Configuring history on MQTT Engine tags

The history configuration for MQTT Engine tags can be setup as needed for your specific requirements as described in Ignition's Configuring Tag History and How the Tag Historian System Works documents.

There are however some caveats regarding tag history configuration persistence and handling of historical event data that are detailed in this document.

History Configuration Persistence

Currently history configuration for MQTT Engine tags is not persistent and it may be required to delete MQTT Engine tags in certain cases. Reference Understanding how tag changes at the Edge affect MQTT Engine for more details.

The recommended way of configuring history for MQTT Engine tags is to use reference tags to indirectly reference MQTT Engine tags. This allows the history configuration to be persisted on the reference tag when the underlying MQTT Engine tags are deleted.

> The reference tag must be a Reference tag only. Derived, Expression and OPC tags (expose MQTT Engine tag provider through OPCUA server) will not properly store history when MQTT Engine tags are updated with historical data at a high rate of speed. This is a limitation within the Ignition platform and may be addressed in a future release.

Alternatively you can use scripting to reapply the history configuration directly to MQTT Engine tags on demand

MQTT Engine Historical Event Processing

MQTT Engine has two ways to process historical events and insert the historical data into Ignition's Tag Historian module:

- Writing historical events directly to the database, via the Historian, bypassing the tag
- Writing historical events directly to the tag

> Writing historical events directly to tag is required if there are:
>
> - Tag Events scripts that fire when applicable
> - Alarms that are triggered when applicable
> - Reference tags used to indirectly reference MQTT Engine tags

Writing historical events directly to the database, via the Historian, bypassing the tag

The configuration parameters required to write historical events directly to the database, via the Historian, bypassing the Tag are shown below.

MQTT Engine

Under the MQTT Engine Settings General Tab, navigate to the Miscellaneous Settings and ensure Store Historical events is selected

Store Historical Events	☑ Enable the writing of historical change events directly to the History provider instead of updating the Tag value

Tag History Configuration

History must be enabled on the MQTT Engine tag but the only property used from the tag history configuration is the Storage Provider.

All historic data will be written to the configured Storage Provider, via the Historian, using the timestamp associated with the historical data.

> ⚠ All other properties such as Sample Mode, Max Time Between Samples, Deadband etc are ignored when writing historic data

Edge Client

The Edge side client can publish historic data either in-order (synchronously) or asynchronously.

> ✓ If you are using MQTT Transmission as the Edge side client, under the MQTT Transmission Settings for your transmitter, navigate to the History Settings to disable the In-Order History configuration parameter. Enabling the In-Order History for MQTT Transmission is unnecessary and will result in a waste of resources.
>
> | | |
> |---|---|
> | **In-Order History** | ☐ Flush history in-order (synchronously) before live data resumes
(default: false) |

Writing historical events directly to tags

The configuration parameters required to write historical events to the tag instead of directly to the Historian are detailed below.

MQTT Engine

Under the MQTT Engine Settings General Tab, navigate to the Miscellaneous Settings and ensure Store Historical events is de-selected

Store Historical Events	☐ Enable the writing of historical change events directly to the History provider instead of updating the Tag value

Tag History Configuration

History must be enabled on the tag (either directly on the MQTT Engine tag and/or reference tag) with these three settings required:

- Deadband Style set to Discrete
- Sample Mode set to On Change
- Min Time Between Samples set to 0

History	
History Enabled	true
Storage Provider	MySQL
Deadband Style	Discrete
Deadband Mode	Absolute
Historical Deadband	0.01
Sample Mode	On Change
Min Time Between Sampl...	0
Min Time Units	Seconds
Max Time Between Sampl...	0
Max Time Units	Seconds

All historic data will be written to the tag using the timestamp associated with the historical data.

> Deadband Style must be set to Discrete for all tag datatypes. This ensures that a change is registered any time the value moves +/- the specified amount from the last stored value.
>
> If left at the default Auto setting, Ignition will determine the deadband style based on the tag datatype. See this Ignition Configuring Tag History Deadband and Analog Compression for details on how the Analog and Discrete Deadband Styles differ.

