under 'SECURITY', it shows 'Auditing'. The main content area shows a table titled 'Database Connections'. It contains three rows: 'DB' (MariaDB, MySQL, Faulted), 'MSSQL' (MySQL, MySQL, Valid), and 'SQLServer' (Microsoft SQLServer, MSSQL, Faulted). At the bottom of the table is a red box around the link 'Create new Database Connection...'. A note below the table says 'Note: For details about a connection's status, see the Database Connection Status page.' The top right of the page has a green banner 'Trial Mode 1:24:26 We're glad you're test driving our software. Have fun.' and a 'Activate Ignition' button.

3. The next step is to choose a JDBC Driver.

Ignition connects to databases using JDBC drivers that are unique to each database. Drivers for the most popular databases are included so there is usually no need to install the JDBC driver manually.

Ignition ships with drivers for Microsoft SQL Server, MySQL, Oracle, and PostgreSQL. Pick the JDBC driver for your database, and click on the **Next** button.

If a suitable driver is not available in the list, you need to add a new JDBC driver for other databases, like IBM DB2, which is not very difficult to do, see [Adding a JDBC Driver](#).

4. **Configure the Connection**

After selecting the driver, you'll configure the settings for the connection. Some settings, such as the Connect URL are specific to the driver that you're using.

## On this page ...

- [Connect Once](#)
- [Add a Database Connection](#)

## Main Database Connection Properties

|                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                                                                                                                                                   | Each database connection needs a unique name, which consists of letters, numbers and underscores.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Description                                                                                                                                            | A brief description of the database.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| JDBC Driver                                                                                                                                            | The JDBC driver dictates the type of database that this connection can connect to. It cannot be changed once created.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Connect URL                                                                                                                                            | A string that instructs the driver how to connect to the database. This string is the server address, and may include the port, instance name, database name, and so on. The format and parameters depend on the driver being used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Username                                                                                                                                               | The username to use when connecting. Some databases support other authentication methods, such as Windows authentication, in which case this field is not used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Change Password?                                                                                                                                       | Check the box to change the existing password.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Password                                                                                                                                               | Enter password.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Password                                                                                                                                               | Re-type password for verification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Extra Connection Properties                                                                                                                            | Depending on which database you are connecting to, there will be different default values placed in this box. MS SQL Server requires you to place your database name here, but for other databases you can usually leave this at its default values.<br>Each database has its own set of available extra connection properties so you must refer to your Database documentation to determine what is valid here.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Enabled                                                                                                                                                | Lets you to enable or disable a database connection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Failover Datasource                                                                                                                                    | The connection that is automatically used when this connection is not available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Failover Mode                                                                                                                                          | Lets you select how to handle the database connection failing and recovering.<br>Database connections support <i>failover</i> . This means that the objects which use a database connection will use a different connection if the one they are using becomes unavailable. The <b>Failover Datasource</b> property determines which connection is used, and the <b>Failover Mode</b> determines when, if ever, the connection is switch back to the primary connection.<br>There are two failover modes: <ul style="list-style-type: none"><li>• <b>STANDARD</b> mode means that this datasource will fail over when a connection cannot be retrieved, but when connectivity is restored, connections will again come from this datasource.</li><li>• <b>STICKY</b> mode means that once this datasource fails over, connections will continue coming from the failover datasource until the failover datasource itself fails or the Gateway is restarted.</li></ul> |
| Slow Query Log Threshold                                                                                                                               | Queries that take longer than this amount of time, in milliseconds, will be logged. This helps to find queries that are not performing well. (default: 60,000)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Validation Timeout                                                                                                                                     | The time in milliseconds between database validation checks. (default: 10,000)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Advanced Settings</b>                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| There are many advanced settings that you don't need to change under normal circumstances. See the description for each property on the settings page. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

In This Section ...

# Connecting to MySQL

In order to get connected to MySQL, your Ignition Gateway must have a Translator, a Driver, and a Connection. New Ignition installations do not have the driver (a JAR file), so you will have to acquire the file yourself. See the [JDBC Drivers and Translators](#) page for more details on obtaining the required file.

Once acquired, you can follow the steps for [Upgrading a JDBC Driver](#). Once the JAR file has been provided, you can follow the steps listed on this page to configure a connection between Ignition and MySQL.

## MariaDB Connections to MySQL Databases

Alternatively, Ignition can use the built-in MariaDB driver to connect to MySQL 5.7 and prior databases. This circumvents the need to manually provide a JAR file to the MySQL JDBC Driver configuration on the Gateway.

This feature is new in Ignition version **8.1.2**  
[Click here](#) to check out the other new features

Ignition version 8.1.2 includes a Maria DB driver that can connect to MySQL 8 databases. Note that upgrading Ignition does not replace existing JDBC drivers. See the [JDBC Drivers and Translators](#) page for more information.

## On this page ...

- [MariaDB Connections to MySQL Databases](#)
- [Connect Ignition to MySQL Database](#)

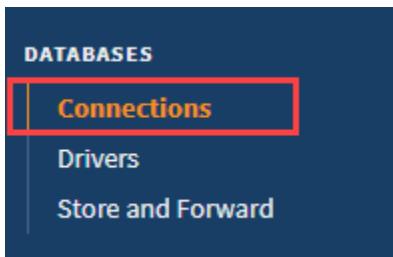


## Connecting to MySQL

[Watch the Video](#)

## Connect Ignition to MySQL Database

1. On the Gateway Webpage, go to the **Config** section.
2. Scroll down to **Databases > Connections**.



3. The Database Connections page is displayed. Click on **Create new Database Connection...**

A screenshot of the Ignition Gateway "Database Connections" page. The left sidebar shows the "Config" section selected. The main area displays a table of connections with two entries: "DB" (MariaDB, MySQL, Faulted) and "MSSQL" (MySQL, MySQL, Valid). A red box highlights the "Create new Database Connection..." button at the bottom left. A note at the bottom right says: "Note: For details about a connection's status, see the [Database Connection Status](#) page." The top right corner shows a "Trial Mode" message and an "Activate Ignition" button.

4. Select the **MySQL ConnectorJ** driver and click **Next**.

The screenshot shows the 'Database Connections' configuration page in Ignition. At the top, there's a green banner with the text 'Trial Mode 1:58:53 We're glad you're test driving our software. Have fun.' and a 'Activate Ignition' button. Below the banner, a message box says: 'Select the correct JDBC Driver for the type of database you wish to connect to. If no driver corresponds to your database, go to the Driver Configuration page to add a new driver.' A red box highlights the 'MySQL' option in the list of drivers.

- MariaDB**  
The MariaDB (a community-owned fork of MySQL) JDBC Driver - compatible with all MariaDB servers and MySQL 5.x ( $\geq 5.5.3$ ).
- Microsoft SQLServer**  
The Microsoft SQL Server JDBC Driver is a Java Database Connectivity (JDBC) 4.2 compliant driver.
- MySQL**  
The official MySQL JDBC Driver, Connector/J.
- Oracle Database**  
The Oracle Database JDBC driver.
- Oracle JDBC**
- PostgreSQL**  
The official PostgreSQL JDBC Driver.
- SQLite**  
Driver for the popular embedded database system.

**Next >**

Database connections in Ignition are powered by JDBC drivers. Ignition ships with drivers for Microsoft SQL Server, MySQL, Oracle, and a few others.

5. On the New Database Connection page, enter the following information:

Name: **MySQL** (use a meaningful name such as **MySQL**)

Connect URL: **jdbc:mysql://localhost:3306/test** (By default, MySQL creates an empty database called test)

The screenshot shows the 'Main Properties' tab of the 'New Database Connection' dialog in Ignition. The 'Name' field contains 'MySQL'. The 'JDBC Driver' dropdown is set to 'MySQL'. The 'Connect URL' field contains 'jdbc:mysql://localhost:3306/test'. A red box highlights the 'Connect URL' field.

| Main Properties |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name            | MySQL<br>Choose a name for this database connection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Description     | (empty text area)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| JDBC Driver     | MySQL<br>The JDBC driver dictates the type of database that this connection can connect to. It cannot be changed once created.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Connect URL     | jdbc:mysql://localhost:3306/test<br>The Connect URL is JDBC-driver specific. It usually contains the address of the machine that the database is running on.<br>The format of the MySQL connect URL is:<br><b>jdbc:mysql://host:port/database</b><br>With the three parameters (in bold)<br><b>host</b> : The host name or IP address of the database server.<br><b>port</b> : The port that the database server is running on. MySQL default port is <b>3306</b> .<br><b>database</b> : The name of the logical database that you are connecting to on the MySQL server. |

As you see in the example above, MySQL uses the following **Connect URL** format:  
**jdbc:mysql://hostaddress:3306/database**

Where **hostaddress** is the address of the machine with MySQL installed, for example: localhost, 192.168.1.1, db-server, etc., and **database** specifies the database schema the connection will target. It's important to understand that a MySQL server can host many database files. The connection will target one schema (a collection of tables and other objects) in the database.

6. To configure the connection, enter the following information:

Username: **root**

Password: **mysql** (password is what you entered during MySQL server installation, **mysql** is the password for this example)

Extra Connection Properties: Leave at the default value. By default, the **zeroDateTimeBehavior** parameter is defined and it is usually not necessary to add more parameters unless you are planning to store text outside of the range of 7-bit ASCII (a-z). If you are, add **useUnicode =yes;characterEncoding=utf8;** to the end of the extra connection properties, including the semi-colons.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Connect URL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                  |
| <pre>jdbc:mysql://localhost:3306/test</pre> <p>The Connect URL is JDBC-driver specific. It usually contains the address of the machine that the database is running on.<br/>The format of the MySQL connect URL is:<br/><b>jdbc:mysql://host:port/database</b><br/>With the three parameters (in bold)<br/><b>host</b>: The host name or IP address of the database server.<br/><b>port</b>: The port that the database server is running on. MySQL default port is <b>3306</b>.<br/><b>database</b>: The name of the logical database that you are connecting to on the MySQL server.</p> |                                                                                                                                  |
| Username                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | root                                                                                                                             |
| Password                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | .....                                                                                                                            |
| Password                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | .....                                                                                                                            |
| Extra Connection Properties                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                  |
| <pre>zeroDateTimeBehavior=CONVERT_TO_NULL;connectTimeout=120000;socketTimeout=120000;useSSL=false;allowPublicKeyValidation=false</pre> <p>There is an extensive list of extra connection properties available for MySQL Connector/J. See the documentation for a table describing all connection properties.<br/>A default <code>serverTimezone</code> value (taken from the gateway) will be appended to the connection string if one is not specified.</p>                                                                                                                               |                                                                                                                                  |
| Enabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <input checked="" type="checkbox"/> Disabling a connection will prevent communication to the target database.<br>(default: true) |
| Failover Datasource                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | - none -                                                                                                                         |
| <p>Another datasource that will be used to handle queries if this datasource faults.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                  |

7. Click on **Create New Database Connection** at the bottom of the form. Your connection is now created and the Database Connections page is displayed showing the **Status** of your connection as **Valid**.

| Name  | Description | JDBC Driver      | Translator | Status |
|-------|-------------|------------------|------------|--------|
| MySQL |             | MySQL ConnectorJ | None       | Valid  |

→ Create new Database Connection...

**Note:** For details about a connection's status, see the Database Connection Status page.

8. To display the details about the status of your database connection, see the **Note** on the above window and click on the **Database Connection Status** link. This will display any errors if your status is Faulted, in this example it shows the status as being Valid.

The screenshot shows the Ignition software interface. The left sidebar has a dark blue background with white text. It includes links for Home, Status (which is highlighted), Config, SYSTEMS (Overview, Performance, Alarm Pipelines, Gateway Scripts, Modules, Redundancy, Reports, SFCs, Tags, Transaction Groups), and CONNECTIONS (Databases, Designers, Devices, Gateway Network, Store & Forward, OPC Connections, Perspective Sessions, Vision Clients). The main content area has a light gray background. At the top, it says "Status > Connections > Databases". On the right, there's a "Get Designer" button. Below this, there are two large boxes: "Valid Connections" showing "0 / 1" and "Total Throughput" showing "0.0 queries/sec". A "Configuration" button is located in the top right corner of the main content area. Below these boxes is a navigation bar with buttons for "«", "<", "1", "of 1", ">", and "»". Underneath is a search/filter bar with "Filter" and "View 20". A table follows, with columns: Name, Driver, Status, Connections, Throughput, Actions. One row is shown: MySQL, MySQL, Valid, 0 / 8, 0.0 queries/sec, and a "Details" button.

| Name  | Driver | Status  | Connections | Throughput      | Actions                 |
|-------|--------|---------|-------------|-----------------|-------------------------|
| MySQL | MySQL  | ✓ Valid | 0 / 8       | 0.0 queries/sec | <a href="#">Details</a> |

#### Related Topics ...

- [Connecting to Microsoft SQL Server Express](#)
- [Store and Forward](#)
- [OPC UA](#)
- [Designer](#)

# Connecting to Microsoft SQL Server Express

## SQL Server Connection Requirements

In order to get connected to SQL Server, you must have a Translator, a Driver, and a Connection. The Translator and Driver only needs to be installed once, and after that you can make as many connections as you want to any compatible SQL Server databases.

**Note:** When you Upgrade Ignition, any existing drivers are carried over. This means only a fresh install of Ignition will not have a SQL Server Connector.

## On this page...

- [SQL Server Connection Requirements](#)
- [Connect to Microsoft SQL Server](#)
- [Microsoft SQL Server Connection Guide](#)
- [Different Ways of Connecting to SQL Server](#)
- [Troubleshooting](#)
- [JDBC Drivers and Translators](#)

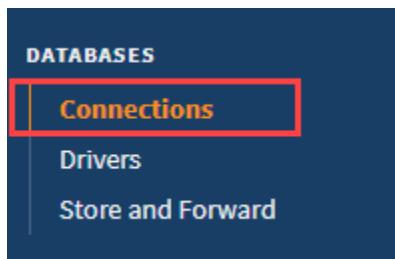


## Connecting to Microsoft SQL Server Express

[Watch the Video](#)

## Connect to Microsoft SQL Server

1. On the Gateway Webpage, go to the **Config** section.
2. Scroll down to **Databases > Connections**.



3. The Database Connections page is displayed. Click on **Create new Database Connection....**
4. Select **Microsoft SQLServer JDBC Driver**, and click **Next**.

The screenshot shows the Ignition Config interface. On the left, there's a sidebar with 'Config' selected. The main area is titled 'Database Connections'. It has a note: 'Select the correct JDBC Driver for the type of database you wish to connect to. If no driver corresponds to your database, go to the Driver Configuration page to add a new driver.' Below this, four options are listed with radio buttons: 'MariaDB', 'Microsoft SQLServer' (which is selected and highlighted with a red border), 'MySQL', and 'Oracle Database'.

5. On the **Database Connections** page, enter the following information:

Name: **SQLServer**

Connect URL: **jdbc:sqlserver://localhost\SQLEXPRESS**

**Note:** We are connecting to the express edition of SQL Server using the default instance name. If you have the full SQL Server with default settings, replace SQLEXPRESS with MSSQLSERVER.

username: **sa**

password: **sqlserver** (password is what you entered during the SQL Server installation. For this example, password is **sqlserver**)

The screenshot shows the 'Main Properties' section of the Database Connections configuration. The 'Name' field is set to 'SQLServer'. The 'JDBC Driver' is set to 'Microsoft SQLServer'. In the 'Connect URL' section, the URL is shown as 'jdbc:sqlserver://localhost\MSSQLSERVER'. A note explains the format: 'The format of the SQL Server connect URL is: **jdbc:sqlserver://host\instanceName[:port]**'. The 'host' is the host name or IP address, 'instanceName' is optional, and 'port' is optional with a default of 1433. For SQL Server, the database name is specified in the 'Extra Connection Properties'. The 'Username' is 'sa' and the 'Password' is 'sqlserver'. The 'Re-type password for verification' field also contains 'sqlserver'.

6. At the bottom of the form, click on **Create New Database Connection**.

Your connection is now created. The Database Connections page is displayed and will show the status of Reconnecting, then Valid.

7. To display the details about the status of your database connection, see the **Note** on the above window and click on the **Database Connection Status** link.

| Name      | Driver                          | Status  | Connections | Throughput       | Actions                 |
|-----------|---------------------------------|---------|-------------|------------------|-------------------------|
| SQLServer | Microsoft SQLServer JDBC Driver | ✓ Valid | 0 / 8       | 12.0 queries/sec | <a href="#">Details</a> |

## Microsoft SQL Server Connection Guide

This guide helps you with any difficulties you may have in getting the correct settings and parameters when connecting Ignition to Microsoft SQL Server, a popular and robust relational database.

### Multiple Instances of Database

Microsoft SQL Server supports multiple instances of the database running concurrently on the same computer. Each instance has its own name and set of system and user databases that are not shared between instances. Applications, such as Ignition, can connect to each instance on a computer in much the same way they connect to databases running on different computers. By default, each instance gets assigned a dynamic TCP/IP port on startup that listens for any incoming requests. Since the port is dynamic and the application does not know what the new port is, it must connect using the instance name.

So if the communication is over TCP/IP and the application knows the instance name, how does the application find which port to communicate to?

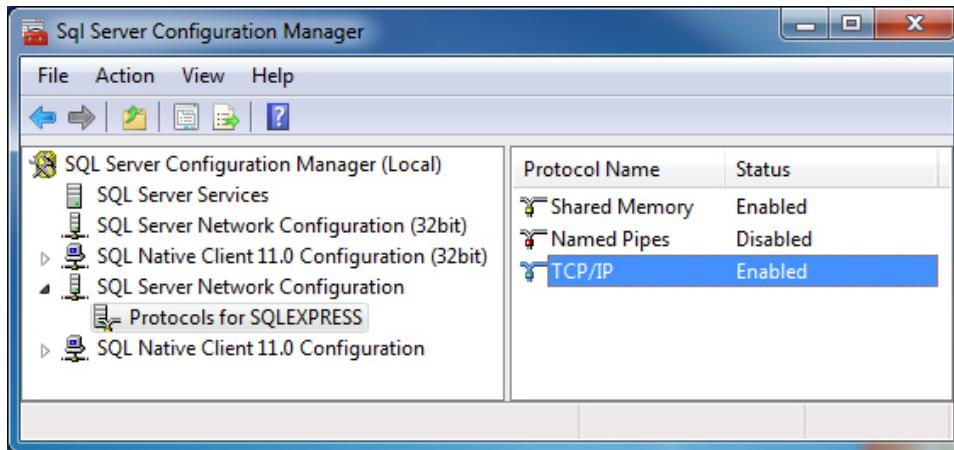
The answer is the **Microsoft SQL Server Browser** service. The Microsoft SQL Server Browser program runs as a Windows service and listens for all incoming requests for resources and provides information, such as the TCP/IP port, about each instance installed on the computer. Microsoft SQL Server Browser also contributes to these two actions: browsing a list of available servers and connecting to the correct server instance.

