Amtiri

REFERENCE MANUAL

Logger

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A LOGGER keeps the history of variables. Each time one of its variables changes, it writes a row with the new value and the time, in a database file of its own. Formulas and dashboards read that history back through the history functions of Amtiri Script, and a Logger Replicator copies it to another instance.

Module	What it does	Typical use
Logger (`LOGGER`)	Writes a row each time one of its variables changes	Trends on a dashboard, daily averages and totals, the history of a module's status

The module also has the settings every module shares: whether it is enabled, its name, its status and message variables and their thresholds. They are described in Settings every module shares.

Logger

Settings

Key	Setting	Type	Default	Meaning
`code`	Code	text	none	Names the logger: its file, and the name the history functions and replicators use. Required
`variables`	Variables	variable codes, separated by commas	none	The variables whose changes are written. Empty writes nothing

The code

- **It names the file**: `loggers/<code>.sqlite` in the instance home, with the code in lower case. `PLANT_LOG` writes into `loggers/plant_log.sqlite`.
- **It is required.** A LOGGER without one does not run. When the configuration loads, its status reads `Configuration invalid: A LOGGER module needs a code: it names the database file.`, and the message stays: the module is left out of the plant, is never opened, and counts no rows as dropped. Before engine 6.18.8 a Start opened it anyway, and the message was replaced at once by an opening error beginning `Database unavailable:`.
- **It must make a file name.** A code holding `/`, `\` or `..` is refused the same way. Use letters, digits and `_`.
- **Case does not count.** `PLANT_LOG` and `plant_log` are the same logger and the same file, so give each LOGGER a code of its own.
- **The file outlives the module.** Deleting a LOGGER leaves its file, and a LOGGER created again with the same code carries on with the same history. Changing a logger's code starts an empty file and leaves the old one in `loggers/`.

What is written

Each row holds three things:

Column	Holds
`variable`	The variable's code, in capital letters
`timestamp`	When the logger was told of the change, in UTC, written `yyyy-MM-dd HH:mm:ss.SSS`, such as `2026-09-29 14:05:07.250`
`value`	The value, as text in the engine's own notation; the history functions turn it back into a number, a text, a list or whatever it was

- **One row per change.** A row is written each time the engine reports that one of the variables changed. A write that leaves the value as it was is not a change, and writes no row. A value that does not change for a week costs nothing for a week.
- **No value, no row.** A variable that changes to no value writes nothing, so the history holds the value it had before. That is why a module's status variable belongs in the list beside its messages: see Keeping a history of status and messages.
- **An announcement is logged too.** When a Modbus master, OPC UA client, S7 or EtherNet/IP client opens, it announces its forwarded variables as changed, and a LOGGER that logs one of them writes a row with the same value; see Forwarders when a module opens.
- **Logging never waits.** Rows go into a queue of the logger's own and are written in order, so a slow disk never holds up the formula or the module that changed the value.

The file is a SQLite database. Its table `log` holds those three columns and is indexed by variable and time. Beside it the logger keeps three small tables of its own: `log_session`, when it was running and what it logged, refreshed every minute; `log_compaction`, which periods are compacted; and `log_replicated_head`, how far each local Logger Replicator's receiver has acknowledged. While the logger is open, SQLite keeps its latest rows in `<code>.sqlite-wal` beside the file, so copy a logger's files with the engine stopped. A configuration transfer can carry a logger's history from one instance to another.

> **Warning**
>
> **Nothing trims the file on its own.** It grows with every change for as long as the logger runs: a variable that changes every second adds 86 400 rows a day. Log what you will read back, put the instance home on a disk with room to grow, and use the **History** section of the logger's settings to delete, export, compact or restore history: see Managing history.

Managing the history

The logger's settings have a **History** tab, which works on the logger's file while the plant runs:

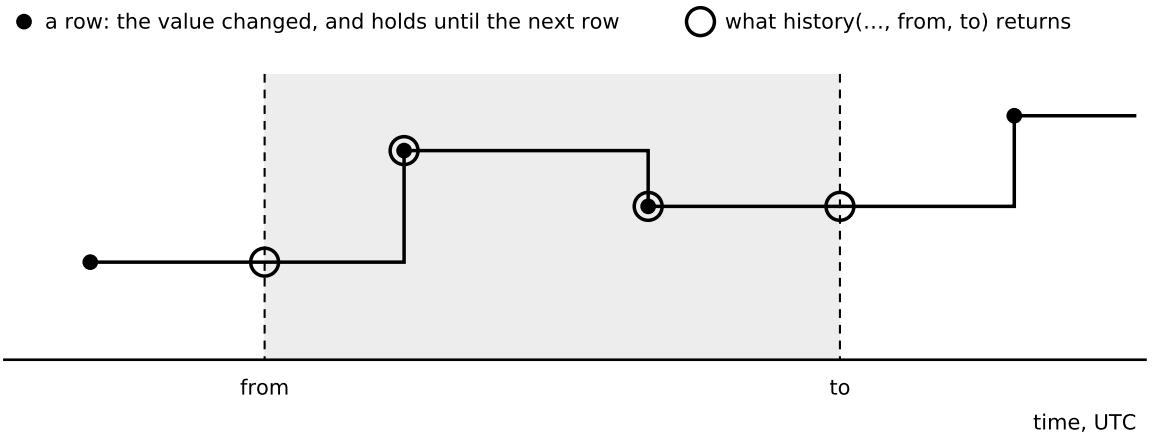
Operation	What it does
Delete	Removes one variable's history, a range of it, or the whole logger's
Export	Writes chosen variables over a chosen range to a history file, for download or another instance
Import / merge	Brings a history file or another logger's history in, after an overlap check per variable
Compact	Replaces each segment of a chosen interval with its average and a spike to its min and max, keeping min, max and time-weighted average
Restore	Puts an old log back over the current one: a backup, removed points or an export