> When Max Time Between Samples is greater than 0, inserts at this sample time are not honored during historical data flushes because the tag updates for historical data occur too quickly.
>
> For example the Max Time Between Samples is 5 Seconds. Whilst the edge node is offline, the edge node tag has updates every 10 seconds. On reconnect, all these historical change events are published and written to the MQTT Engine tag within milliseconds. As a result the Max Time Between Samples does not trigger.

Edge Client

If you are not using reference tags, the Edge side client must publish historic data in-order (synchronously) before live data resumes. This is because Ignition will ignore writes to the tag if the timestamp on the tag change is older that the current value.

If you are using reference tags and have the Ignition Allow Back-fill Data disabled on the tag provider that will contain the reference tags, the Edge side client must publish historic data in-order (synchronously) before live data resumes. This is because Ignition will ignore writes to the tag if the timestamp on the tag change is older that the current value.

If you are using reference tags and have the Ignition Allow Back-fill Data enabled on the tag provider that will contain the reference tags, the Edge side client can publish historic data either synchronously or asynchronously. Using each of these different flush methods has the following implications:

- In-order history from the Edge Node
  - Historical data will be stored for the reference tag
  - If history is enabled on MQTT Engine tags, historical data will be stored the MQTT Engine tag
- Asynchronous history from the Edge Node
  - Historical data will be stored for the reference tag
  - Even if history is enabled on MQTT Engine tags, historical data will not be stored the MQTT Engine tag. New values will only be stored in the historical database if it is a non-historical value.

> If you are using MQTT Transmission as the Edge side client, under the MQTT Transmission Settings for your transmitter, navigate to the History Settings to select or deselect the In-Order History configuration parameter.
>
> As shown below, when the MQTT Transmission client comes back online and flushes history, it will flush the oldest historical events first (in order) before sending live Tag changes events to Engine.

In-Order History	☑ Flush history in-order (synchronously) before live data resumes (default: false)

History Configuration Examples

Sample Mode = On Change, Min Time Between Samples = 0, Max Time Between Samples = 0

- Suitable for writing historical events directly to the database or writing historical events directly to the tag
- Real-time data is written to the storage provider on each tag change event whilst the tag quality is Good
- Historical data is written to the storage provider or tag using the timestamp associated with the historical data
    - Handles historical metrics flushed from the Edge that have very high resolution; e.g., the historical metrics have timestamps 1 ms apart for a single tag

History	
History Enabled	true
Storage Provider	MySQL
Deadband Style	Discrete
Deadband Mode	Absolute
Historical Deadband	0.01
Sample Mode	On Change
Min Time Between Sampl...	0
Min Time Units	Seconds
Max Time Between Sampl...	0
Max Time Units	Seconds

Resultset 1

tagid	intvalue	floatvalue	stringvalue	datevalue	dataintegrity	t_stamp
11	56	NULL	NULL	NULL	192	1711644430959
11	55	NULL	NULL	NULL	192	1711644426485
11	54	NULL	NULL	NULL	192	1711644424485
11	53	NULL	NULL	NULL	192	1711644422484
11	52	NULL	NULL	NULL	192	1711644421484
11	51	NULL	NULL	NULL	192	1711644419483
11	50	NULL	NULL	NULL	192	1711644417482
11	49	NULL	NULL	NULL	192	1711644415480
11	48	NULL	NULL	NULL	192	1711644413479
11	46	NULL	NULL	NULL	500	1711644411602
11	46	NULL	NULL	NULL	192	1711644409475
11	45	NULL	NULL	NULL	192	1711644407473
11	44	NULL	NULL	NULL	192	1711644405471
11	43	NULL	NULL	NULL	192	1711644403471
11	42	NULL	NULL	NULL	192	1711644401470
11	41	NULL	NULL	NULL	192	1711644399467

Tag value changing - db inserts on change

Tag changes at every every 2 seconds inserted as historical data after edge node reconnect

Tag quality bad on edge node disconnect

Tag value changing - db inserts on change

Sample Mode = On Change, Min Time Between Samples = 0, Max Time Between Samples = 5