If the Microsoft SQL Server Browser service is not running, you can still connect to SQL Server if you provide the correct port number. For example, you can connect to the default instance of SQL Server with TCP/IP if it is running on port 1433.

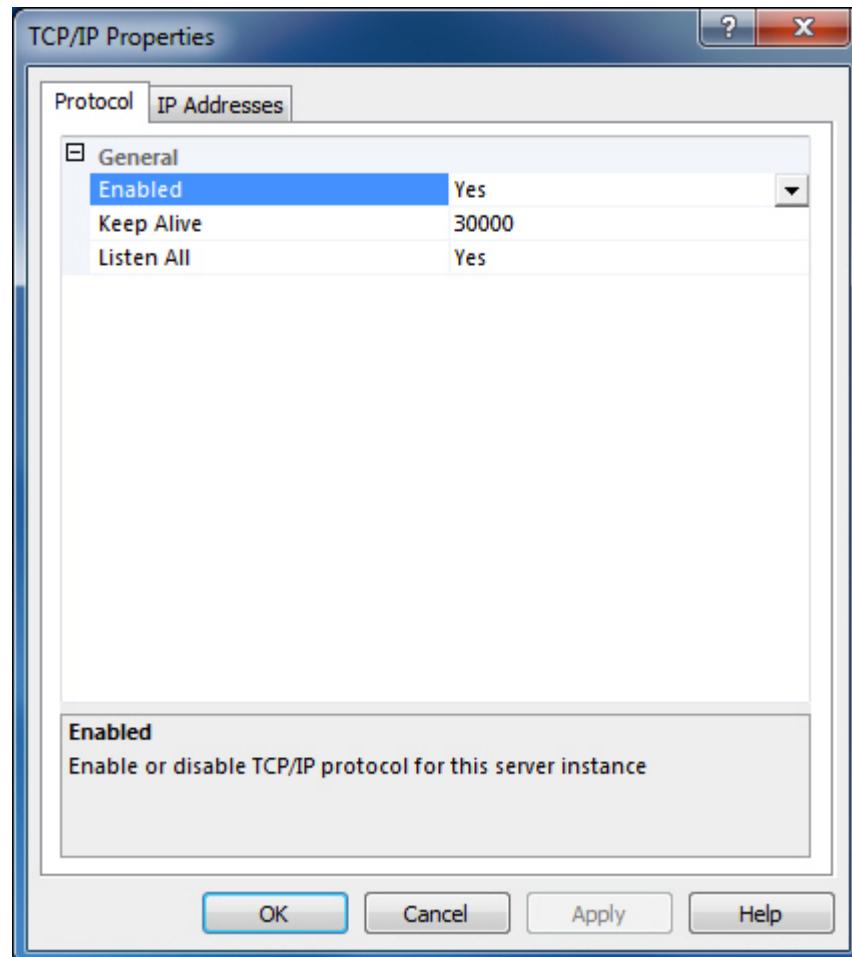
## Check 1: Make Sure the Database has TCP/IP Enabled

Ignition connects using TCP/IP, therefore make sure your database has TCP/IP enabled.

1. Open the SQL Server Configuration Manager from Start > All Programs > Microsoft SQL Server Version # > Configuration Tools > SQL Server Configuration Manager.  
The Sql Server Configuration Manager window is displayed.
2. To see all the instances setup on that machine, expand **SQL Server Network Configuration**.
3. Find the database (or instance) you plan on using. To the right, all of the protocols the database supports are shown. Find the **TCP/IP** protocol and select it.



4. Make sure the **Status** next to TCP/IP is **Enabled**. If not, double-click **TCP/IP** and choose **Yes** from the drop-down next to Enabled and click **OK**.

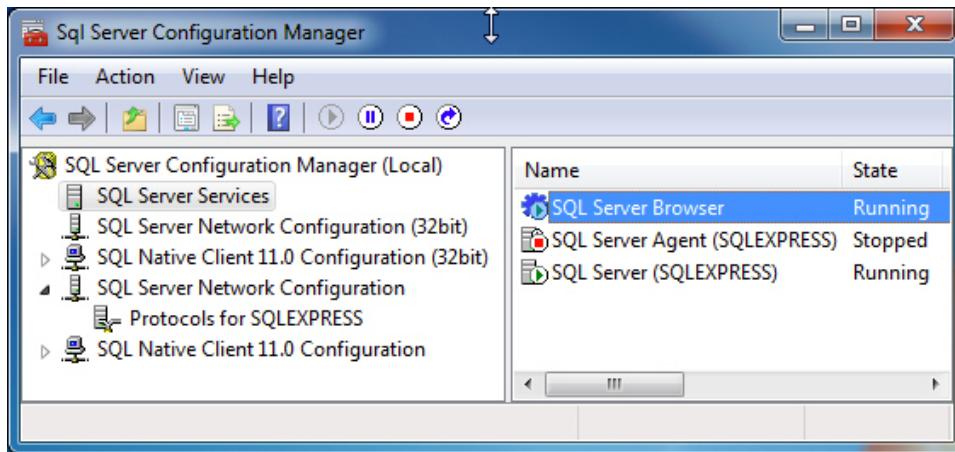


## Check 2: Make Sure Microsoft SQL Server Browser is Running

If you ARE connecting to your database using a NAMED INSTANCE, you must make sure that the Microsoft SQL Server Browser is running. As mentioned earlier, the Microsoft SQL Server Browser translates the instance name to a TCP/IP port in order for Ignition to connect to it.

1. Open the **SQL Server Configuration Manager** from **Start > All Programs > Microsoft SQL Server Version # > Configuration Tools > SQL Server Configuration Manager**.
2. Select the **SQL Server Services** section.
3. On the right, see all of the services installed. One of the services is **SQL Server Browser**. Make sure this service is in fact running. If the service is not running, right-click and select **Start**.

**Note:** The service could be disabled, so you may need to double-click it to enable the service before starting it up.



## Different Ways of Connecting to SQL Server

Now that you have ensured that TCP/IP is enabled and the Microsoft SQL Server Browser is running, you can connect to Microsoft SQL Server in four different ways (all using TCP/IP communication) as follows:

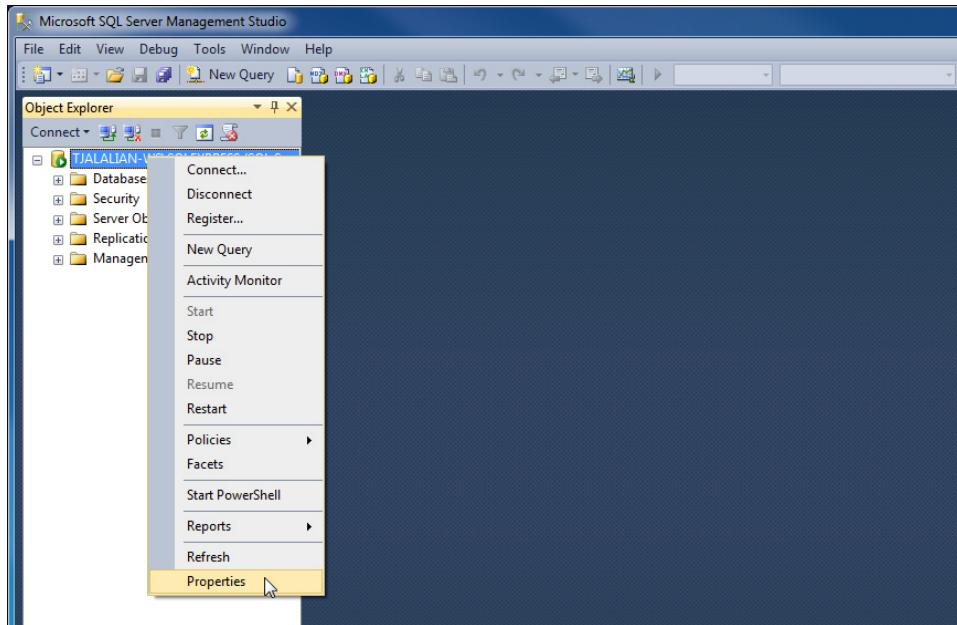
1. Connect using an Instance Name and SQL Authentication.
2. Connect using an Instance Name and Windows Authentication (this is the most common method).
3. Connect using a Port and SQL Authentication.
4. Connect using a Port and Windows Authentication.

### Scenario 1: Connect By Using an Instance Name and SQL Authentication

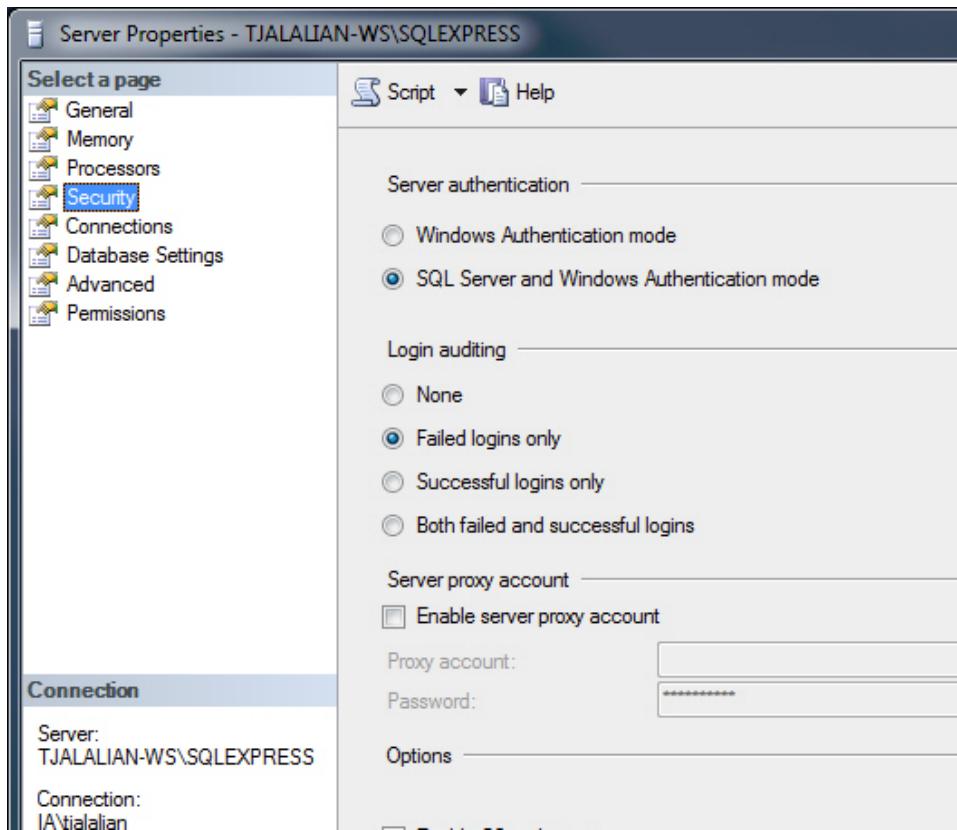
By default, Microsoft SQL Server only allows Windows authentication since it is more secure. But because we are using SQL authentication, we must enable Microsoft SQL to allow this type of authentication.

#### Enable SQL Authentication

1. Open the **Microsoft SQL Server Management Studio** window from **Start > All Programs > Microsoft SQL Server Version # > SQL Server Management Studio**.  
The window is displayed showing connections to your database.
2. Right-click the top-level database in the **Object Explorer** and select **Properties**.



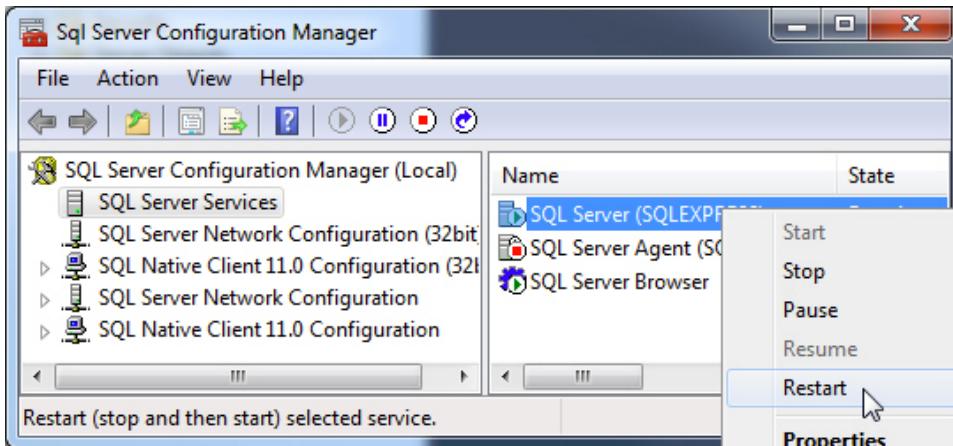
3. From the Server Properties window, on the left side, select **Security**.



4. Verify that **SQL Server and Windows Authentication mode** is selected.  
If not, select it and click **OK**.

Now you need to restart the **SQL Server Windows** service so that this setting takes effect.

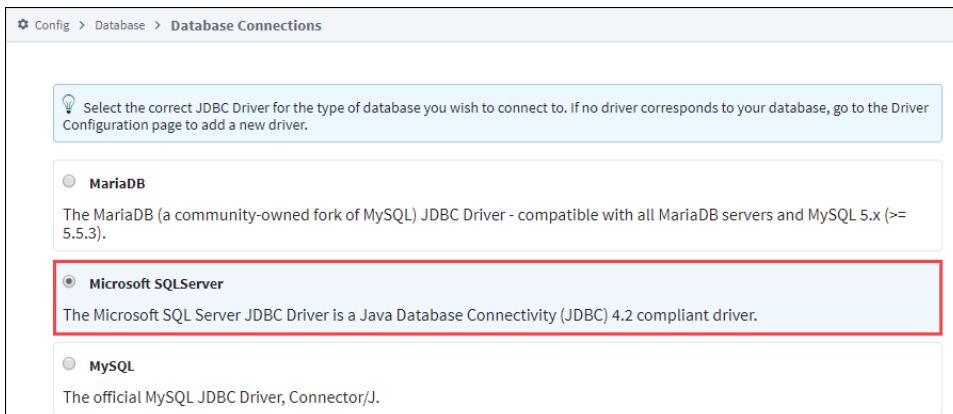
5. Open the **SQL Server Configuration Manager** at  
**Start > All Programs > Microsoft SQL Server Version # > Configuration Tools > SQL Server Configuration Manager**.
6. Select the **SQL Server Services** section and restart the **SQL Server (Instance Name)** item.



Now that Microsoft SQL Server accepts SQL authentication, we can configure Ignition.

### Configure the Database Connection in Ignition

1. Go to and login to the Ignition Gateway Config page from your webbrowser at <http://hostname:8088/main/web/config/>
2. Select **Databases > Connections** from the menu.
3. Click on **Create new Database Connection**.
4. Select **Microsoft SQL Server JDBC Driver** and click **Next**.



5. In the **New Database Connection** window, enter the following information:

Name: **SQLServer\_SQLAuth** (no spaces)

Connect URL: **jdbc:sqlserver://Hostname\InstanceName**

where **Hostname** is your databases IP address or hostname and **InstanceName** is your databases instance name, for example:  
**jdbc:sqlserver://localhost\SQLEXPRESS**  
**jdbc:sqlserver://10.10.1.5\MSSQLSERVER**

6. Set the username and password to a valid SQL authentication user. For example, **sa** is the default administrator account you can use.

**Main Properties**

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                        | SQLServer_SQLAuth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Description                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| JDBC Driver                 | Microsoft SQLServer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Connect URL                 | jdbc:sqlserver://localhost\SQLEXPRESS<br>The Connect URL is JDBC-driver specific. It usually contains the address of the machine that the database is running on.<br>The format of the SQL Server connect URL is:<br><code>jdbc:sqlserver://host\instanceName[:port]</code><br>With the three parameters (in bold)<br><b>host</b> : The host name or IP address of the database server.<br><b>instanceName</b> : (optional) the instance to connect to on the host. If not specified, a connection to the default instance is made.<br><b>port</b> : (optional) the port to connect to. The default is <b>1433</b> . If you are using the default, you can omit the port and the preceding ':'.<br>For SQL Server, you specify the <i>database name</i> to connect to using the <code>databaseName</code> property in the <i>Extra Connection Properties</i> . |
| Username                    | sa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Password                    | .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Re-type Password            | .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Extra Connection Properties | databaseName=test<br>Use <code>databaseName=YOUR_DATABASE</code> to specify the database to connect to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

7. To add your own user account, open the SQL Server Management Studio and expand the **Security > Logins** folder. You will see all the current logins including **sa** and you can add a new login.

- To add a new login, right-click on the **Logins** folder and click **New Login...**. The **Login** window is displayed.
- Choose the **SQL Server authentication** mode and type in a Login name and password.

**Note:** You will also have to add permissions to your database by mapping `db_datareader` and `db_datawriter` to the new user in the User Mapping section of the Login window. If you want Ignition to be able to create tables (ie: for Tag History), you also need to give table creation access such as `db_owner`.

- Go back to the **New Database Connection** page in the Gateway, enter the name of your database, for example, in the **Extra Connection Properties** enter: `databaseName=test` (replace `test` with your database name, not the instance name).
- Click **Create New Database Connection**. The Database Connection page is displayed showing the Status as **Valid** after a couple of seconds. If the connection is **Faulted**, click on the Database Connection Status link to find out why. Typically, the username/password is incorrect or the user doesn't have the right permissions.

## Scenario 2: Connect By Using Instance Name and Windows Authentication

In Windows authentication mode, the username and password used to connect comes from the Ignition Windows Service logon. By default, the Ignition Windows Service is set to local system account which usually doesn't have privileges to connect.

### Set Up the Service to Use Windows Authentication

- Download a copy of the **SQL Server JDBC driver**. Specifically, download a ZIP or tar.gz file (NOT an installer), as you will need to extract a specific file and relocate it to the gateway's installation directory. The exact version required depends on the version of Java your gateway is using. Ignition 8.0 uses Java 11, but future updates could change the java version. Regardless, it's recommended you use the most recent driver available for your system.
- Locate the `mssql-jdbc-auth-#.#.x##.dll` file from the correct architecture folder ("x64" for 64-bit JDBC) inside of the `enu/auth` folders in the zip file.

