

DAQUP

A proposal for a new data acquisition system

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Plan

- **Feedbacks about the current system**
- **Top-level requirements**
- **Overview of the architecture**
- **What tools & techs are considered ?**
- **How the architecture solves the initial top-level requirements ?**

Feedbacks

- Hard to use; steep learning curve
 - Some actions are performed by entering commands in a terminal.
- Implementing new functionalities is costly.
 - The architecture of the current system is not designed to be extended.
 - Numerous patches have accumulated over the years.
 - An excessive number of scripts drive the system.
- The current system is not designed to run anywhere else.
 - The system requires access to specific resources available on the GANIL infrastructure.
- Time could be saved by accessing some functionalities remotely
 - e.g. Remote diagnosis and maintenance operations

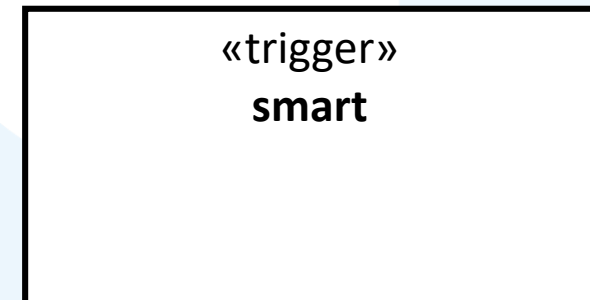
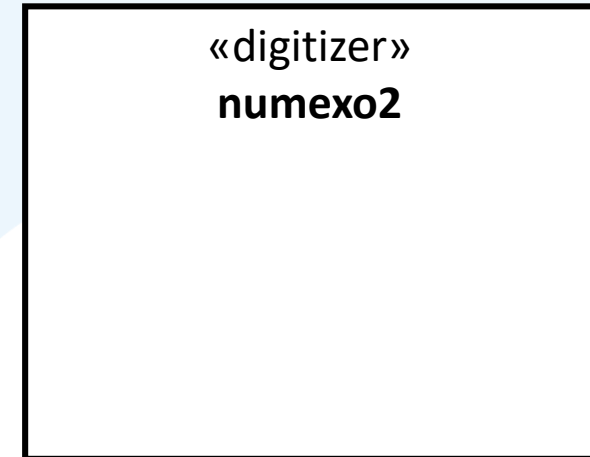
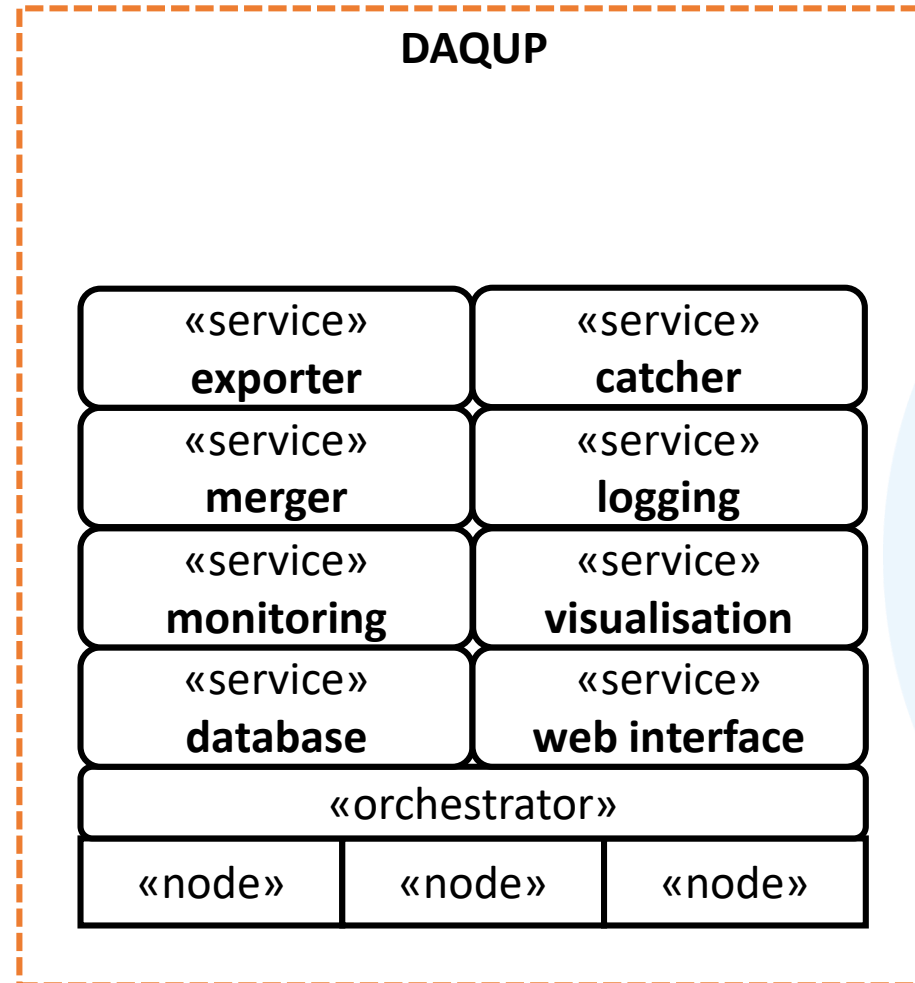
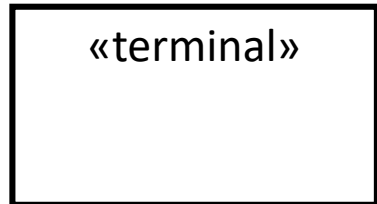
Requirements