- Suitable for writing historical events directly to the database or writing historical events directly to the tag
- Real-time data is written to the storage provider on each tag change event whilst the tag quality is Good
- Real-time data is written to the storage provider on the Max Time Between Samples interval if no tag change events whilst the tag quality is Good
- Historical data is written to the storage provider or tag using the timestamp associated with the historical data
    - When the Max Time Between Samples > 0, there will be no inserts during a history flush as the tag updates occur too quickly
    - Handles historical metrics flushed from the Edge that have very high resolution; e.g., the historical metrics have timestamps 1 ms apart for a single tag

History	
History Enabled	true
Storage Provider	MySQL
Deadband Style	Discrete
Deadband Mode	Absolute
Historical Deadband	0.01
Sample Mode	On Change
Min Time Between Sampl...	0
Min Time Units	Seconds
Max Time Between Sampl...	5
Max Time Units	Seconds

Resultset 1

tagid	intvalue	floatvalue	stringvalue	datevalue	dataintegrity	t_stamp
11	29	NULL	NULL	NULL	192	1711645822694
11	29	NULL	NULL	NULL	192	1711645817687
11	29	NULL	NULL	NULL	192	1711645812683
11	29	NULL	NULL	NULL	192	1711645807678
11	29	NULL	NULL	NULL	192	1711645802484
11	29	NULL	NULL	NULL	192	1711645749027
11	28	NULL	NULL	NULL	192	1711645739009
11	27	NULL	NULL	NULL	192	1711645729000
11	26	NULL	NULL	NULL	192	1711645718981
11	25	NULL	NULL	NULL	192	1711645708970
11	24	NULL	NULL	NULL	500	1711645634253
11	24	NULL	NULL	NULL	192	1711645629451
11	24	NULL	NULL	NULL	192	1711645624444
11	24	NULL	NULL	NULL	192	1711645619438
11	24	NULL	NULL	NULL	192	1711645614432
11	24	NULL	NULL	NULL	192	1711645609425
11	24	NULL	NULL	NULL	192	1711645604420
11	24	NULL	NULL	NULL	192	1711645599414
11	24	NULL	NULL	NULL	192	1711645594406
11	24	NULL	NULL	NULL	192	1711645589399
11	24	NULL	NULL	NULL	192	1711645584394
11	24	NULL	NULL	NULL	192	1711645579390
11	24	NULL	NULL	NULL	192	1711645574385
11	24	NULL	NULL	NULL	192	1711645569378
11	24	NULL	NULL	NULL	192	1711645564372
11	24	NULL	NULL	NULL	192	1711645557790
11	23	NULL	NULL	NULL	192	1711645555991
11	22	NULL	NULL	NULL	192	1711645553806
11	21	NULL	NULL	NULL	192	1711645550165
11	20	NULL	NULL	NULL	192	1711645549355
11	20	NULL	NULL	NULL	192	1711645544350
11	20	NULL	NULL	NULL	192	1711645539343
11	20	NULL	NULL	NULL	192	1711645534338
11	20	NULL	NULL	NULL	192	1711645529332
11	20	NULL	NULL	NULL	192	1711645524326

Tag value not changing - db inserts every 5 seconds

Tag changes at edge every 10 seconds inserted as historical data after edge node reconnect

Tag quality bad on edge node disconnect

Tag value not changing - db inserts every 5 seconds

Tag value changing < Max Time Between Samples - db inserts on change

Tag value not changing - db inserts every 5 seconds

Sample Mode = Periodic, Max Time Between Samples = 0, Sample Rate = 5

- Suitable only for writing historical events directly to the database
- Real-time data is written to the storage provider on the Sample Rate whilst the tag quality is Good
- Historical data is written to the storage provider using the timestamp associated with the historical data

History	
History Enabled	true
Storage Provider	MySQL
Deadband Style	Discrete
Deadband Mode	Absolute
Historical Deadband	0.01
Sample Mode	Periodic
Max Time Between Sampl...	0
Max Time Units	Seconds
Sample Rate	5
Sample Rate Units	Seconds