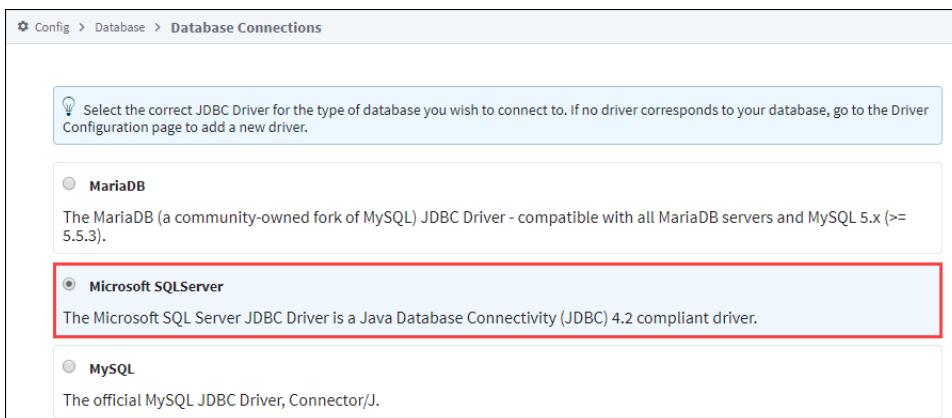
3. Copy the `sqljdbc_auth.dll` file to the **lib** folder in your install directory. If you have the default install directory, it's in the following location:  
**C:\Program Files\Inductive Automation\Ignition\lib\**

**Note:** Older version of the JDBC driver (such as version 7.2.1) needed to be renamed to `sqljdbc_auth.dll` before Ignition could utilize the file. However, in more modern version of the driver, this is no longer the case.

4. The account used to connect will be the account that Ignition is running under in the services menu. To setup Ignition to logon using the right Windows account, open the **Services Control Panel** from Start > Control Panel > Administrative Tools > Services
5. Right-click the **Ignition** service and choose **Properties**.
6. Select the **Log On** tab.
7. Choose the **This account** radio button and enter in your Windows username and password.
8. Click **OK** to save.
9. Now restart the Ignition service to make this change take effect. Click the **Action > Restart** button in the menubar to restart the Ignition service (or you can stop and start from the right-click menu).

## Configure the Database Connection in Ignition

1. Go to and login to the Ignition Gateway Config page from your webbrowser at <http://hostname:8088/main/web/config>
2. Select **Databases > Connections** from the menu.
3. Click on **Create new Database Connection**.
4. Select **Microsoft SQL Server JDBC Driver** and click **Next**.



5. On the **New Database Connection** page, enter the following information:  
Name: **SQLServer\_WinAuth** (no spaces)

Connect URL: `jdbc:sqlserver://Hostname\InstanceName`

where **Hostname** is your databases IP address or hostname and **InstanceName** is your databases instance name, for example:  
`jdbc:sqlserver://localhost\SQLEXPRESS`  
`jdbc:sqlserver://10.10.1.5\MSSQLSERVER`

**username:** leave blank  
**password:** leave blank

Extra Connection Properties:  
`databaseName=test; integratedSecurity=true;` (replace test with your database name)

Config > Database > Database Connections

| Main Properties             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                        | <input type="text" value="SQLServer_WinAuth"/> <a href="#">[i]</a><br>Choose a name for this database connection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Description                 | <input type="text"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| JDBC Driver                 | Microsoft SQLServer <a href="#">[▼]</a><br>The JDBC driver dictates the type of database that this connection can connect to. It cannot be changed once created.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Connect URL                 | <input type="text" value="jdbc:sqlserver://localhost\MSSQLSERVER"/><br>The Connect URL is JDBC-driver specific. It usually contains the address of the machine that the database is running on.<br>The format of the SQL Server connect URL is:<br><code>jdbc:sqlserver://host\instanceName[:port]</code><br>With the three parameters (in bold)<br><b>host</b> : The host name or IP address of the database server.<br><b>instanceName</b> : (optional) the instance to connect to on the host. If not specified, a connection to the default instance is made.<br><b>port</b> : (optional) the port to connect to. The default is <b>1433</b> . If you are using the default, you can omit the port and the preceding '!'.<br>For SQL Server, you specify the <i>database name</i> to connect to using the <code>databaseName</code> property in the <i>Extra Connection Properties</i> . |
| Username                    | <input type="text"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Password                    | <input type="password"/> <a href="#">[i]</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Password                    | <input type="password"/> <a href="#">[i]</a><br>Re-type password for verification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Extra Connection Properties | <input type="text" value="databaseName=test;integratedSecurity=true"/><br>Use <code>databaseName=YOUR_DATABASE</code> to specify the database to connect to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Enabled                     | <input checked="" type="checkbox"/> Disabling a connection will prevent communication to the target database.<br>(default: true)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failover Datasource         | <input type="text" value="- none -"/> <a href="#">[▼]</a><br>Another datasource that will be used to handle queries if this datasource faults.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

6. Click on **Create New Database Connection**.

The Status should be Valid after a couple of seconds. Again, if the connection is Faulted, click the Database Connection Status link to find out why.

### Scenario 3: Connect By Using Port and SQL Authentication

1. Connecting by using a port and SQL authentication is just like scenario 1 above except you specify a port instead of the instance name in the **New Database Connection** page.
2. Enter the following:

Connect URL: `jdbc:sqlserver://Hostname:Port`

where **Hostname** is your databases IP address or hostname and **Port** is your databases TCP/IP port (SQLSERVER default port is 1433), for example:

`jdbc:sqlserver://localhost:1433`  
`jdbc:sqlserver://10.10.1.5:1433`

### Scenario 4: Connect By Using Port and Windows Authentication

Connecting by using a port and Windows authentication is just like scenario 2 above except you specify a port instead of the instance name in the **New Database Connection** page. Don't forget to download the `sqljdbc_auth.dll` file if you need it.

Enter the following:

Connect URL: `jdbc:sqlserver://Hostname:Port`

where **Hostname** is your databases IP address or hostname and **Port** is your databases TCP/IP port (SQLSERVER default port is 1433), for example:  
`jdbc:sqlserver://localhost:1433`  
`jdbc:sqlserver://10.10.1.5:1433`

## Troubleshooting

### TCP/IP Communication Not Enabled

SQL Server requires that you explicitly turn on TCP connectivity. To do this, use the SQL Server Configuration Manager, located in the **Start** menu under **Microsoft SQL Server > Configuration Tools**. Under **SQL Server Network Configuration**, select your instance, and then enable TCP/IP in the panel to the right. You need to restart the server for the change to take affect.

### Window Firewall

When connecting remotely, make sure that Windows Firewall is disabled, or set up to allow the necessary ports. Normally ports 1434 and 1433 must be open for TCP traffic, but other ports may be required based on configuration.

### SQL Server Browser Process Not Running

To connect to a named instance, the **SQL Server Browser** service must be running. It is occasionally disabled by default, so you need to verify that the service is not only running, but set to start automatically on bootup. The service can be found in the Windows Service Manager (**Control Panel > Administrative Tools > Services**).

### Mixed Mode Authentication Not Enabled

Unless selected during setup, **mixed mode** or **SQL authentication** is not enabled by default. This mode of authentication is the **username/password** scheme that most users are used to. When not enabled, SQL Server only allows connections using Windows Authentication. Due to the ease of using SQL Authentication over Windows Authentication, we recommend enabling this option and defining a user account for Ignition.

1. To enable this, open the SQL Server Management Studio.
2. Connect to the server.
3. Right click on the instance and select **Properties**.
4. Under **Security**, select **SQL Server and Windows Authentication mode**.

## JDBC Drivers and Translators

In some cases, you may need to add your own JDBC Driver, or configure a Translator. More information on configuring these can be found on the [JDBC Drivers and Translators](#) page. However, you may need to check the JDBC driver's documentation for information on how to configure them.

### Related Topics ...

- [Connecting to Oracle Express](#)
- [Store and Forward](#)
- [OPC UA](#)
- [Designer](#)

# Connecting to Oracle Express

This page documents how to configure a database connection to an Oracle Express instance.

## Oracle User Grants

When using an Oracle Express database connection, it is required to provide user credentials that have grants for "CREATE TRIGGER" and "CREATE SEQUENCE". Some of Ignition's subsystems, such as the [Tag Historian](#), will fail to work properly if the user defined in the Database Connection does not have these grants. In addition, any manual queries (for example, those called by `system.db.runNamedQuery`) that need to insert records or create sequences may fail if the gateway does not have the grants.

## On this page ...

- [Oracle User Grants](#)
- [Connect Ignition to the Oracle Express Database](#)
- [JDBC Drivers and Translators](#)

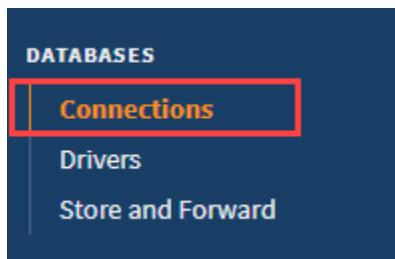


## Connecting to Oracle Express

[Watch the Video](#)

## Connect Ignition to the Oracle Express Database

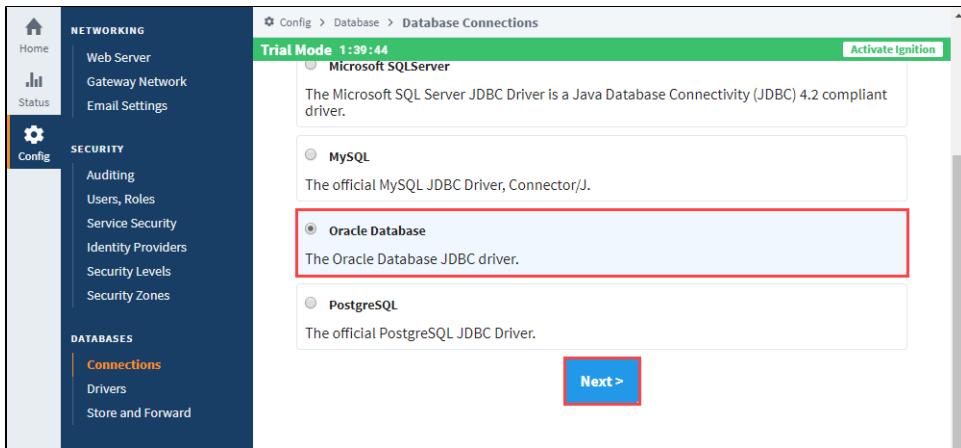
1. On the Gateway Webpage, go to the **Config** section.
2. Scroll down to **Databases > Connections**.



3. The Database Connections page is displayed. Click on **Create new Database Connection...**

A screenshot of the Ignition Config 'Database Connections' page. A new connection named 'DB' is listed with 'MariaDB' as the JDBC Driver and 'MySQL' as the Translator. A red box highlights the 'Create new Database Connection...' button. A note at the bottom states: 'Note: For details about a connection's status, see the Database Connection Status page.'.

4. Select the **Oracle JDBC Driver** and click **Next**.



5. Enter the following information:

| Property Name | How should it be configured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | The name of the database connection. Other features in Ignition will reference this connection by the name specified here.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Connect URL   | <p>A URL that describes where on the network the database is, as well as information about which schema to connect to. The initial value should look something like the following</p> <pre>jdbc:oracle:thin:@localhost:1521:XE</pre> <p>However, you may need to make some changes. If we examine the key pieces of the URL, it would look like this:</p> <pre>jdbc:oracle:thin://1:2:3</pre> <p>Where:</p> <ul style="list-style-type: none"> <li>1 = The IP Address or hostname of the computer/server that the database is installed on.</li> <li>2 = The port that the database is running on. The default is 1521, but this could have been changed during installation, or sometime afterwards. When in doubt, ask the person that installed the database.</li> <li>3 = The System ID for the database. More information on the System ID can be found in Oracle's documentation.</li> </ul> |
| Username      | The username that the Gateway will use to connect to the database.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Password      | The password for the user specified under the Username property.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

For our example, we entered information relevant to our installation. The values seen below may differ from each installation.

The screenshot shows the Ignition Config interface with the 'Config' tab selected. In the left sidebar, under 'DATABASES', 'Connections' is highlighted. The main content area is titled 'Database Connections' and shows a 'Main Properties' form. The 'Name' field is populated with 'Oracle' and has a note below it: 'Choose a name for this database connection.' The 'JDBC Driver' dropdown is set to 'Oracle Database'. The 'Connect URL' field contains 'jdbc:oracle:thin:@localhost:1521:test'. Below it, a note explains the format: 'The Connect URL is JDBC-driver specific. It usually contains the address of the machine that the database is running on. The format of the Oracle connect URL is: **jdbc:oracle:thin:@host:port:SID**. With the three parameters (in bold): **host**: The host name or IP address of the database server. **port**: The port that the database server is running on. Oracle's default port is **1521**. **SID**: the system ID that identifies the database to connect to.' The 'Username' field is set to 'SYSTEM'. The 'Password' field contains '.....' and has a note below it: 'Re-type password for verification.' A red box highlights both the 'Name' field and the 'Password' field.

6. Click **Create New Database Connection** at the bottom of the form.
7. The Database Connections page is displayed showing the **Status** of your connection as **Valid**.

The screenshot shows the Ignition Config interface with the 'Config' tab selected. In the left sidebar, under 'DATABASES', 'Connections' is highlighted. The main content area is titled 'Database Connections' and displays a table of connections. A green success message at the top says 'Successfully created new Database Connection "Oracle"'. The table has columns: Name, Description, JDBC Driver, Translator, and Status. There are two rows: one for 'MySQL' (Status: Faulted) and one for 'Oracle' (Status: Valid). A red box highlights the 'Status' cell for the 'Oracle' connection. Buttons for 'delete' and 'edit' are shown for each row.

8. To display the details about the status of your database connection, see the **Note** on the above window and click on the **Database Connection Status** link.

The screenshot shows the Ignition interface with the 'Config' tab selected. In the left sidebar, under 'DATABASES', 'Connections' is highlighted. The main content area shows 'Valid Connections' as '1 / 1' and 'Total Throughput' as '0.1 queries/sec'. A table at the bottom provides detailed information about the connection:

| Name   | Driver             | Status                                     | Connections | Throughput      |
|--------|--------------------|--------------------------------------------|-------------|-----------------|
| Oracle | Oracle JDBC Driver | <span style="color: green;">✓ Valid</span> | 0 / 8       | 0.1 queries/sec |

A blue 'Details' button is located at the bottom right of the table.

## JDBC Drivers and Translators

In some cases, you may need to add your own JDBC Driver, or configure a Translator. More information on configuring these can be found on the [JDBC Drivers and Translators](#) page.

Related Topics ...

- [Store and Forward](#)
- [OPC UA](#)
- [Designer](#)

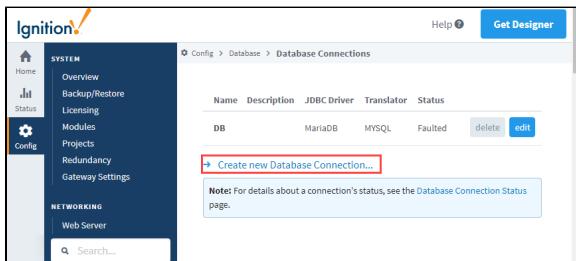
# Connecting to PostgreSQL

## Connect Ignition to the PostgreSQL Database

1. On the Gateway Webpage, go to the **Config** section.
2. Scroll down to **Databases > Connections**.



3. The Database Connections page is displayed. Click on **Create new Database Connection....**



4. Select the **PostgreSQL JDBC Driver** and click **Next**.



5. Next, you'll need to enter information that will allow the Gateway to connect to a Postgres instance. In most cases, the following properties should be updated:

| Property Name | How should it be configured                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name          | The name of the database connection. Other features in Ignition will reference this connection by the name specified here.                                                                                                                                                                                                                                                                                                |
| Connect URL   | A URL that describes where on the network the database is, as well as information about which schema to connect to. The initial value should look something like the following<br><br><code>jdbc:postgresql://localhost:5432/schema</code><br><br>However, you may need to make some changes. If we examine the key pieces of the URL, it would look like this:<br><br><code>jdbc:postgresql://1:2/3</code><br><br>Where: |

## On this page ...

- Connect Ignition to the PostgreSQL Database
- JDBC Drivers and Translators



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## Connecting to PostgreSQL

[Watch the Video](#)

|          |                                                                                                                                                                                                                                                                                                                                                                                  |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <p>1 = The IP Address or hostname of the computer/sever that Postgres is installed on</p> <p>2 = The port that Postgres is running on. The default is 5432, but this could have been changed during installation, or sometime afterwards. When in doubt, ask the person that installed the database.</p> <p>3 = The schema name that this connection will provide access to.</p> |
| Username | The username that the Gateway will use to connect to the database.                                                                                                                                                                                                                                                                                                               |
| Username | The username that the Gateway will use to connect to the database.                                                                                                                                                                                                                                                                                                               |

6. Click **Create New Database Connection** at the bottom of the form.
7. The Database Connections page is displayed showing the **Status** of your connection as **Valid**.
8. To display the details about the status of your database connection, see the **Note** on the above window and click on the **Database Connection Status** link.

## JDBC Drivers and Translators

In some cases, you may need to add your own JDBC Driver, or configure a Translator. More information on configuring these can be found on the [JDBC Drivers and Translators](#) page.

### Related Topics ...

- [Store and Forward](#)
- [OPC UA](#)
- [Designer](#)

# Connecting to SQLite

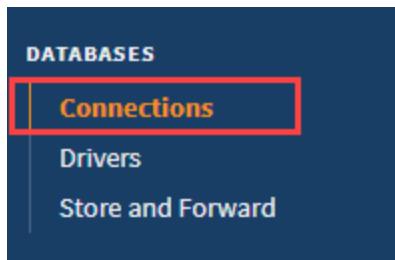
An Ignition Gateway can create a SQLite database, allowing for data collection without installing a separate SQL database. This is ideal for small scale applications, as well as testing and demonstrations.

SQLite connections offer convenience, but Relational Database Management Systems (RDBMS) generally offer better performance, especially so in cases where queries are frequently executed such as systems utilizing a historian system. As a result, the SQLite connection is **not** recommended for production systems as a historian database. Learn more about appropriate uses of SQLite in their [official documentation](#).