Every operation that removes rows keeps them in a file first, unless you decline it, and compaction suggests exporting the data it is about to compact. The section needs the engine running and the logger open. Step by step: Managing history.

When the database fails

- **At the start.** A file that cannot be created or opened, such as one on a read-only disk, keeps the module out of the plant as the configuration loads, with `Configuration invalid: {reason}`. The logger stays in error until the engine is started again. Before engine 6.18.8 the Start opened it anyway, and the error read `Database unavailable: {reason}`.
- **While running.** A row the database refuses is dropped, not kept for later, and counted: `Database unavailable: {n} rows dropped`, rewritten at most once a second. The next row tries the database again, so logging resumes by itself when the database is back, and the first row written then ends the error: the module returns to on with `Recovered after {n} failure(s) in {duration}`, where `{n}` counts the once-a-second reports, not the rows. Before engine 6.18.8 the error stayed until the next Start.
- **A long queue.** When 5 000 rows are waiting to be written, the module warns `Logging queue backlog: {n} row(s) waiting`, until the queue is down to 1 000.

Reading the history back



Amtiri Script reads a logger by its code:

- `history(CODE, "VARIABLE", from, to)` gives the samples of one variable over a window, oldest first: the value in force at `from`, every row inside the window, and the last value again at `to`. A value holds from its row until the next, which is what the time-series functions, such as `tsAverage`, weigh it by. The logger's code is written bare, not in quotes; the variable is text, in any case.
- `loggerValueAt` and `loggerValuesAt` read the value in force at one instant.
- **Times are UTC**, like the rows: `now()` gives the current UTC time, and `addHours(now(), -24)` the same time a day earlier.

A formula that reads history names the variable as text, so no change of that variable recalculates it. Give it a Scheduler definition to recalculate it on a clock.

Inside a compacted period the rows are the simplified series: each segment's time-weighted average, with a 1 ms spike to its max and one to its min where they happened. On windows aligned to the compacted segments, `tsMin` and `tsMax` over `history()` give the logged extremes exactly, and `tsAverage` the logged average to within the segment's range times 1 ms over its length - three ten-millionths of the range for one-hour segments. Inside a segment, a read sees the segment's average, not a measured value.

Receiving replicated history

A LOGGER can also be the target of a Logger Replicator on another instance. The rows arrive with their own UTC timestamps and go straight into the file, a whole batch at a time; rows the file already holds are dropped. The target must be enabled, and it should log nothing of its own: see A dedicated target logger.

Messages

The complete list is in Module messages.

When	Level	Text
Loading: the code is missing or cannot name a file, or the file cannot be created or opened. The module is left out and does not run	`ERROR`	`Configuration invalid: {reason}`
Opening: the database opened	`INFO`	`Database {file} opened`
Opening: the database cannot be opened. The module does not run	`ERROR`	`Database unavailable: {reason}`
Running: rows could not be written and were dropped. The count is rewritten at most once a second	`ERROR`	`Database unavailable: {n} rows dropped`
Running: a row was written again after rows were dropped	`INFO`	`Recovered after {n} failure(s) in {duration}`
5 000 rows are waiting to be written	`WARNING`	`Logging queue backlog: {n} row(s) waiting`
A history job is running	`INFO`	`History job running: {job}`
A history job failed; the warning stays until a later job ends well	`WARNING`	`History job failed: {job}: {reason}`
Replicated rows arrived inside a period this logger had compacted	`WARNING`	`{n} replicated row(s) arrived inside a compacted period of {variable}`

Example

A logger for a tank's level, a flow and a pump, and the status of the PLC module that reads them:

```
Code       PLANT_LOG
Name       Plant history
Variables  LIT_301, FIT_501, P101_RUN, PLC1_STATUS
```

The rows go into `loggers/plant_log.sqlite`, and the module's info message reads `Database plant_log.sqlite opened`. A variable `LIT_301_AVG_24H` with the formula

```
tsAverage(history(PLANT_LOG, "LIT_301", addHours(now(), -24), now()))
```

and a Scheduler definition `0 0/15 * * * ?` holds the level's time-weighted average over the last 24 hours, recalculated every quarter of an hour.

Next steps

- Managing history
- Scheduler
- Orchester links
- Settings every module shares
- Module messages

- Module catalogue

This page describes Data Orchester engine 6.21.0.