Resultset 1

tagid	intvalue	floatvalue	stringvalue	datevalue	dataintegrity	t_stamp
11	41	NULL	NULL	NULL	192	1711655211031
11	38	NULL	NULL	NULL	192	1711655206029
11	35	NULL	NULL	NULL	192	1711655201028
11	33	NULL	NULL	NULL	192	1711655194071
11	32	NULL	NULL	NULL	192	1711655192069
11	31	NULL	NULL	NULL	192	1711655190068
11	30	NULL	NULL	NULL	192	1711655188067
11	29	NULL	NULL	NULL	192	1711655186066
11	28	NULL	NULL	NULL	192	1711655184064
11	27	NULL	NULL	NULL	192	1711655182062
11	26	NULL	NULL	NULL	192	1711655180061
11	25	NULL	NULL	NULL	192	1711655178059
11	24	NULL	NULL	NULL	192	1711655176057
11	23	NULL	NULL	NULL	192	1711655174056
11	22	NULL	NULL	NULL	192	1711655172055
11	21	NULL	NULL	NULL	192	1711655171055
11	18	NULL	NULL	NULL	500	1711655171020
11	20	NULL	NULL	NULL	192	1711655169053
11	19	NULL	NULL	NULL	192	1711655167052
11	17	NULL	NULL	NULL	192	1711655166018
11	15	NULL	NULL	NULL	192	1711655161017
11	12	NULL	NULL	NULL	192	1711655156015
11	10	NULL	NULL	NULL	192	1711655151015

Tag value changing every 2 seconds - db inserts every 5 seconds

Tag changes at edge every 2 seconds inserted as historical data after edge node reconnects

Tag quality bad after edge node disconnect

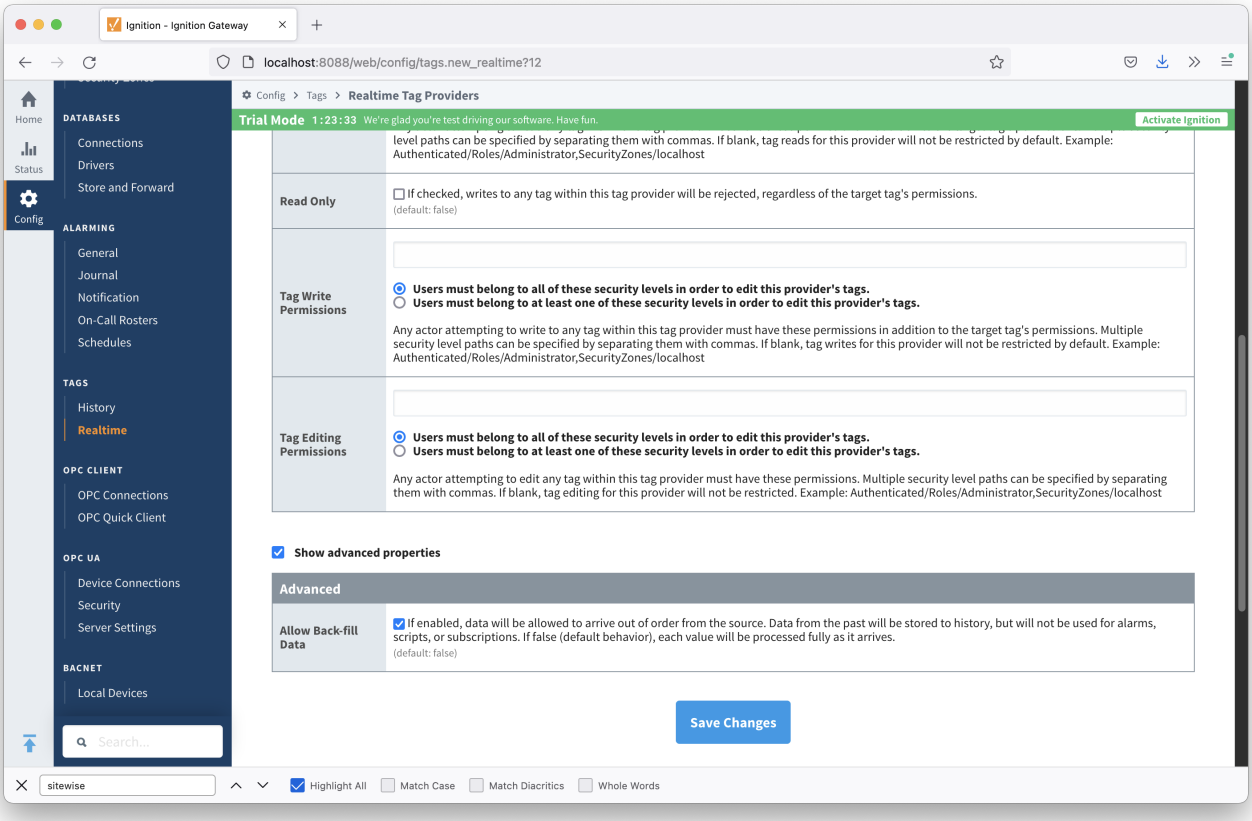
Tag value changing every 2 seconds - db inserts every 5 seconds