Unlike other database connections, SQLite databases only support a single connection at a time. Configuring this type of Database Connection means the Gateway will constantly be connected to the SQLite database, preventing other systems from connecting.

## Connect Ignition to SQLite Database

1. On the Gateway Webpage, go to the **Config** section.
2. Scroll down to **Databases > Connections**.



3. The Database Connections page is displayed. Click on **Create new Database Connection....**

A screenshot of the Ignition Gateway's 'Database Connections' page. The left sidebar shows the 'Config' section selected. The main area displays a table of connections with two entries: 'DB' (MariaDB, MySQL, Faulted) and 'MSSQL' (MySQL, MySQL, Valid). A red box highlights the 'Create new Database Connection...' button. A note below the table states: 'Note: For details about a connection's status, see the [Database Connection Status](#) page.'

| Name  | Description | JDBC Driver | Translator | Status  | delete                  | edit                  |
|-------|-------------|-------------|------------|---------|-------------------------|-----------------------|
| DB    |             | MariaDB     | MySQL      | Faulted | <button>delete</button> | <button>edit</button> |
| MSSQL |             | MySQL       | MySQL      | Valid   | <button>delete</button> | <button>edit</button> |

4. Select the **SQLite** driver and click **Next**.

The screenshot shows the 'Database Connections' configuration page. It lists several database drivers: MySQL, Oracle Database, Oracle JDBC, PostgreSQL, and SQLite. The 'SQLite' option is selected, indicated by a red border around its box. Below the list is a blue 'Next >' button.

- On the **New Database Connection** page, enter a name for your connection. We used **SQLite\_Connect**.
- Next, enter the connect URL for the database. For SQLite this setting must lead to a location on a filesystem. In our example here we used **jdbc:sqlite:C:Program Files/SQLite/File.db**. This path ultimately must lead to a local directory, or a locally mapped drive.

The JDBC Driver for SQLite will attempt to create a database if one does not already exist.

For Windows machines, either forward / or backslashes\ can be used.

The screenshot shows the 'New Database Connection' form under the 'Main Properties' tab. The 'Name' field contains 'SQLite\_Connect'. The 'Description' field contains 'My SQLite connection'. The 'JDBC Driver' dropdown is set to 'SQLite'. The 'Connect URL' field contains 'jdbc:sqlite:C:/Program Files/SQLite/File.db'. Below the URL, explanatory text states: 'The Connect URL is JDBC-driver specific. It usually contains the address of the machine that the database is running on. The format of the SQLite connect URL is: jdbc:sqlite:/path/on/linux/File.db'.

- Click on **Create New Database Connection** at the bottom of the form.

Your connection is now created and the Database Connections page is displayed showing the **Status** of your connection as **Valid**.

Config > Database > Database Connections

Successfully created new Database Connection "SQLite\_Connect"

| Name           | Description | JDBC Driver         | Translator | Status       |                        |                      |
|----------------|-------------|---------------------|------------|--------------|------------------------|----------------------|
| DB             |             | MariaDB             | MYSQL      | Faulted      | <a href="#">delete</a> | <a href="#">edit</a> |
| MSSQL          |             | MySQL               | MYSQL      | Valid        | <a href="#">delete</a> | <a href="#">edit</a> |
| SQLServer      |             | Microsoft SQLServer | MSSQL      | Reconnecting | <a href="#">delete</a> | <a href="#">edit</a> |
| SQLite_Connect |             | SQLite              | SQlite     | Valid        | <a href="#">delete</a> | <a href="#">edit</a> |

[Create new Database Connection...](#)

**Note:** For details about a connection's status, see the [Database Connection Status](#) page.

#### Related Topics ...

- [Connecting to Microsoft SQL Server Express](#)
- [Store and Forward](#)
- [OPC UA](#)
- [Designer](#)

# JDBC Drivers and Translators

In most cases, the default JDBC drivers and Translator settings in Ignition will not need to be modified. However, there are cases where drivers or translators may need modification.

## JDBC Drivers and Ignition Upgrades

When upgrading Ignition, JDBC drivers are **not** modified during the upgrade process. This is to prevent database connection issues on upgrade: you should only need to upgrade your JDBC drivers when the database is updated, not when Ignition is upgraded. Only new Ignition installations will always use the JDBC drivers that are included with the installer.

Running the installer to upgrade a preexisting Ignition installation will not modify the installed JDBC drivers, even if newer drivers are included in the installer. In addition, restoring a Gateway backup from an older version will replace any new versions of the drivers with the versions from the backup. In this case, you will need to manually update the JDBC drivers.

## On this page ...

- [JDBC Drivers and Ignition Upgrades](#)
- [MySQL Translator and JDBC Driver Settings](#)
- [MSSQL Translator and JDBC Driver Settings](#)
- [Oracle Express Translator and JDBC Driver Settings](#)
- [PostgreSQL Translator and JDBC Driver Settings](#)
- [Add a New JDBC Driver](#)
- [Upgrade a JDBC Driver](#)
- [Database Translators](#)

Commonly, you will have to download the official JAR file from the creator's website. We have a few links here to make it easy to find.

| Database   | Link                                                                                                                                                                                                      | Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MySQL      | <a href="https://dev.mysql.com/downloads/connector/j/">https://dev.mysql.com/downloads/connector/j/</a>                                                                                                   | <ol style="list-style-type: none"><li>1. Select Your Operating system (or <b>Platform Independent</b> if you are on Windows).</li><li>2. After the file has been downloaded, unzip the archive. On Windows you can right-click and select the <b>Extract All</b> option.</li><li>3. The location of the JAR we need should be in the extracted folder under <b>mysql-connector-java-X.X.XX</b> where the Xs are the version number. You are looking for a file that is named like <b>mysql-connector-java-X.X.XX.jar</b>.</li></ol> |
| MSSQL      | <a href="https://github.com/microsoft/mssql-jdbc/releases">https://github.com/microsoft/mssql-jdbc/releases</a>                                                                                           | You only need the .jar file, so you can select just the <b>mssql-jdbc-X.X.XX.jre11.jar</b> file. The Xs will be replaced with the version numbers. Ensure you download the <b>jre11</b> version of the JAR.                                                                                                                                                                                                                                                                                                                         |
| Oracle     | <a href="https://www.oracle.com/technetwork/database/application-development/jdbc/downloads/index.html">https://www.oracle.com/technetwork/database/application-development/jdbc/downloads/index.html</a> | <ol style="list-style-type: none"><li>1. You will need to create an Oracle account to download the JAR files.</li><li>2. You can select the Unzipped version of the newest JAR.</li><li>3. You are looking for a file that is named like <b>odbcX.jar</b>. Where X is the version number.</li></ol>                                                                                                                                                                                                                                 |
| PostgreSQL | <a href="https://jdbc.postgresql.org/download.html">https://jdbc.postgresql.org/download.html</a>                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## MySQL Translator and JDBC Driver Settings

MySQL connections can often use the included MariaDB translator, but we recommend using a separate MySQL Translator. However, you may need to check the JDBC driver's documentation for information on how to configure them. Below are some recommended settings, but the vendor's documentation should always supersede any suggestions here.

| Main Properties                 |                                                         |
|---------------------------------|---------------------------------------------------------|
| Name                            | MySQL                                                   |
| Create Table Syntax             | CREATE TABLE {tablename} ({creationdef}{primarykeydef}) |
| Create Sequence Syntax          | <leave empty>                                           |
| Create Trigger Syntax           | <leave empty>                                           |
| Create Index Syntax             | CREATE INDEX {indexname} ON {tablename}({columnname})   |
| Auto Increment Field Definition | {type} NOT NULL AUTO_INCREMENT                          |
| Alter Table Syntax              | ALTER TABLE {tablename} {alterdef}                      |
| Add Column Syntax               | ADD COLUMN {columnname} {type}                          |

|                                         |                            |
|-----------------------------------------|----------------------------|
| Primary Key Syntax                      | PRIMARY KEY ({columnname}) |
| Limit Syntax                            | LIMIT {limit}              |
| Limit Position                          | Back                       |
| Current Timestamp Query                 | SELECT CURRENT_TIMESTAMP   |
| Column Quote Character                  | '                          |
| Supports Returning Auto-generated Keys? | True                       |
| Fetch Key Query                         | <leave empty>              |
| Table List Filter                       | <leave empty>              |
| <b>Data Type Mapping</b>                |                            |
| Byte (I1)                               | int                        |
| Short (I2)                              | int                        |
| Integer (I4)                            | int                        |
| Long (I8)                               | bigint                     |
| Boolean                                 | int                        |
| Datetime                                | datetime                   |
| Float (R4)                              | float(10)                  |
| Double (R8)                             | double                     |
| String                                  | varchar(255)               |
| Binary                                  | varbinary                  |
| Long Text                               | text                       |

| Main Properties                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                           | MySQL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Description                    | The official MySQL JDBC Driver, Connector/J.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Class Name                     | com.mysql.cj.jdbc.Driver                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| JAR File(s)                    | <Click on the <b>Choose File</b> button to select and upload the JAR(s). This is the part where you upload the JDBC driver. >                                                                                                                                                                                                                                                                                                                                                                                                          |
| Driver Defaults & Instructions |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Driver Type                    | MySQL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| URL Format                     | jdbc:mysql://localhost:3306/test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| URL Instructions               | <br/>The format of the MySQL connect URL is:<br><code>jdbc:mysql://<b>host</b>:<b>port</b>/<b>database</b></code><br/>With the three parameters (in bold) <ul style="list-style-type:none; margin-left:10px;"><li><b>host</b>: The host name or IP address of the database server.</li><li><b>port</b>: The port that the database server is running on. MySQL default port is <b>3306</b>.</li><li><b>database</b>: The name of the logical database that you are connecting to on the MySQL server.</li></ul>                        |
| Default Connection Properties  | zeroDateTimeBehavior=CONVERT_TO_NULL;connectTimeout=120000;socketTimeout=120000;useSSL=false;allowPublicKeyRetrieval=true;                                                                                                                                                                                                                                                                                                                                                                                                             |
| Connection Proper              | There is an extensive list of extra connection properties available for MySQL Connector/J. See <a href='the'> <a href="http://dev.mysql.com/doc/connectors/en/connector-j-reference-configuration-properties.html">http://dev.mysql.com/doc/connectors/en/connector-j-reference-configuration-properties.html</a> </a> for the documentation for a table describing all connection properties.<br/>A default <tt>serverTimezone</tt> value (taken from the Gateway) will be appended to the connection string if one is not specified. |

|                                    |          |
|------------------------------------|----------|
| ties<br>Instruc<br>tions           |          |
| Default<br>Validat<br>ion<br>Query | SELECT 1 |
| <b>SQL Language Compatibility</b>  |          |
| Default<br>Transl<br>ator          | MySQL    |

## MSSQL Translator and JDBC Driver Settings

In some cases, you may need to add your own JDBC Driver, or configure a Translator. However, you may need to check the JDBC driver's documentation for information on how to configure them. Below are some recommended settings, but the vendor's documentation should always supersede any suggestions here.

| Main Properties                         |                                                                                                        |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------|
| Name                                    | <Name of the Translator. The JDBC driver will reference the settings below by the name specified here> |
| Create Table Syntax                     | CREATE TABLE {tablename} ({creationdef}{primarykeydef})                                                |
| Create Sequence Syntax                  | <Blank>                                                                                                |
| Create Trigger Syntax                   | <Blank>                                                                                                |
| Create Index Syntax                     | CREATE INDEX {indexname} ON {tablename}({columnname})                                                  |
| Auto Increment Field Definition         | {type} IDENTITY(1,1)                                                                                   |
| Alter Table Syntax                      | ALTER TABLE {tablename} ADD {alterdef}                                                                 |
| Add Column Syntax                       | {columnname} {type}                                                                                    |
| Primary Key Syntax                      | PRIMARY KEY CLUSTERED ({columnname})                                                                   |
| Limit Syntax                            | TOP {limit}                                                                                            |
| Limit Position                          | Front                                                                                                  |
| Current Timestamp Query                 | SELECT CURRENT_TIMESTAMP                                                                               |
| Column Quote Character                  | "                                                                                                      |
| Supports Returning Auto-generated Keys? | True                                                                                                   |
| Fetch Key Query                         | <Blank>                                                                                                |
| Table List Filter                       | <Blank>                                                                                                |
| Data Type Mapping                       |                                                                                                        |
| Byte (I1)                               | int                                                                                                    |
| Short (I2)                              | int                                                                                                    |
| Integer (I4)                            | int                                                                                                    |
| Long (I8)                               | bigint                                                                                                 |
| Boolean                                 | int                                                                                                    |
| Datetime                                | datetime                                                                                               |
| Float (R4)                              | float(10)                                                                                              |
| Double (R8)                             | double precision                                                                                       |
| String                                  | varchar(255)                                                                                           |

|           |               |
|-----------|---------------|
| Binary    | varbinary     |
| Long Text | nvarchar(max) |

| Main Properties                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                               | <Name of the driver, as you would like it to appear on the Gateway>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Description                        | <Enter a useful description you would like to see next to the driver>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Class Name                         | com.microsoft.sqlserver.jdbc.SQLServerDriver                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| JAR File(s)                        | <Click on the <b>Choose File</b> button to select and upload the JAR(s). This is the part where you upload the JDBC driver. >                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Driver Defaults & Instructions     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Driver Type                        | Microsoft SQL Server                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| URL Format                         | jdbc:sqlserver://localhost\SQLEXPRESS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| URL Instructions                   | <p>&lt;br/&gt;The format of the SQL Server connect URL is:&lt;br/&gt;&lt;code&gt;jdbc:sqlserver://&lt;b&gt;host&lt;/b&gt;\&lt;b&gt;instanceName&lt;/b&gt;[:&lt;b&gt;port&lt;/b&gt;]&lt;/code&gt;&lt;br/&gt;With the three parameters (in bold) &lt;ul style="list-style-type:none; margin-left:10px;"&gt;&lt;li&gt;&lt;b&gt;host&lt;/b&gt;: The host name or IP address of the database server.&lt;/li&gt;&lt;li&gt;&lt;b&gt;instanceName&lt;/b&gt;: (optional) the instance to connect to on the host. If not specified, a connection to the default instance is made.&lt;/li&gt;&lt;li&gt;&lt;b&gt;port&lt;/b&gt;: (optional) the port to connect to. The default is &lt;b&gt;1433&lt;/b&gt;. If you are using the default, you can omit the port and the preceding '&lt;/li&gt;&lt;/ul&gt;&lt;br/&gt;For SQL Server, you specify the &lt;i&gt;database name&lt;/i&gt; to connect to using the &lt;code&gt;databaseName&lt;/code&gt; property in the &lt;i&gt;Extra Connection Properties&lt;/i&gt;.</p> |
| Default Connection Properties      | databaseName=test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Connection Properties Instructions | Use <i>databaseName=YOUR_DATABASE</i> to specify the database to connect to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Default Validation Query           | SELECT 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| SQL Language Compatibility         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Default Translator                 | The Translator this driver should use. If you're adding a new Driver, then you may                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Oracle Express Translator and JDBC Driver Settings

In some cases, you may need to add your own JDBC Driver, or configure a Translator. However, you may need to check the JDBC driver's documentation for information on how to configure them. Below are some recommended settings, but the vendor's documentation should always supersede any suggestions here.

| Main Properties                         |                                                                                                                                                                            |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                                    | <Name of the Translator. The JDBC driver will reference the settings below by the name specified here>                                                                     |
| Create Table Syntax                     | CREATE TABLE {tablename} ({creationdef}{primarykeydef})                                                                                                                    |
| Create Sequence Syntax                  | CREATE SEQUENCE {tablename}seq START WITH 1 INCREMENT BY 1                                                                                                                 |
| Create Trigger Syntax                   | CREATE TRIGGER {tablename}trig BEFORE INSERT ON {tablename} REFERENCING NEW AS NEW FOR EACH ROW BEGIN select {tablename}seq.nextval INTO :NEW.{columnname} FROM dual; END; |
| Create Index Syntax                     | CREATE INDEX {indexname} ON {tablename}({columnname})                                                                                                                      |
| Auto Increment Field Definition         | {type} NOT NULL                                                                                                                                                            |
| Alter Table Syntax                      | ALTER TABLE {tablename} ADD ({alterdef})                                                                                                                                   |
| Add Column Syntax                       | {columnname} {type}                                                                                                                                                        |
| Primary Key Syntax                      | PRIMARY KEY ({columnname})                                                                                                                                                 |
| Limit Syntax                            | rownum<={limit}                                                                                                                                                            |
| Limit Position                          | Where                                                                                                                                                                      |
| Current Timestamp Query                 | SELECT CURRENT_TIMESTAMP FROM DUAL                                                                                                                                         |
| Column Quote Character                  | "                                                                                                                                                                          |
| Supports Returning Auto-generated Keys? | False                                                                                                                                                                      |
| Fetch Key Query                         | SELECT {tablename}SEQ.CURRVAL FROM DUAL                                                                                                                                    |
| Table List Filter                       | <leave empty>                                                                                                                                                              |
| Data Type Mapping                       |                                                                                                                                                                            |
| Byte (I1)                               | int                                                                                                                                                                        |
| Short (I2)                              | int                                                                                                                                                                        |
| Integer (I4)                            | int                                                                                                                                                                        |
| Long (I8)                               | int                                                                                                                                                                        |
| Boolean                                 | int                                                                                                                                                                        |
| Datetime                                | timestamp                                                                                                                                                                  |
| Float (R4)                              | float                                                                                                                                                                      |
| Double (R8)                             | double precision                                                                                                                                                           |
| String                                  | varchar2(255)                                                                                                                                                              |
| Binary                                  | varbinary                                                                                                                                                                  |
| Long Text                               | nclob                                                                                                                                                                      |

| Main Properties |                                                                       |
|-----------------|-----------------------------------------------------------------------|
| Name            | <Name of the driver, as you would like it to appear on the Gateway>   |
| Descrip         | <Enter a useful description you would like to see next to the driver> |

