Using MQTT and Node-RED to monitor AMI[1] and define pipelined tasks

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ATLAS Metadata Interface (AMI) is a generic ecosystem for metadata aggregation, transformation and cataloging, benefiting from more than 20 years of feedback in the LHC context. AMI provides to ATLAS physicists the official tool to select datasets by criteria.

AMI stack

→ Monitoring of the AMI stack with the Message Queuing Telemetry Transport (MQTT) protocol, Node-RED (a tool for wiring together hardware / software devices) and Elasticsearch.


More info...
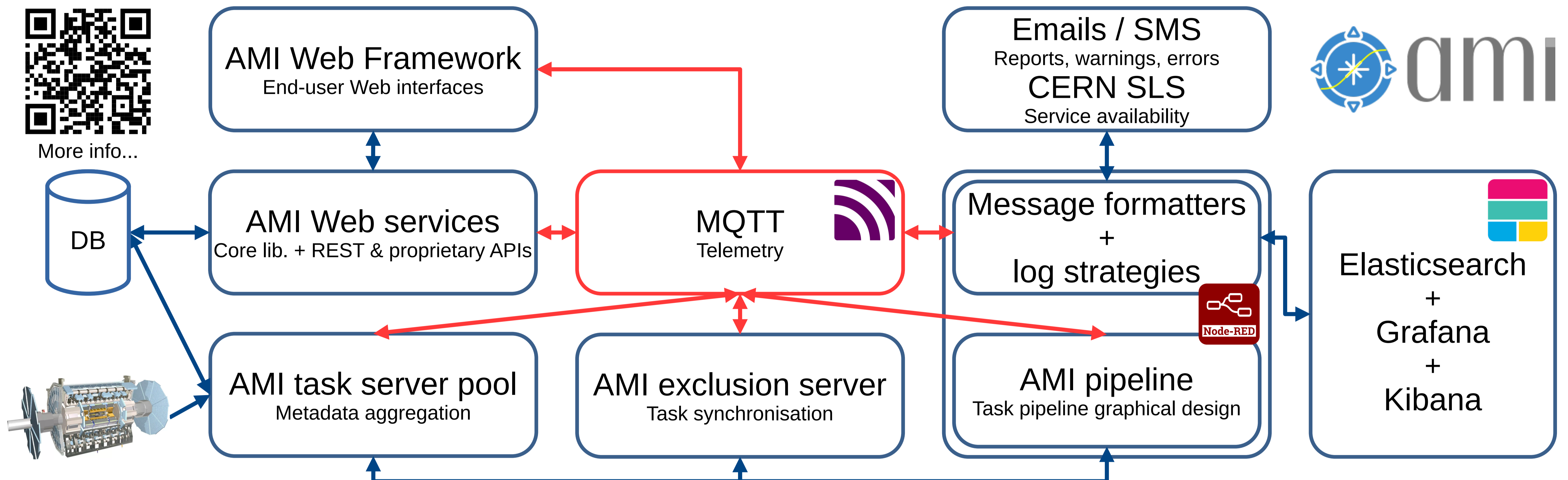
- Each subsystem sends metrics (disk / mem / cpu usage, …) and logs through the MQTT protocol.
- Node-RED aggregates metrics and implements strategies (emails, high-level logs to an Elasticsearch stack, …).
- AMI implements a bidirectional overlay of the MQTT protocol for command execution (restarting / stopping a subsystem, ...).

Pipelined metadata aggregation tasks: definition
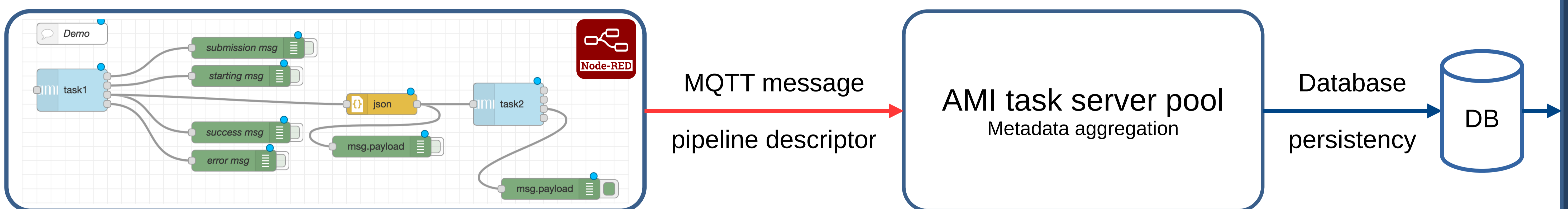
- The AMI ecosystem provides a Node-RED plugin to graphically define metadata aggregation task pipelines.
- Each individual pipeline description is sent to the task server pool which validates and persists the description.

Pipelined metadata aggregation tasks: execution
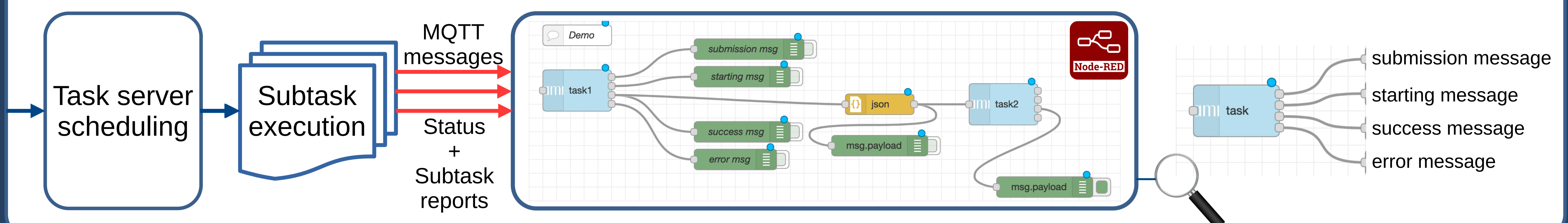
- A task server executes the pipeline. At each stage, messages are sent to Node-RED for monitoring purposes.
- In case of issue, an error report is returned and the pipeline stops. Otherwise, a subtask report is propagated to the next subtask. The final status can be sent to Elasticsearch.
- No single point of failure is introduced.

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Refs.: [1] Jérôme Odier, Fabian Lambert and Jérôme Fulachier.
The ATLAS Metadata Interface (AMI) 2.0 metadata ecosystem: new design principles and features.
J. Phys.: Conf. Ser., vol. 214, year 2019.
https://doi.org/10.1051/epjconf/201921405046

ATLAS EXPERIMENT