Ignition Allow Back-fill Data

Starting in Ignition 8.1.4 Ignition supports a feature to 'back-fill' historical data for tag providers.

Normally if a tag is updated with a value that is older than the current value, Ignition simply throws it away. In doing so, no tag change event will ever fire and the tag will not be updated. The back-fill option allows the value to be stored to the historical database if history is enabled on that tag. However even with this option enabled, it is important to note that no tag change event will fire. So, tag change event scripts, transaction groups, and any other subsystem that relies on tag change events will not be notified of the event if it is older than the current tag value (i.e. is historical).

To enable this option, browse to the Ignition Gateway Web UI Config Tag Providers Realtime. Select 'edit' for the Tag Provider that will contain Reference Tags that will point to MQTT Engine tags. Scroll to the bottom and click the 'Show advanced properties' checkbox. This will show the 'Allow Back-fill Data' option. Set it to true as shown below and then click 'Save Changes'.


Ignition - Ignition Gateway
localhost:8088/web/config/tags.new_realtime?12
Home
Status
Config
DATABASES
Connections
Drivers
Store and Forward
ALARMING
General
Journal
Notification
On-Call Rosters
Schedules
TAGS
History
Realtime
OPC CLIENT
OPC Connections
OPC Quick Client
OPC UA
Device Connections
Security
Server Settings
BACNET
Local Devices
Search...
Config > Tags > Realtime Tag Providers
Trial Mode 1:23:33 We're glad you're test driving our software. Have fun.
Activate Ignition
level paths can be specified by separating them with commas. If blank, tag reads for this provider will not be restricted by default. Example: Authenticated/Roles/Administrator,SecurityZones/localhost
Read Only
If checked, writes to any tag within this tag provider will be rejected, regardless of the target tag's permissions.
(default: false)
Tag Write Permissions
Users must belong to all of these security levels in order to edit this provider's tags.
Users must belong to at least one of these security levels in order to edit this provider's tags.
Any actor attempting to write to any tag within this tag provider must have these permissions in addition to the target tag's permissions. Multiple security level paths can be specified by separating them with commas. If blank, tag writes for this provider will not be restricted by default. Example: Authenticated/Roles/Administrator,SecurityZones/localhost
Tag Editing Permissions
Users must belong to all of these security levels in order to edit this provider's tags.
Users must belong to at least one of these security levels in order to edit this provider's tags.
Any actor attempting to edit any tag within this tag provider must have these permissions. Multiple security level paths can be specified by separating them with commas. If blank, tag editing for this provider will not be restricted. Example: Authenticated/Roles/Administrator,SecurityZones/localhost
Show advanced properties
Advanced
Allow Back-fill Data
If enabled, data will be allowed to arrive out of order from the source. Data from the past will be stored to history, but will not be used for alarms, scripts, or subscriptions. If false (default behavior), each value will be processed fully as it arrives.
(default: false)
Save Changes
sitewise
Highlight All
Match Case
Match Diacritics
Whole Words