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| tion                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Classn ame                                | oracle.jdbc.driver.OracleDriver                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| JAR File(s)                               | <Click on the <b>Choose File</b> button to select and upload the JAR(s). This is the part where you upload the JDBC driver. >                                                                                                                                                                                                                                                                                                                                                            |
| <b>Driver Defaults &amp; Instructions</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Driver Type                               | Oracle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| URL Format                                | jdbc:oracle:thin:@localhost:1521:test                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| URL Instructions                          | <br/>The format of the Oracle connect URL is:<br/><code>jdbc:oracle:thin:@<b>host</b>:<b>port</b>:<b>SID</b></code><br/>With the three parameters (in bold) <ul style="list-style-type:none; margin-left:10px;"><li><b>host</b>: The host name or IP address of the database server.</li><li><b>port</b>: The port that the database server is running on. Oracle's default port is <b>1521</b>.</li><li><b>SID</b>: the system ID that identifies the database to connect to.</li></ul> |
| Default Connection Properties             | <Blank>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Connection Properties Instructions        | <Blank>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Default Validation Query                  | SELECT 1 FROM DUAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>SQL Language Compatibility</b>         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Default Translator                        | The Translator this driver should use. If you're adding a new Driver, then you may                                                                                                                                                                                                                                                                                                                                                                                                       |

## PostgreSQL Translator and JDBC Driver Settings

In some cases, you may need to add your own JDBC Driver, or configure a Translator. However, you may need to check the JDBC driver's documentation for information on how to configure them. Below are some recommended settings, but the vendor's documentation should always supersede any suggestions here:

| Main Properties                 |                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------|
| Name                            | <Name of the Translator. The JDBC driver will reference the settings below by the name specified here> |
| Create Table Syntax             | CREATE TABLE {tablename} ({creationdef}{primarykeydef})                                                |
| Create Sequence Syntax          | <Blank>                                                                                                |
| Create Trigger Syntax           | <Blank>                                                                                                |
| Create Index Syntax             | CREATE INDEX {indexname} ON {tablename}({columnname})                                                  |
| Auto Increment Field Definition | SERIAL NOT NULL                                                                                        |
| Alter Table Syntax              | ALTER TABLE {tablename} {alterdef}                                                                     |
| Add Column Syntax               | ADD COLUMN {columnname} {type}                                                                         |
| Primary Key Syntax              | PRIMARY KEY ({columnname})                                                                             |
| Limit Syntax                    | LIMIT {limit}                                                                                          |

|                                         |                          |
|-----------------------------------------|--------------------------|
| Limit Position                          | Back                     |
| Current Timestamp Query                 | SELECT CURRENT_TIMESTAMP |
| Column Quote Character                  | "                        |
| Supports Returning Auto-generated Keys? | True                     |
| Fetch Key Query                         | <Blank>                  |
| Table List Filter                       | <Blank>                  |

#### Data Type Mapping

|              |                  |
|--------------|------------------|
| Byte (I1)    | int              |
| Short (I2)   | int              |
| Integer (I4) | int              |
| Long (I8)    | bigint           |
| Boolean      | int              |
| Datetime     | timestamp        |
| Float (R4)   | float            |
| Double (R8)  | double precision |
| String       | varchar(255)     |
| Binary       | bytea            |
| Long Text    | text             |

| Main Properties                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                               | <Name of the driver, as you would like it to appear on the Gateway>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Description                        | <Enter a useful description you would like to see next to the driver>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Classname                          | org.postgresql.Driver                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| JAR File(s)                        | <Click on the <b>Choose File</b> button to select and upload the JAR(s). This is the part where you upload the JDBC driver. >                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Driver Defaults & Instructions     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Driver Type                        | PostgreSQL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| URL Format                         | jdbc:postgresql://localhost:5432/test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| URL Instructions                   | <p>&lt;br/&gt;The format of the PostgreSQL connect URL is:&lt;br/&gt;&lt;code&gt;jdbc:postgresql://&lt;b&gt;host&lt;/b&gt;:&lt;b&gt;port&lt;/b&gt;/&lt;b&gt;database&lt;/b&gt;&lt;/code&gt;&lt;br/&gt;With the three parameters (in bold) &lt;ul style="list-style-type:none; margin-left:10px;"&gt;&lt;li&gt;&lt;b&gt;host&lt;/b&gt;: The host name or IP address of the database server.&lt;/li&gt;&lt;li&gt;&lt;b&gt;port&lt;/b&gt;: The port that the database server is running on. PostgreSQL default port is &lt;b&gt;5432&lt;/b&gt;.&lt;/li&gt;&lt;li&gt;&lt;b&gt;database&lt;/b&gt;: The name of the logical database that you are connecting to on the PostgreSQL server.&lt;/li&gt;&lt;/ul&gt;</p> |
| Default Connection Properties      | <Blank>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Connection Properties Instructions | No extra connection parameters are recommended for PostgreSQL. For possible parameter values, see the documentation at <a href='the'> <a href="http://jdbc.postgresql.org">http://jdbc.postgresql.org</a> '>the PostgreSQL JDBC driver website</a>.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

|                                   |                                                                                    |
|-----------------------------------|------------------------------------------------------------------------------------|
| Default Validation Query          | SELECT 1                                                                           |
| <b>SQL Language Compatibility</b> |                                                                                    |
| Default Translator                | The Translator this driver should use. If you're adding a new Driver, then you may |

## Add a New JDBC Driver

To add a new JDBC driver to Ignition, do the following steps:

1. On the Gateway Webpage Config section, click on **Databases > Drivers**.



The Database Drivers & Settings page is displayed.

2. Click on the **Create new JDBC Driver...** link at the bottom of the page.

| Name                | Driver Type          | Default Translator | Status    | Actions                                       |
|---------------------|----------------------|--------------------|-----------|-----------------------------------------------|
| MariaDB             | MySQL                | MYSQL              | Installed | <button>delete</button> <button>edit</button> |
| Microsoft SQLServer | Microsoft SQL Server | MSSQL              | Installed | <button>delete</button> <button>edit</button> |
| MySQL               | MySQL                | MYSQL              | Installed | <button>delete</button> <button>edit</button> |
| Oracle JDBC         | Oracle               | ORACLE             | Installed | <button>delete</button> <button>edit</button> |
| PostgreSQL          | PostgreSQL           | POSTGRES           | Installed | <button>delete</button> <button>edit</button> |
| SQLite              | Generic              | SQlite             | Installed | <button>delete</button> <button>edit</button> |

[Create new JDBC Driver...](#)

Note: Please see [this help page](#) for information about installing driver files that are not able to be bundled with Ignition.

3. In the **Name** field, type the full name of the JDBC driver, see the manufacturer's documentation to get the name.
4. In the **JAR File(s)** field, specify the JAR file that contains the driver, as well as any other required JARs. If you do not have the JAR file needed, see above for download links.
5. Use the default settings for the following properties:

| Driver Defaults and Instructions |                                                                                                                                                                                                                                                            |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Driver Type                      | Is the brand of database. This is used for optimizations in the Gateway, if in doubt, select GENERIC.                                                                                                                                                      |
| URL Format                       | Is a default value for the connect URL. This provides a hint to the format of the connect URL that this driver requires while adding a datasource connection. For example, the hint for the format can be, <code>jdbc:dbtype://host:port/database</code> . |
| URL Instructions                 | Free form instructions that are shown to help the user to create a connection.                                                                                                                                                                             |

|                                    |                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------|
| Default Connection Properties      | Any additional properties to add by default to the connection string.             |
| Connection Properties Instructions | Tips about which connection properties might be useful.                           |
| Default Validation Query           | The default query that is used to verify that the connection is available.        |
| <b>SQL Language Compatibility</b>  |                                                                                   |
| Default Translator                 | The database translator that is used by default for connections from this driver. |

6. Click the **Create New JDBC Driver** button, located at the very bottom of the page, to create the new driver.

## Upgrade a JDBC Driver

In some cases you may need to upgrade a driver. The steps below detail where this would take place

1. You will need to obtain the new driver. These are typically provided by the same organization that made the database. The driver will be a JAR file.
2. Once you have the new driver, head to your Ignition Gateway's **Config** section, click on **Databases > Drivers**.
3. The Database Drivers & Settings page will be displayed. These are the currently configured JDBC drivers on the Gateway, and can be modified from the **Edit** button. Click the Edit button for the driver you need to upgrade.
4. You will need to pass in the new driver to the **JAR File(s)** property.
  - a. Click the **Choose File** button
  - b. Navigate to the driver, and click **Open**.
5. **[Optional]** Update any other properties. In most cases, you may skip this step. However you may need to update some other properties when a new driver is in place. This step depends on the driver, and what it changes. Refer to the driver's documentation to determine if any connection properties need to be changed. For example, users upgrading to MySQL 8.0 from legacy versions will need to change the Default Connection Properties value from:

```
zeroDateTimeBehavior=convertToNull;
```

to:

```
zeroDateTimeBehavior=CONVERT_TO_NULL;useSSL=false;allowPublicKeyRetrieval=true;
```

Again, this step depends on the driver, and in some cases you may be able to skip it.

6. Click the **Save Changes** button at the bottom of the page.

## Database Translators

Despite the presence of a SQL standard, many database system vary in how they implement or accomplish various tasks. The JDBC driver system tries to hide these differences as much as possible, but unfortunately some differences persist.

The database translator system in Ignition navigates these differences as they apply to the system. It provides a way to define certain key operations that are commonly different between database vendors, such as creating auto-incrementing index columns, and the keywords used for different data types.

### Translator Management

Database translators are managed in the Gateway from the **Databases > Drivers > Translators** tab. Ignition comes pre-configured with translators for the major supported databases, but you can edit and remove them, as well as create new translators. It is necessary to create a new translator only when adding a new JDBC driver for a database that does not share syntax with any of the existing translators.

### Creating a New Translator

To add a new database translator to Ignition, do the following steps:

- In the Gateway Config section, click on **Databases > Drivers**.  
The Database Drivers & Settings page is displayed.
- Go to the Translators tab, find the blue arrow, and click on the **Create new Database Translator...** link.  
The New Database Translator page is displayed showing a list of all the translator properties.
- Define the tokens used with the translator properties on the New Database Translator page.

For most of the properties, you need to define special token markers to indicate places where other values are placed. For example, the default **Create Table Syntax** entry looks as follows:

```
CREATE TABLE {tablename} ({creationdef}{primarykeydef})
```

Where:

`tablename`, `creationdef`, and `primarykeydef` are all tokens that are expanded. `tablename` is replaced directly with the table, `creationdef` is a list of columns, and `primarykeydef` is the phrase created by the **Primary Key Syntax** entry in the translator.

The possible tokens are as follows:

| Token                                                                  | Description                                                                                                                                                                                   |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>tablename</code>                                                 | The name of the table being created.                                                                                                                                                          |
| <code>indexname</code>                                                 | The name of the index to create, when adding a column index to the table.                                                                                                                     |
| <code>primarykeydef</code>                                             | A clause that defines a primary key for a new table.                                                                                                                                          |
| <code>creationdef</code>                                               | The list of columns to create in the table.                                                                                                                                                   |
| <code>alterdef</code>                                                  | A list of columns to add/remove/modify in the table.                                                                                                                                          |
| <code>columnname</code>                                                | The name of a column.                                                                                                                                                                         |
| <code>type</code>                                                      | The data type of a column.                                                                                                                                                                    |
| <code>limit</code>                                                     | The value of the limit clause.                                                                                                                                                                |
| <b>Other Properties</b>                                                |                                                                                                                                                                                               |
| <code>Limit Position</code>                                            | Defines where the limit clause should be placed. <b>Back</b> , the limit is placed at the end of the query. <b>Front</b> , places it directly after the SELECT keyword.                       |
| <code>Column Quote Character</code>                                    | All columns are created and accessed with the defined quote, which tells the database to use a specific casing, as well as avoiding collisions between the column name and database keywords. |
| <code>Supports Returning Auto-generated Keys? / Fetch Key Query</code> | Indicates whether the JDBC driver supports the return of generated keys. If the driver does not support this feature, the <b>Fetch Key Query</b> is used to retrieve the last key.            |
| <b>Date Type Mapping</b>                                               |                                                                                                                                                                                               |
| <code>All data types</code>                                            | The keywords that are used when creating columns of the given types.                                                                                                                          |

- Click the **Create New Database Translator** button, located at the very bottom of the page, to create the translator.

# Store and Forward

The store-and-forward system provides a reliable way for Ignition to store data to the database. In Ignition, systems such as [Tag Historian](#) and [SQL Bridge \(Transaction Groups\)](#) use store-and-forward to ensure that data reaches its destination in the database, and is stored in an efficient manner. The store-and-forward system can be configured in a number of ways, offering both memory buffering for performance and local disk caching for safe storage.

**Note:** Store-and-forward engines are automatically created for each Database Connection.

## Primary Features and Benefits

The store-and-forward system offers a number of benefits over other systems that log directly to the database, such as:

- **Data loss prevention**  
Data is removed from the system only when the write to the database has executed successfully.
- **Guaranteed ordering**  
Data is forwarded in the same order that it arrived, even if a database connection is not currently available.
- **Enhanced performance**  
By first buffering the data in memory, the store-and-forward system can optimize writes, and prevent the originating systems from blocking. This means that the system is less likely to lose data samples in the event of system slow downs.

## On this page ...

- [Primary Features and Benefits](#)
- [Store and Forward Data Flow](#)
  - [Understanding the Forward Triggers](#)
  - [Store and Forward for Reliability](#)



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## Using Store and Forward

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## Store and Forward Data Flow

Although the system offers settings that can affect the pipeline, by default the data flow occurs as follows:

1. Data is generated in some system.
2. Data is placed in a memory buffer.
3. If not removed from memory buffer in some time (the **Write Time**), or if a certain amount of data accumulates (**Write Size**), it is placed in the local cache.
4. The data sink, based on a database connection, pulls data in first from the local store, and then the memory buffer, based on the **Write Time** and **Write Size** settings under **Forward Settings**.
5. If the data fails to forward, either due to an error in the connection or in the data itself, it is returned to the buffer or cache.
6. If the data errors out too many times, it becomes quarantined.
7. Quarantined data can be managed through the Gateway, and can be deleted or un-quarantined, once the error is resolved.

## Understanding the Forward Triggers

Data is forwarded from one stage to the next based on the **Write Time** and **Write Size** triggers. These settings work as an **either/or** manner, meaning that if either of them is surpassed, the data is forwarded. One important point to note is that the **Write Size** setting influences the transaction size of similar data to be forwarded, and therefore can have a big impact on performance. As a result, the **Write Time** should normally be used as the controlling factor, with the **Write Size** set to something that will provide reasonable transactions, like 100.

## Store and Forward for Reliability

The store-and-forward system settings, while seemingly limited, offer a good deal of flexibility in tuning. Different types of situations and goals will likely require different configurations.

When the safety of the data is a concern, the goal is to get the data stored to disk as quickly as possible in order to minimize risk of loss due to a power outage or system failure. The local cache plays a crucial role in this, allowing the system to store data locally for any amount of time until the remote database can accept it. This protects against network failures and database failures, as well.

By setting the **write size** and **write time** of both the local cache and forwarder to low values, the data spends less time in the memory buffer. While the memory buffer can be set to 0 to bypass it completely, this is not usually recommended, as the buffer is used to create a loose coupling between the history system and other parts of Ignition that report history. This disconnect improves performance and protects against temporary system slowdowns. In fact, it is recommended that for reliable logging, this value be set to a high value, to allow the maximum possible amount of data to enter the system in the case of a storage slowdown.

In This Section ...

# Using Store and Forward

The current status of the Store and Forward system can be viewed from the Status section of the [Gateway Web Interface](#). These pages provide detailed analysis on each Store and Forward engine.

## To Monitor the Store and Forward Engine

1. Go to the **Status** section of the Gateway.
2. Click on **Store & Forward** from the left menus.  
The **Store & Forward Connections** page is displayed showing each store-and-forward engine along with the current throughput and capacity of its **Memory Buffer** and **Disk Cache**.

On this page, there are several notable items:

| Name                 | Description                                                                                                                                                                                                                                   |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aggregate Throughput | The aggregated number of records inserted into a database from any engine, per second.                                                                                                                                                        |
| Total Quarantined    | The current count of quarantined items across all engines.                                                                                                                                                                                    |
| Total Dropped        | The number of records that have been dropped from all store and forward engines. A record is considered dropped if it can not be added to one of the buffers, such as when a buffer is full, and the engine can no longer accept new records. |

## On this page ...

- [To Monitor the Store and Forward Engine](#)



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## Using Store and Forward

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My-Gateway

Ignition!

admin | Sign Out

Help ? Get Designer

**SYSTEMS**

- Home
- Status
- Config
- Overview
- Performance
- Alarm Pipelines
- Gateway Scripts
- Modules
- Redundancy
- Reports
- SFCs
- Voice Alarming
- Tags
- EAM Tasks
- Transaction Groups

**CONNECTIONS**

- EAM Agents
- Databases
- Designers
- Devices
- Gateway Network
- Store & Forward**
- OPC Connections
- Perspective Sessions
- Vision Clients

**DIAGNOSTICS**

- Execution
- Logs
- Running Scripts
- Threads

Status > Connections > **Store and Forward**

Configuration

Aggregate Throughput per second: 0.5

Total Quarantined: 0

Total Dropped: 0

### Store and Forward Engines

Filter type to filter View 20

| Name                 | Store Throughput | Forward Throughput | Quarantined | Activity    | Actions |
|----------------------|------------------|--------------------|-------------|-------------|---------|
| DB                   | 0.5/sec          | 0.5/sec            | 0           | ✓ Available | Details |
| Local Edge Historian | N/A              | N/A                | 0           | ✓ Available | Details |
| SQLite               | N/A              | N/A                | 0           | ✓ Available | Details |

You can click on **Details** under the **Store and Forward Engines** section to refresh and update the displayed values. This page provides in-depth information on the current status of the engine.

| Name              | Description                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Memory Buffer     | The number of records entering the Memory Buffer per second. The progress bar shows the percent of the buffer being utilized, along with the current and max number of records.                                                                                                                                                                                    |
| Disk Buffer       | The number of records entering the Disk Buffer per second. Note that a state of "idle" means the engine is able to successfully store all records into the database before the <b>Write Size</b> or <b>Write Time</b> values have been reached. The progress bar shows the percent of the buffer being utilized, along with the current and max number of records. |
| Database          | Shows the number of records pushed from either buffer to the database per second.                                                                                                                                                                                                                                                                                  |
| Quarantined Items | Lists all quarantined items in the engine. Includes the number of occurrences, a description of the where the items originated from, and the reason why the record was placed into the quarantine. Provides an opportunity to retry, export, or delete the items.                                                                                                  |

My-Gateway

admin | Sign Out

Ignition!

Home

Status

Config

SYSTEMS

- Overview
- Performance
- Alarm Pipelines
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- Modules
- Redundancy
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- Tags
- EAM Tasks
- Transaction Groups

CONNECTIONS

- EAM Agents
- Databases
- Designers
- Devices
- Gateway Network
- Store & Forward
- OPC Connections
- Perspective Sessions
- Vision Clients

Help ?

Get Designer

Configuration

Store Details

Memory Buffer /sec 0 0% (0/250)

Local Cache Idle 0% (0/25000)

Database Storage /sec 0

Quarantined Items

Import quarantine file < Retry All

Delete All

The screenshot shows the Ignition My-Gateway web interface. The left sidebar is dark blue and contains navigation links for Home, Status, and Config. Under SYSTEMS, there are links for Overview, Performance, Alarm Pipelines, Gateway Scripts, Modules, Redundancy, Reports, SFCs, Voice Alarming, Tags, EAM Tasks, and Transaction Groups. Under CONNECTIONS, there are links for EAM Agents, Databases, Designers, Devices, Gateway Network, Store & Forward, OPC Connections, Perspective Sessions, and Vision Clients. The 'Store & Forward' link is highlighted with a red box. The main content area is titled 'Store and Forward' and shows 'Store Details' for Memory Buffer, Local Cache, and Database Storage. It also features a 'Quarantined Items' section with buttons for Import, Retry All, and Delete All.

Related Topics ...

- [Configuring Store and Forward](#)

# Configuring Store and Forward

## Store and Forward for High-speed Buffering

When configuring the store-and-forward system for high-speed buffering, you are expecting the case that data will come in quick bursts. By buffering the data, the system can accommodate more information than would be possible going directly against the database.

The key points in configuring a buffering system is to avoid expensive operations like storing and reading from the local cache, and to set the memory buffer large enough to accommodate the expected burst sizes.

Each database connection has its own store and forward settings. Store-and-forward engines are directly correlated to database connections, and are automatically managed so that each connection has an engine defined.



You can create multiple database connections pointing to the same database if you wish to configure multiple store-and-forward engines for different purposes.

## Configuring Store and Forward

To configure the Store and Forward engine for your database, do the following steps:

1. Go to the Gateway **Config** section and select **Databases > Store and Forward**.  
The **Store and Forward** page is displayed and you will see a store-and-forward setting for each of your database connections and you can edit these settings.
2. On the **Store and Forward** page, look for **edit** at the far right of the table and click on it to see all the store-and-forward settings.  
The settings of a store-and-forward engine define how and when data is moved through the system. You must understand these settings so that you can carefully set them according to your goals.

The screenshot shows the Ignition My-Gateway configuration interface. The left sidebar has sections for Home, Status, and Config (which is selected). Under Config, there are sections for SYSTEM (Overview, Backup/Restore, Ignition Exchange, Licensing, Modules, Projects, Redundancy, Gateway Settings) and NETWORKING (Web Server, Gateway Network, Email Settings). The main content area is titled "Config > Database > Store and Forward Settings". It displays a table with three rows:

| Name     | Memory Buffer Size | Disk Cache Enabled | Action                                            |
|----------|--------------------|--------------------|---------------------------------------------------|
| DB       | 250                | true               | <a href="#">edit</a> (highlighted with a red box) |
| SQLite   | 250                | true               | <a href="#">edit</a>                              |
| Internal | 250                | true               | <a href="#">edit</a>                              |

A note at the bottom of the table area states: "Note: Store and Forward engines are automatically created for each Database Connection. For details about a store's status, see the [Store and Forward Status](#) page."

## On this page ...

- [Store and Forward for High-speed Buffering](#)
  - [Configuring Store and Forward](#)
  - [Store and Forward Settings](#)



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## Configuring Store and Forward

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| <b>Buffer Settings</b>                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Memory Buffer Size                                                                                                                                                                                                                     | The number of records that can be stored in the memory buffer, the first stage of the store-and-forward chain. Other settings define when the data will move from the memory buffer forward, this setting only determines the maximum size. If the max size is reached, additional data will error out and be discarded. The memory buffer cannot quarantine data, so if there are errors and the disk cache is not enabled, the data will be lost.<br><br>If set to 0, the memory buffer will always be considered full, dropping records.   |
| <b>Store Settings</b>                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>These settings apply to the local disk storage cache.</b>                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Disk Cache Enabled                                                                                                                                                                                                                     | Turns on the hard-disk cache. Data is stored here if it cannot be forwarded in a timely manner. The cache also stores quarantined data (that is, data with errors).                                                                                                                                                                                                                                                                                                                                                                           |
| Max Records                                                                                                                                                                                                                            | The maximum size of the cache. After the max is reached, data is backed up into the memory buffer, and once that is full, it is dropped. A 'record' is an insert or update statement. These statements may be batches, thus it is possible for a single 'record' to impact multiple rows.                                                                                                                                                                                                                                                     |
| Write Size                                                                                                                                                                                                                             | The number of records that should be accumulated in the memory store before written to the cache. Writing data in blocks can increase performance, but too large of a size increases the risk of data being lost in the event of a power outage or system failure.                                                                                                                                                                                                                                                                            |
| Write Time                                                                                                                                                                                                                             | The max age of records in the memory buffer before they are stored to the cache. This setting is used in combination with the write size in order to give the forwarder the opportunity to retrieve data directly from the memory store and avoid the write to disk entirely.                                                                                                                                                                                                                                                                 |
| <b>Forward Settings</b>                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>These settings govern when data is forwarded to the database. The data is pulled first from the local cache, and then from the memory store. When no data is present in the cache, it is pulled directly from the memory store.</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Write Size                                                                                                                                                                                                                             | Same as disk cache setting above.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Write Time                                                                                                                                                                                                                             | Same as disk cache setting above.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Enable Schedule                                                                                                                                                                                                                        | If enable schedule is selected, the forward engine will only be enabled during the times specified by the pattern. The pattern can specify specific times and ranges using a simple syntax.                                                                                                                                                                                                                                                                                                                                                   |
| Schedule Pattern                                                                                                                                                                                                                       | <p>The schedule is specified as a comma separated list of times or time ranges. You can use the following formats:</p> <p>24-hour times, that is <b>8:00-15:00</b> (for 8am through 3pm) or <b>21:00-24:00</b> (9pm through midnight).</p> <p>12-hour with am/pm (if not specified, <b>12</b> is considered noon): <b>8am-3pm or 9pm-12am</b></p> <p><b>Note:</b> When the time period is over, any queued data will remain cached until the next execution period. That is, the forward engine does not run until all data is forwarded.</p> |

Once you made the changes you want, click **Save Changes** at the bottom of the page. This will take you back to the Store and Forward page.

#### Related Topics ...

- [Controlling Quarantine Data](#)

# Controlling Quarantine Data

Quarantined data is data that has erred-out multiple times during attempts to forward it or data that could not be stored because of some configuration issues. It is removed from the forward queue to allow other data to pass. The most common reason for data quarantining is an invalid schema in the database for the data that is being stored. Quarantined data is held indefinitely until the issue is resolved, then you can either delete it or re-insert it into the queue.

## Handle the Quarantined Data

1. From **Status** section of the Gateway, go to **Connections > Store and Forward**.
2. Click the **Details** tab next to a Store and Forward engine that you would like to see the quarantine data for. Here you will see any quarantined data, including the number of occurrences, a description of the where the items originated from, and the reason why the record was placed into the quarantine. Each set of data has the option to retry it, delete it, or export it for later use. If there are a lot of quarantined records, it may be a good idea to export and delete them so that the store and forward engine won't fill up and drop records.
3. Fix the problem/error you found that caused the quarantine data.
4. Click on **retry**, or if the data had been exported, import the data using the import tool and then **retry**. This way, you can ensure no data gets lost.

## On this page ...

- [Handle the Quarantined Data](#)



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## Controlling Quarantine Data

[Watch the Video](#)

» Status > Connections > **Store and Forward**

[Configuration](#)

### Store Details

| Memory Buffer | Local Cache  | Database Storage |
|---------------|--------------|------------------|
| 6 /sec        | 1 /sec       | 6 /sec           |
| 1% (2/250)    | 0% (0/25000) |                  |

### Quarantined Items

[Import quarantine file](#)

[Choose File](#) No file chosen

[Submit](#)

[Retry All](#) [Delete All](#)

[Filter](#)  [View](#) 20

| ID | Count | Description         | Reason                                                | Actions                                                             |
|----|-------|---------------------|-------------------------------------------------------|---------------------------------------------------------------------|
| 1  | 10    | SQLTag History Data | Duplicate entry '252-1548372275630' for key 'PRIMARY' | <a href="#">Retry</a> <a href="#">Delete</a> <a href="#">Export</a> |

#### Related Topics ...

- [Store and Forward](#)
- [Connections - Store & Forward](#)

# Security

Security options in Ignition provide many ways to safeguard access to your data and applications. You control not only who accesses your systems, but when and where they can access them. Ignition offers two authentications strategies: [Classic Authentication Strategy](#) or [Identity Provider Authentication Strategy](#).

## Gateway Security

Security in Ignition falls into a few categories, tying into the various scopes (Designer, Gateway, Vision Clients and Perspective Sessions). In the Gateway scope, the bulk of security setup happens under the **Config** section of the Gateway Webpage, under the Security header. you'll find pages for authentication, role mappings, zones, and more.



## On this page ...

- [Gateway Security](#)
- [Authentication Strategies](#)
  - [Classic Authentication Strategy \(Designer and Vision Only\)](#)
  - [Identity Provider Authentication Strategy](#)

The primary purpose of Gateway security is to protect access to the two most critical areas of Ignition: the Designer and the Gateway. Many important resources are configured in these areas, so access to each Gateway section (Status and Config), as well as the Designer, can be limited by Security Level.

## Authentication Strategies

In regard to authentication and permissions, there are two approaches.

### Classic Authentication Strategy (Designer and Vision Only)

[Classic Authentication Strategy](#) involves a concept known as a User Source, which is a configuration that contains multiple roles and users. Users are assigned roles, and security restrictions within a project can be used to check if a user has one or more roles. User Sources can be "internal", meaning all users and roles are contained within an Ignition Gateway, or externally stored in an SQL database. Furthermore, User Sources offer integration with [Active Directory](#).

### Identity Provider Authentication Strategy

Ignition can also integrate with Federated [Identity Providers](#) (IdP), allowing users to authenticate against a trusted third party. The Identity Provider Authentication Strategy works by assigning [Security Level](#) restrictions to various features within Ignition, and utilizing [User Attribute Mapping](#) and [Security Level Rules](#) to assign Security Levels to users.

Ignition can integrate with both OpenID Connect and Security Assertion Markup Language (SAML) providers. In addition, Ignition can act as an Identity Provider for isolated systems.

# Gateway General Security Settings

This feature is new in Ignition version **8.1**  
[Click here](#) to check out the other new features

The Gateway General Security Settings page is new for release 8.1. This page determines security permissions for the Gateway and Designer.

Config > Security > General

**General Gateway Security Settings** \* Required Field

|                                    |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System Identity Provider *         | default       | This Identity Provider controls access to the Gateway's web configuration interface and the Designer when the Designer Authentication Strategy is set to Identity Provider.<br><input checked="" type="checkbox"/> Always ask the IdP to re-authenticate users by default<br>When enabled, Ignition will always ask the IdP to re-authenticate the user by default. This effectively disables Single Sign-On.                                            |
| Designer Authentication Strategy * | Classic       | Controls how Designer users are authenticated. The Classic strategy requires the user to enter their username and password in an embedded login form in the Designer. Classic authentication is performed against the System User Source. The Identity Provider strategy redirects the user to their IdP in their web browser in order to authenticate. The System Identity Provider setting controls which Identity Provider the user is redirected to. |
| System User Source *               | default       | This user source controls access to the Designer when the Designer Authentication Strategy is set to Classic.                                                                                                                                                                                                                                                                                                                                            |
| Designer Role(s) *                 | Administrator | Users must belong to one of these roles in order to log into the Designer. Multiple roles can be specified by separating them with commas. Example: Administrator, Operator                                                                                                                                                                                                                                                                              |
| Create Project Role(s)             |               | Users must belong to one of these roles in order to create a new Designer project. Multiple roles                                                                                                                                                                                                                                                                                                                                                        |

## On this page ...

- [Gateway Security Settings Table](#)



## Restricting Gateway Access

[Watch the Video](#)

## Gateway Security Settings Table

| Setting                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| System User Source               | This user source controls access to the Designer when the Designer Authentication Strategy is set to Classic. This field is required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| System Identity Provider         | Dropdown list to select the Identity Provider that controls access to the Gateway's web configuration interface and the Designer (only when the Designer Authentication Strategy is set to <b>Identity Provider</b> ).<br><br>Additional option to always ask the IdP to re-authenticate users by default. When enabled, Ignition will always ask the IdP to re-authenticate the user by default. This effectively disables Single Sign-On.<br><br>This field is required.                                                                                                                                                                                                                                                                                                      |
| Designer Authentication Strategy | Controls how the Designer authenticates users. Options are <b>Classic</b> or <b>Identity Provider</b> . <ul style="list-style-type: none"><li><b>Classic:</b> The Classic strategy requires the user to enter their username and password in an embedded login form in the Designer. Classic authentication is performed against the System User Source.</li><li><b>Identity Provider:</b> The Identity Provider strategy redirects the user to their IdP in their web browser in order to authenticate. The System Identity Provider setting controls which Identity Provider the user is redirected to. Required.</li></ul><br>This field is required. Additional options on this screen will change depending on the Designer Authentication Strategy that is selected here. |
| Designer Permissions             | ( <i>Identity Provider strategy only</i> ) Select one of the following options: <ul style="list-style-type: none"><li>Users must belong to all of these security levels in order to login to the Designer.</li><li>Users must belong to at least one of these security levels in order to login to the Designer.</li></ul><br><div style="border: 1px solid red; padding: 5px; margin-top: 10px;"><b>Caution:</b> Empty value in this field means "Public" security level: Access will be unrestricted.</div>                                                                                                                                                                                                                                                                   |
| Create Project Permissions       | ( <i>Identity Provider strategy only</i> ) Enter the security levels required to create a new project, for example, Authenticated/Roles /Administrator, SecurityZones/localhost.. Then select one of the following options:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | <ul style="list-style-type: none"> <li>• Users must belong to all of these security levels in order to create a new Designer project.</li> <li>• Users must belong to at least one of these security levels in order to create a new Designer project.</li> </ul> <p><b>Caution:</b> Empty value in this field means "Public" security level: Access will be unrestricted.</p>                                                                                                                                                                                                                                                                                                       |
| Designer Role(s)           | (Classic authentication strategy only) Enter the roles required for access to the Designer. Users must belong to at least one of these roles in order to log into the Designer. Multiple roles can be specified by separating them with commas, for example: Administrator, Operator.                                                                                                                                                                                                                                                                                                                                                                                                |
| Create Project Role(s)     | (Classic authentication strategy only) Enter the roles required for create a new Designer project. Users must belong to at least one of these roles in order to create a new Designer project. Multiple roles can be specified by separating them with commas, for example: Administrator, Operator.                                                                                                                                                                                                                                                                                                                                                                                 |
| Gateway Config Permissions | <p>Enter the security levels required for access to the Gateway Config section. Then select one of the following options:</p> <ul style="list-style-type: none"> <li>• Users must belong to all of these security levels in order to login to the configuration section.</li> <li>• Users must belong to at least one of these security levels in order to login to the configuration section.</li> </ul> <p>Multiple security level paths can be specified by separating them with commas. For example, Authenticated/Roles/Administrator, SecurityZones/localhost</p> <p><b>Caution:</b> Empty value in this field means "Public" security level: Access will be unrestricted.</p> |
| Status Page Permissions    | <p>Enter the security levels required for access to the Gateway Status section. Then select one of the following options:</p> <ul style="list-style-type: none"> <li>• Users must belong to all of these security levels in order to login to the configuration section.</li> <li>• Users must belong to at least one of these security levels in order to login to the configuration section. Multiple security level paths can be specified by separating them with commas, for example: Authenticated/Roles/Administrator, SecurityZones /localhost.</li> </ul> <p><b>Caution:</b> Empty value in this field means "Public" security level: Access will be unrestricted.</p>      |
| Home Page Permissions      | <p>Sets the security levels required to access the Gateway Home section. Then select one of the following options:</p> <ul style="list-style-type: none"> <li>• Users must belong to all of these security levels in order to login to the home section.</li> <li>• Users must belong to at least one of these security levels in order to login to the home section. Multiple security level paths can be specified by separating them with commas, for example: Authenticated/Roles/Administrator, SecurityZones/localhost.</li> </ul> <p><b>Caution:</b> Empty value in this field means "Public" security level: Access will be unrestricted.</p>                                |
| User Inactivity Timeout    | <p>This feature is new in Ignition version <b>8.1.1</b><br/> <a href="#">Click here</a> to check out the other new features</p> <p>The number of minutes which must elapse before expiring a user's gateway web interface session to inactivity. Sessions will not timeout if set to any number less than or equal to zero.</p>                                                                                                                                                                                                                                                                                                                                                      |
| Allow User Admin           | Allows the administration of the gateway's system user source from the Designer and client. Unless this is enabled, the Vision module's 'User Management Component' will be prevented from altering the gateway's system user source and scripts will not be able to alter users or roles. (Default is false.)                                                                                                                                                                                                                                                                                                                                                                       |
| Allow Designer SSO         | Allows single-sign-on authentication for logging into the Designer if the System User Source supports it. The Designer SSO capability is only available when the Designer Authentication Strategy is set to Classic. (Default is false.)                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Gateway Audit Profile      | Dropdown list to select the The name of the audit profile that Gateway-scoped actions will log to.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

Related Topics ...

- [Users, Roles](#)
- [Service Security](#)

# Classic Authentication Strategy

The Classic authentication strategy authenticates users against a User Source. Both the Designer and Vision can authenticate users with this strategy.

## User Sources

User sources are a collection of users, roles, and other user data, such as contact information or schedule. When a [new user or role is created](#), it is applied and stored in the user source. Projects and the Gateway are assigned a User Source to authenticate against. This determines which users have access to which project(s).

There are several types of user sources: single-storage types with varying storage mediums, "hybrids" that combine features of the other types, and a cache type used in Local Client Fallback systems.

**Note:** If you have Ignition 8.1 with the Perspective module, authentication is handled instead by [Identity Provider Authentication Strategy](#).

## On this page ...

- [User Sources](#)
  - [Single-Storage](#)
  - [Hybrid](#)
  - [Fallback Cache](#)
- [Shared Functionality](#)
- [Main Properties](#)
- [The Default User Source](#)
  - [Editing a User](#)

## Single-Storage

Users and roles are stored in a single location. The single-storage users sources are:

- [Internal Authentication](#) - Users and roles are stored internally to Ignition.
- [Database Authentication](#) - Users and roles are stored in a SQL database. Managing users is done via direct interaction with the database.
- [Active Directory Authentication](#) - Users and roles are managed by Active Directory. Users are authenticated through the LDAP protocol.

## Hybrid

Users in hybrid user sources authenticate against Active Directory, meaning that user names and passwords are checked against those stored in Active Directory. However, roles are stored either internally in Ignition or in a SQL database, so it is possible to make a role change without have to contact your Active Directory administrator. This way, Active Directory can be consulted to see if a user is valid, but the management of roles does not require coordination with the IT department, who typically control the Active Directory system. This "best of both worlds" approach is popular for many users of Active Directory.

- [Active Directory-Internal Hybrid](#) - Users managed by Active Directory and roles stored to Ignition internally.
- [Active Directory-Database Hybrid](#) - Users managed by Active Directory and roles stored in an SQL database.

## Fallback Cache

This User Source was developed specifically for a system that is using Local Client Fallback, and allows you to cache the login credentials from a remote user source. This means your users can still log in with their normal username/password on a Local Client Fallback project, even when the network connection is unavailable.

More information can be found on the [Fallback Cache Authentication](#) page.

## Shared Functionality

Regardless of type, all User Sources have the following functionality:

- **Failover Source:** If the User Source is unavailable for authentication, then a backup User Source can be specified. The type of the fail-over User Source can differ from the primary, so configurations where an internal-type fails over to a database-type are possible.
- **Schedule Restrictions:** The User Source can prevent users from logging in when they are off schedule, meaning that the schedule assigned to the user determines when the user may login.

## Main Properties

All User Sources have a section of properties that are categorized as "Main". Below is a description of these properties.

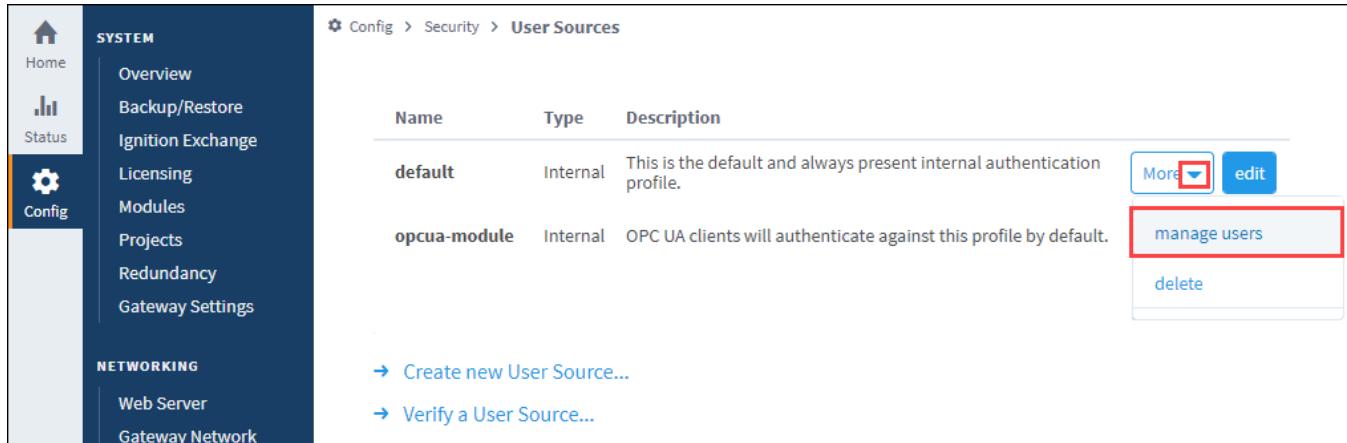
| Name                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                     | The name of the User Source. This is how other systems in Ignition reference the user source. Note that every User Source <b>must</b> have a unique name.                                                                                                                                                                                                                                                                                                       |
| Description              | An optional description of the user source. Useful for noting which database connection or AD server the User Source may be referencing.                                                                                                                                                                                                                                                                                                                        |
| Schedule Restricted      | Forces schedule restrictions on users. Specifically, if a user attempts to log into a client while they are off schedule, the login will fail. Utilizes <a href="#">User Schedules</a> .                                                                                                                                                                                                                                                                        |
| Failover Source          | Allows authentication attempts against this User Source to failover to another User Source in the event of a network outage, or some other connection issue. Useful with database or Active Directory user sources, as connection failures to the database/AD server will prevent users from logging in.<br><br>This property is initially set to <b>None</b> , meaning a failover User Source is not configured.                                               |
| Failover Mode            | When a <b>Failover Source</b> is configured, this property determines when the failover User Source should be consulted. The following options are available:<br><br><b>Hard:</b> The Failover User Source is only consulted when this User Source is unreachable.<br><br><b>Soft:</b> The Failover User Source will be consulted if the user's credentials fail authentication, meaning that the user typed in credentials that are unrecognized or incorrect. |
| Cache Validation Timeout | The amount of time between cache updates of the User Source. If you set this value to -1, the cache validation timeout is turned off.                                                                                                                                                                                                                                                                                                                           |
| Lockout Enabled          | Lock out a user's account after more than the maximum allowed number of failed authentication attempts occur within the lockout window. Default is true.<br><br>Note that access can be restored to all locked out users by editing the user source, and clicking the <b>Save Changes</b> button.                                                                                                                                                               |
| Lockout Attempts         | Maximum number of failed authentication attempts allowed within the lockout window before locking the user out. Default is 5. If this value is set to something less than zero (for example, -1), then the lockout functionality will be entirely disabled, regardless of what the <b>Lockout Enabled</b> property is set to.                                                                                                                                   |
| Lockout Window           | The duration of the lockout window in minutes. Default is 15. Setting this property to a value of less than zero (for example, -1) will disable the lockout functionality entirely, regardless of what the <b>Lockout Enabled</b> property is set to.                                                                                                                                                                                                           |

Details on the Password Policy Properties can be found on the [Internal Authentication](#) page.

## The Default User Source

When Ignition is installed for the first time, an internal User Source named 'default' is created. You can manage the default User Source by navigating to the **Config > Security > Users, Roles** section of the Gateway.

The manage users link next to the 'default' user source allows you to add new users, modify roles and passwords for existing users, remove users, and add/remove roles from the user source.



The screenshot shows the Ignition configuration interface. On the left, there's a sidebar with 'Home', 'Status', and 'Config' sections. Under 'Config', there are 'SYSTEM', 'NETWORKING', and 'WEB' sections. In the 'SYSTEM' section, 'User Sources' is selected. The main content area shows a table of user sources with columns for Name, Type, and Description. The 'default' user source is listed as Internal with the description: 'This is the default and always present internal authentication profile.' To the right of the table is a 'More' dropdown and an 'edit' button. Below the table, there are two links: 'Create new User Source...' and 'Verify a User Source...'. A red box highlights the 'manage users' link next to the 'default' entry in the table.

| Name         | Type     | Description                                                             |
|--------------|----------|-------------------------------------------------------------------------|
| default      | Internal | This is the default and always present internal authentication profile. |
| opcua-module | Internal | OPC UA clients will authenticate against this profile by default.       |

When you open the 'default' user source for the first time, you will see the first user that was created at installation. This is the administrator account that has full privileges. If this user source has been modified before, a list of existing users is displayed.

Config > Security > User Sources

**Users** Roles

Changes to user "admin" saved.

| Username | Name          | Roles | Contact Info                                       | Schedule |                                             |
|----------|---------------|-------|----------------------------------------------------|----------|---------------------------------------------|
| admin    | Administrator |       | email: admin@mycompany.com,<br>phone: 555-555-5555 | Always   | <a href="#">Edit</a> <a href="#">Delete</a> |
| Bob      | Driver        |       | email: bob@mycompany.com                           | Always   | <a href="#">Edit</a> <a href="#">Delete</a> |

→ Add User

## Editing a User

Choosing to edit a user will bring you to the following page allowing you to make any necessary changes to that user. Fill out the fields for that user then click **Save Changes**.

| User Properties  |                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name             | Description                                                                                                                                               |
| Username         | The name of the User Source. This is how other systems in Ignition reference the user source. Note that every User Source <b>must</b> have a unique name. |
| Change Password? | Check this box to change the existing password.                                                                                                           |
| Password         | New password.                                                                                                                                             |
| Password         | Re-type password for verification.                                                                                                                        |
| First Name       | First name of the user.                                                                                                                                   |
| Last Name        | Last name of the user.                                                                                                                                    |
| Roles            | Role(s) assigned to this user. Check the box next to each role you want this user to have.                                                                |
| Schedule         | Schedule for the user. Choose from a dropdown list of schedules that are already defined.                                                                 |
| Language         | Language to be used for the user. Choose from a dropdown list of languages that are already defined.                                                      |
| Notes            | Any notes for this user.                                                                                                                                  |
| Badge            | A string that represents the value set for the user's badge.                                                                                              |
| Contact Info     |                                                                                                                                                           |
| Type             | Choose email or SMS.                                                                                                                                      |
| Value            | The email value or SMS number.                                                                                                                            |

Users

Roles

### User Properties

Username

admin



Change Password?

Check this box to change the existing password.

Password

Password

Re-type password for verification.

First Name

Last Name

Roles

Administrator

Driver

Guest

Operator

In This Section ...

# Managing Users and Roles

## Users and Roles

Security is based on the roles that are assigned to specific users. Roles do not have any structure or hierarchy by default, but can be created. You can create a hierarchy based on users with a greater role being assigned all matching lesser roles.

There isn't a built-in restriction to the number of roles a user can have, so each user can have access to many roles, or none at all.

It's important to think about the different roles in your project and how they affect the security of your project. For instance, what level of access a particular area of a project needs may determine the functional type roles that you create, and the different users assigned to each role.



When using role-based security in a project, the project stores the name of the role as a string. This means that if you were to modify the name of the role in the Gateway, the role-based security in your project will not update to reflect the new name, and instead will try searching for a role with the original name. Be very careful when modifying the names of roles.

You can manage users and roles using either the Gateway interface, or using the [User Management component](#) inside the Designer or Client. This section shows how to manage users and roles using the Gateway interface.

## Create a Role

1. On the Gateway Webpage, go to the **Config** section, and choose **Security > Users, Roles** from the menu on the left. The User Sources page is displayed.
2. Click on the **manage users** link for the **User Source** you want to manage.

| Name         | Type     | Description                                                             | Actions                                                                |
|--------------|----------|-------------------------------------------------------------------------|------------------------------------------------------------------------|
| default      | Internal | This is the default and always present internal authentication profile. | <a href="#">manage users</a> <a href="#">edit</a>                      |
| opcua-module | Internal | OPC UA clients will authenticate by default.                            | <a href="#">manage users</a> <a href="#">More</a> <a href="#">edit</a> |

→ [Create new User Source...](#)  
→ [Verify an User Source...](#)

3. Click the **Roles** tab. Look for the blue arrow at the bottom, and click the **Add Role** link.
4. Name the role by entering it in the **Role Name** field, and click on the **Add Role** button.  
The role is now available to be associated with specific users.

## On this page ...

- [Users and Roles](#)
- [Create a Role](#)
  - [Assigning Roles to Users](#)
  - [Role Hierarchy](#)
- [Manage Users](#)
- [User Management Component](#)
  - [Save Failed. You are not authorized...](#)

The screenshot shows a 'Role Properties' dialog box. At the top, there are tabs for 'Users' and 'Roles', with 'Roles' being the active tab. Below the tabs, the title 'Add Role' is displayed. A 'Role Name' field contains the value 'Maintenance'. At the bottom left is a 'Cancel' link, and at the bottom right is a blue 'Add Role' button.

## Assigning Roles to Users

1. On the Gateway Webpage, go to the **Config** tab, and choose **Security > Users, Roles** from the menu on the left. The User Sources page is displayed.
2. Click on the **manage users** link for the **User Source** you want to manage.
3. Click the **Edit** link for the User you want to edit, or click the blue **Add User** link to add a new user. (When adding a new user, you can also add their roles at the same time).

The screenshot shows the 'User Sources' page under the 'Config' tab. The 'Users' tab is selected. Two users are listed: 'admin' and 'guest'. For each user, there are columns for 'Username', 'Name', 'Roles', 'Contact Info', and 'Schedule'. To the right of each user, there are 'Edit' and 'Delete' links. At the bottom left, there is a red box around the 'Add User' button.

4. If you're creating a new user, the Add User window will open. Enter the user's properties including the roles you want this user to have. If no roles have been created, then follow the instructions in the Creating a Role section from above. If your user already exists and you simply want to modify their roles, the Edit User window will open. (The Edit User window and the Add User window look identical).

To assign a role, there is a **Roles** property with a list of roles that have already been created. Select the role(s) that you want this user to have. (It's not required for a user to have a role, but be aware that they might not have access to an area of the project that requires them to have a role).

The screenshot shows a list of roles. The 'Administrator' role is checked. Other roles listed are 'guests', 'Maintenance', 'Operator', 'Prod\_Sups', and 'Test\_Group', each with an unchecked checkbox.

### Administrator Role

When a project is first created, the **Administrator** role is the only role available, and no other roles will appear until they are created. When more roles are created, they appear as check boxes just like the Administrator option.

5. Click either **Add User** if you adding a new user, or **Save Changes** if you are modifying a user's role(s).  
The user now has the privileges associated with the selected role(s).

## Role Hierarchy

Often you might want to have one role that includes all the permissions for another role, i.e., Supervisor can do everything that Administration and Maintenance roles can do. In the Designer, access to Components can be restricted to specific security roles. You can give any Supervisor both of the Administration and Maintenance.

## Manage Users

User Sources support managing the users and roles from within Ignition to varying degrees. Some User Sources are fully manageable, meaning that you can administer the users, roles, contact info, and so on from within the Ignition Gateway, as well as inside a Vision Client. Other User Sources do not support this at all, while yet others only partially support it. Make sure you understand how and where the administration takes place before you choose a User Source type.

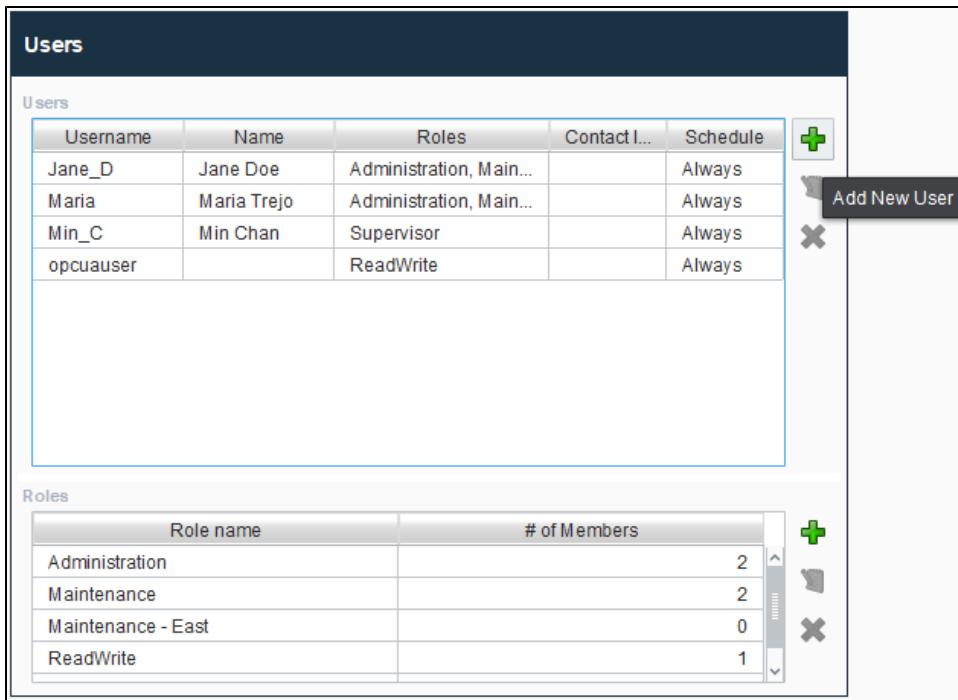
For User Sources that support it, you can manage the users and roles from within the Ignition Gateway's web configure interface under **Config > Security > Users, Roles**. Click on the **manage users** link for the **User Source** you want to administer.

Often, it is desirable to let some management or administrative users of a Vision project manage other users without having to log into the Gateway's Configure section. To do this for a User Source that supports being managed, you can simply use the built-in **User Management Panel** that comes with the Vision Module.

## User Management Component

Ignition has a special User Management component in the Vision Module that allows you to add, modify, and delete users and roles (and more) inside the Designer and the Client. This is simple to set up and use.

1. In Designer, go to the Project Browser and then to Vision.
2. Create a new Window or open an existing one.
3. Drag a **User Management** component to your window. This component will automatically point to the default user source being used by your project. You can change the User Source property if needed.
4. If you already have some users and roles setup using the Gateway Webpage, you will see them in the User Management component. If you don't have any users or roles setup, you can create them here. Use the icons on the right side to add, edit, or delete a user or role.
5. To add a new user, put the Designer in **Preview Mode**. Click the the plus  icon next to the user section.



| Username  | Name        | Roles                   | Contact I... | Schedule |
|-----------|-------------|-------------------------|--------------|----------|
| Jane_D    | Jane Doe    | Administration, Main... |              | Always   |
| Maria     | Maria Trejo | Administration, Main... |              | Always   |
| Min_C     | Min Chan    | Supervisor              |              | Always   |
| opcuauser |             | ReadWrite               |              | Always   |

| Role name          | # of Members |
|--------------------|--------------|
| Administration     | 2            |
| Maintenance        | 2            |
| Maintenance - East | 0            |
| ReadWrite          | 1            |

6. The Add User window will open. At a minimum, enter the **Username** and **Password**. All other properties are optional. When finished, click **Save**.

**Users > Add User**

< back  Save

| <b>User Properties</b>                            |                                                                                              | <b>Roles</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |       |  |  |
|---------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|--|--|
| Username<br><input type="text" value="Jerry_A"/>  | Password<br><input type="password" value="*****"/><br><input type="password" value="*****"/> | <input type="checkbox"/> Administration<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> ReadWrite<br><input type="checkbox"/> Supervisor                                                                                                                                                                                                                                                                                                                                                                                     |      |       |  |  |
| First Name<br><input type="text" value="Jerry"/>  | Last Name<br><input type="text" value="Anderson"/>                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |       |  |  |
| Schedule<br><input type="button" value="Always"/> | Language<br><input type="button" value="English"/>                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |       |  |  |
| Notes<br><input type="text"/>                     |                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |       |  |  |
| <b>Contact Info</b>                               |                                                                                              | <input style="float: right; margin-right: 10px;" type="button" value="+"/><br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Type</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td colspan="2"></td> </tr> </tbody> </table> <div style="clear: both; margin-top: 10px;"> <input style="float: left; margin-right: 10px;" type="button" value="X"/><br/> <input style="float: left; margin-right: 10px;" type="button" value="Up"/><br/> <input style="float: left;" type="button" value="Down"/> </div> | Type | Value |  |  |
| Type                                              | Value                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |       |  |  |
|                                                   |                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |       |  |  |

7. To add a new role, make sure the Designer is in **Preview Mode**. Click the the plus  icon next to the role.
- The Add Role window will open.
8. Enter the name of the new role. Click **Save**.

**Users > Add Role**

< back  Save

|                                                 |
|-------------------------------------------------|
| <b>Role name</b>                                |
| <input type="text" value="Maintenance - East"/> |

9. Now you can see the user and role that were just added in the User Management window.

The screenshot shows the User Management interface. The top section, titled 'Users', contains a table with five rows of data:

| Username  | Name            | Roles                            | Con... | Sch... |
|-----------|-----------------|----------------------------------|--------|--------|
| Jane_D    | Jane Doe        | Administration, Maintenance, ... |        | Alw... |
| Jerry_A   | Jerry Anders... | Maintenance - East               |        | Alw... |
| Maria     | Maria Trejo     | Administration, Maintenance, ... |        | Alw... |
| Min_C     | Min Chan        | Supervisor                       |        | Alw... |
| opcuauser |                 | ReadWrite                        |        | Alw... |

To the right of the table are three icons: a green plus sign for adding new users, a grey edit icon, and a grey delete icon.

The bottom section, titled 'Roles', contains a table with four rows of data:

| Role name          | # of Members |
|--------------------|--------------|
| Administration     | 2            |
| Maintenance        | 2            |
| Maintenance - East | 1            |
| ReadWrite          | 1            |

To the right of the table are three icons: a green plus sign for adding new roles, a grey edit icon, and a grey delete icon.

### Save Failed. You are not authorized...

By default, changes to the system's user source may not be made from this component. This prevents users from locking themselves out of the Gateway, or give themselves access to the Gateway.

However, this behavior can be overridden from the **Allow User Admin** property located under the [gateway's general security settings](#). This allows for the administration of the Gateway's system user source from the Designer and Vision Client. Unless this is enabled, the Vision Module's User Management component is prevented from modifying the Gateway system's selected user source and you will see an error at the bottom of the component if it is attempted.

#### Related Topics ...

- [Classic Authentication Strategy](#)
- [Internal Authentication](#)
- [User Management](#)
- [User Schedules](#)

#### In This Section ...

# User Schedules

Schedules define the times of users on-call availability and unavailability. For example, the **Always** schedule is a schedule that is active 24/7. You can set a schedule for each user in the alarm notification system. The notification messages are then sent only to those users with an active schedule. When a message reaches a notification block in a pipeline, that block's on-call roster is used to find the users with active schedules so they can be notified.

There are also a number of system functions that allow you to create, read, edit, and delete schedules or holidays from a user source using scripting. (i.e., `system.user.addSchedule`, `system.user.getHoliday`, etc.). To learn what system functions are available for user scheduling and holiday scripting, refer to the [Scripting Functions](#) in the Appendix.

## On this page ...

- [Define a New Schedule](#)
- [Manage User Schedules from the Vision Client](#)
- [Use Schedules for Alarm Notification](#)
- [Use Schedules for Restricting Login](#)



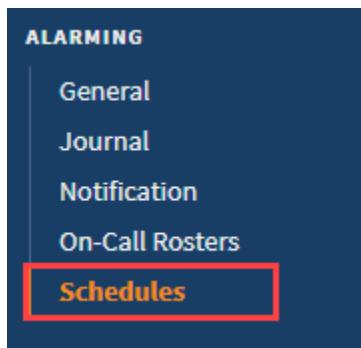
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## User Schedules

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### Define a New Schedule

1. Go to the **Config** tab of the Gateway Webpage and scroll down to **Alarming > Schedules**.



2. The Schedule Management page is displayed. Here you can see an Always and an Example schedule.

The **Always** Schedule is a built-in schedule that is always available: 24x7x365.

The **Example** Schedule is an example of a M-F 8am-5pm schedule with a lunch break. Click on the **edit** to see the detailed settings.

Schedule Management

| Name    | Type              | Description                                             | Active Now? |
|---------|-------------------|---------------------------------------------------------|-------------|
| Always  | Standard Schedule | Built-in schedule that is always available: 24x7x365    | Yes         |
| Example | Standard Schedule | An example of a M-F 8am-5pm schedule with a lunch break | No          |

[Create new Schedule...](#)

3. Click on **Create new Schedule**.
4. For our example, we'll set up a new Standard schedule. Enter a schedule name, description, and set the hours.  
 Name: **Weekend Basic**  
 Description: **Regular Weekend schedule, no holidays**  
 All days: **No** (Unselect this option)  
 Saturday: Yes (Select this option)  
 Sunday: Yes (Select this option)

Schedule Management

**General**

|                  |                                                                                                |
|------------------|------------------------------------------------------------------------------------------------|
| Name             | Weekend Basic                                                                                  |
| Description      | Regular Weekend schedule, no holidays.                                                         |
| Observe Holidays | <input type="checkbox"/> Choose whether or not this schedule observes any configured holidays. |

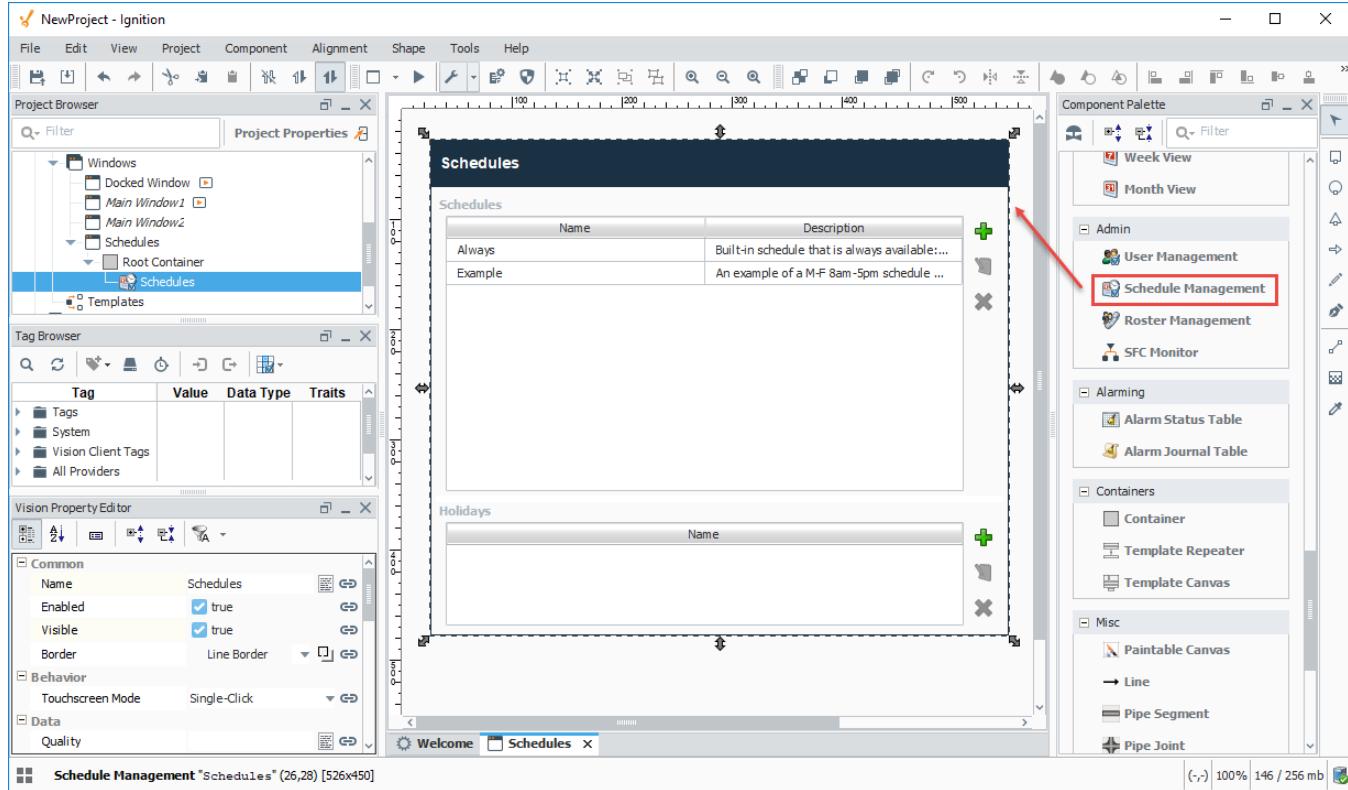
**Schedule**

|          |                                                                                                         |
|----------|---------------------------------------------------------------------------------------------------------|
| All days | <input checked="" type="checkbox"/> 0:00-24:00<br>This schedule will have the same hours 7 days a week. |
|----------|---------------------------------------------------------------------------------------------------------|

5. Click **Add Schedule**.

## Manage User Schedules from the Vision Client

There are a few ways to manage user schedules from the Vision client. The first is to use the [Schedule Management](#) component on a window. This component allows you to quickly and easily manage the schedules from the Vision client.



For more granular control, you may instead want to use scripting to manage the schedules. This may offer a more granular control at the click of a button.

```
This code creates a new schedule by using an old schedule but setting observe holidays to true.
mySchedule = system.user.getSchedule("WeeklySchedule")
if mySchedule != None and mySchedule.getType() == "basic schedule":
 mySchedule.setObserveHolidays(True)
 mySchedule.setName("NewWeeklySchedule")
 system.user.addSchedule(mySchedule)
```

## Use Schedules for Alarm Notification

The alarm notification system always uses the Schedules. When an alarm notification pipeline reaches a notification block, it looks at all of the users defined in that block's configured [on-call roster](#). Only those users whose schedules are currently active will be notified. This way, you can group people in call rosters by role, not by shift. For example, suppose you have alarms that should be sent to all supervisors. You can put all of the supervisors in one call roster, and the scheduling system will automatically only notify those supervisors who are on-shift when the alarm goes active.

## Use Schedules for Restricting Login

You can use Schedules to restrict users' ability to log in. To enable this, select the **Schedule Restricted** option on the user source in question. That user source will then reject logins for users whose schedule is inactive, even if their credentials were accurate.

### Related Topics ...

- [On-Call Rosters](#)
- [User Notifications](#)



# Internal Authentication

## Internal User Sources

An Internal type User Source stores user information internally in the Gateway's database. This means that Internal User Sources are included in Gateway Backup files, and don't require an external SQL database, or other external user management system.

When Ignition is first installed, the [default User Source](#) that initially grants access to the Gateway and Design is an Internal type User Source. You can, of course, continue to use this default internal User Source for your project(s), or you may choose to use other User Sources instead.

The Internal User Source is fully [manageable](#) from within Ignition. You can access User Sources from the Gateway Webpage under the [Config](#) section, [Security > User, Roles](#), and click the [edit](#) button.



| Name         | Type     | Description                                                             | Actions                                           |
|--------------|----------|-------------------------------------------------------------------------|---------------------------------------------------|
| default      | Internal | This is the default and always present internal authentication profile. | <a href="#">manage users</a> <a href="#">edit</a> |
| opcua-module | Internal | OPC UA clients will authenticate against this profile by default.       | <a href="#">More</a> <a href="#">edit</a>         |

## On this page ...

- [Internal User Sources](#)
- [Property Reference](#)
  - [Main Properties](#)
  - [Password Policies Properties](#)



## Internal Authentication

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## Property Reference

This section details Internal User Source properties, organized by category.

### Main Properties

Details on the Main Properties can be found on the [User Sources](#) page.

### Password Policies Properties

The Internal User Source has password policies that are configurable from within the Gateway to provide an extra layer of security by ensuring that good password practices are used.

1. From the [Config](#) tab in the [Gateway Webpage](#), select [Users, Roles](#).
2. Click the Edit button for the User Source you want to update.
3. Scroll down to the Password Policy section. You can change the default password policies by entering the appropriate password values to support your password policies.

| Password Policy     |                                                                                                                                                                                                                                                   |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Password Max Age    | 90<br>The maximum age (in days) that a password is valid for. A value of zero disables password expiration.<br>(default: 0)                                                                                                                       |
| Password Min Length | 10<br>Passwords must be at least this many characters long.<br>(default: 1)                                                                                                                                                                       |
| Password Complexity | 2<br>The number of character types (lowercase letters, uppercase letters, digits, punctuation) each password must contain. For example, a value of 3 means passwords must have 3 of the 4 character types to be considered valid.<br>(default: 1) |
| Password History    | 3<br>The number of previous passwords to store. Passwords in the history list may not be re-used. A value of zero disables this feature.<br>(default: 0)                                                                                          |

Below is a description of the Password Policy properties.

| Name                    | Description                                                                                                                                                                                                                                                                                                                |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Password Maximum Age    | The maximum age in days that the password will still be valid. After the number of days has past, when the user tries to login, it will prompt them to change their password. A value of 0 will disable this feature.                                                                                                      |
| Password Minimum Length | The minimum amount of characters that a password must contain to be considered valid. If the user tries to make a shorter password, it will not allow it, and let them know that it does not meet the minimum length requirements.                                                                                         |
| Password Complexity     | This determines how complex a password must be. There are four character types: lowercase letter, uppercase letter, digits, and special characters. The value here determines how many of those character types must be present at least once in the password for it to be considered valid.                               |
| Password History        | Determines the number of previously used passwords to store. When users make a new password, old passwords can not be re-used. A value of zero disables this functionality. History is only stored while this setting is turned on, so any passwords used while this is off can be re-used when history is turned back on. |

#### Related Topics ...

- [Database Authentication](#)
- [Active Directory Authentication](#)
- [AD Internal Hybrid Authentication](#)
- [AD Database Hybrid Authentication](#)
- [Identity Provider Authentication Strategy](#)
- [User Management](#)
- [Managing Users and Roles](#)
- [Security](#)

# Database Authentication

## Database User Source

The Database Authentication type uses an external database instead of storing data inside Ignition. Managing users is done via direct interaction with the database. This section addresses how to setup a database user source. The Database Authentication type requires you have a connection to an existing database, like SQL Server, Oracle, or MySQL. It stores all users, roles, schedules, and more in the database, and uses queries to check login credentials. When you create a database user source, you have the option of setting it up in Automatic or Manual mode.

### Automatic Mode

In Automatic mode, Ignition will create and manage the database tables for you. You can specify a prefix for the tables that are created automatically for you, but their names after the prefix are chosen by the user source. In this mode, the user source will be fully [manageable](#) in Ignition.

### Manual Mode

In Manual mode, you must provide SQL queries for various functions of the user source. In this mode, the user source will not be manageable from the Gateway or the Clients. You'll have to manage the users directly through the database. Examples for each of the queries are given on the user source setup page. Read each query description carefully to make sure you design your queries to return all the columns that are defined in the query's description as shown below.

## Property Reference

Database User Sources have the following properties, organized by category

### Main Properties

Details on the Main Properties can be found on the [Classic Authentication Strategy](#) page. The Database User Source also has the following properties:

| Name     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Database | The database connection this User Source will retrieve user information from.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Mode     | How the Gateway should manage the database tables. Has two settings:<br><b>Automatic:</b> The gateway will automatically create the database tables necessary, and all interactions with the table will use the built-in queries. When this option is set, the <b>Tablename Prefix</b> property is utilized.<br><b>Manual:</b> The Gateway will not automatically create any database tables, nor will it automatically modify users or roles. When set to manual, it is assumed that you want to manually write the queries that update the tables, or are utilizing another system. When Mode is set to this option, the <b>Manual Mode</b> properties are used to determine how the Gateway should query user data. |

### Automatic Mode Properties

| Name             | Description                                                                                                                                                                                                         |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tablename Prefix | When set to <b>Automatic</b> mode, this property determines the prefix that will be used on all automatically created tables. Useful when multiple database User Sources are connected to the same database scheme. |

### Manual Mode

| Name                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Authentication Query | A query that <b>must</b> return a row if the given username and password combination provided is valid. The query will run as a prepared statement, so use the question mark character (?) to represent username first and then password. The returned row may contain the user's basic properties under the column names: [firstname, lastname, schedule, language, notes]<br><br>Note that the Gateway will pass both the username and password the user typed in, so this query <b>MUST</b> utilize exactly two question marks, otherwise an exception will occur. |

## On this page ...

- [Database User Source](#)
- [Property Reference](#)
  - [Main Properties](#)
  - [Automatic Mode Properties](#)
  - [Manual Mode](#)
- [To Create a Database User Source](#)



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## Database Authentication

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|                           |                                                                                                                                                                                                                                                                                                                                |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| List Roles Query          | A query that returns all possible roles that any user could be a member of. The role names must be returned in the first column of the query's results.                                                                                                                                                                        |
| User's Roles Query        | A query that returns all of the roles that the provided user belongs to. The roles must be strings and must be in the first column of the query's results. The query will be run as a prepared statement with one parameter: the username.                                                                                     |
| List Users Query          | A query that returns a row containing each username. There must be at least one column: the username. Other columns are optional, supported columns are: [username, firstname, lastname, schedule, language, notes].                                                                                                           |
| Contact Info Query        | A query that returns all of the contact info for the user. The first column must be the contact type, the second column the contact value. Optional, may be blank.                                                                                                                                                             |
| Schedule Adjustment Query | <p>A query that returns the upcoming schedule adjustments for the user. This property is optional, and may be left blank.</p> <p>The results set expects the following columns:</p> <ul style="list-style-type: none"> <li>• Start(date)</li> <li>• End(date)</li> <li>• Available(boolean)</li> <li>• Note(string)</li> </ul> |
| Extra Properties Query    | A query that returns name, value pairs of extra properties for the user. Will be run with one parameter: the username. Optional, may be blank.                                                                                                                                                                                 |

## To Create a Database User Source

1. On the Gateway Webpage under the **Config** tab, go **Security > Users, Roles**.  
The User Sources page will be displayed. Click the blue arrow, **Create new User Source**.
2. Choose the **Database** authentication type, and click **Next**.