For the new architecture

- **Availability**
 - Minimize the downtime of the system
- **Ease of use**
 - User friendly interfaces
- **Monitoring**
 - Users must have access to data related to the operational state of the system.
- **Extendability**
 - The system must be designed to be extended with new functionalities.
- **Flexibility**
 - Users must be able to change, add or remove existing functionalities with ease.
- **Performance**
 - The system must be designed to scale according to the needs.
- **Reproducibility**
 - Users must be able to reuse existing configurations with ease.
- **Exportability**
 - The system must be deployable outside GANIL, in environments that meet reasonable requirements.

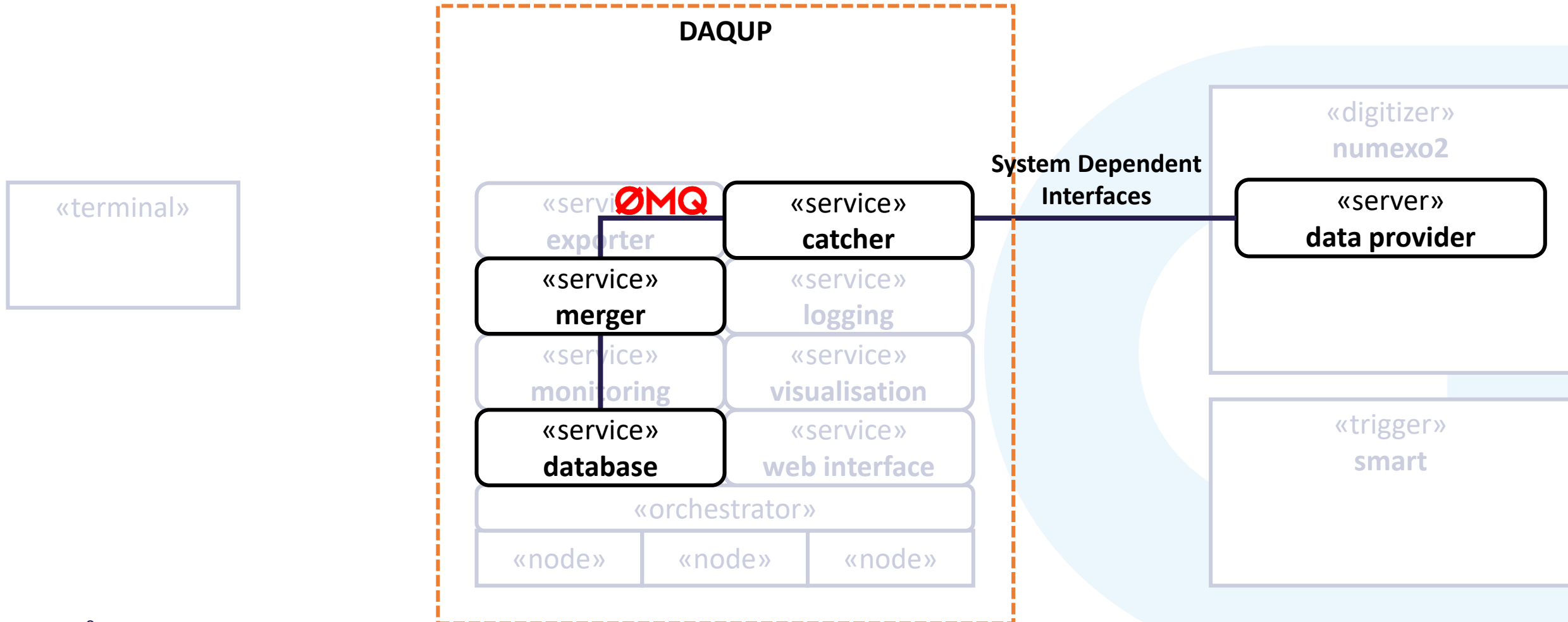
Architecture

Overview



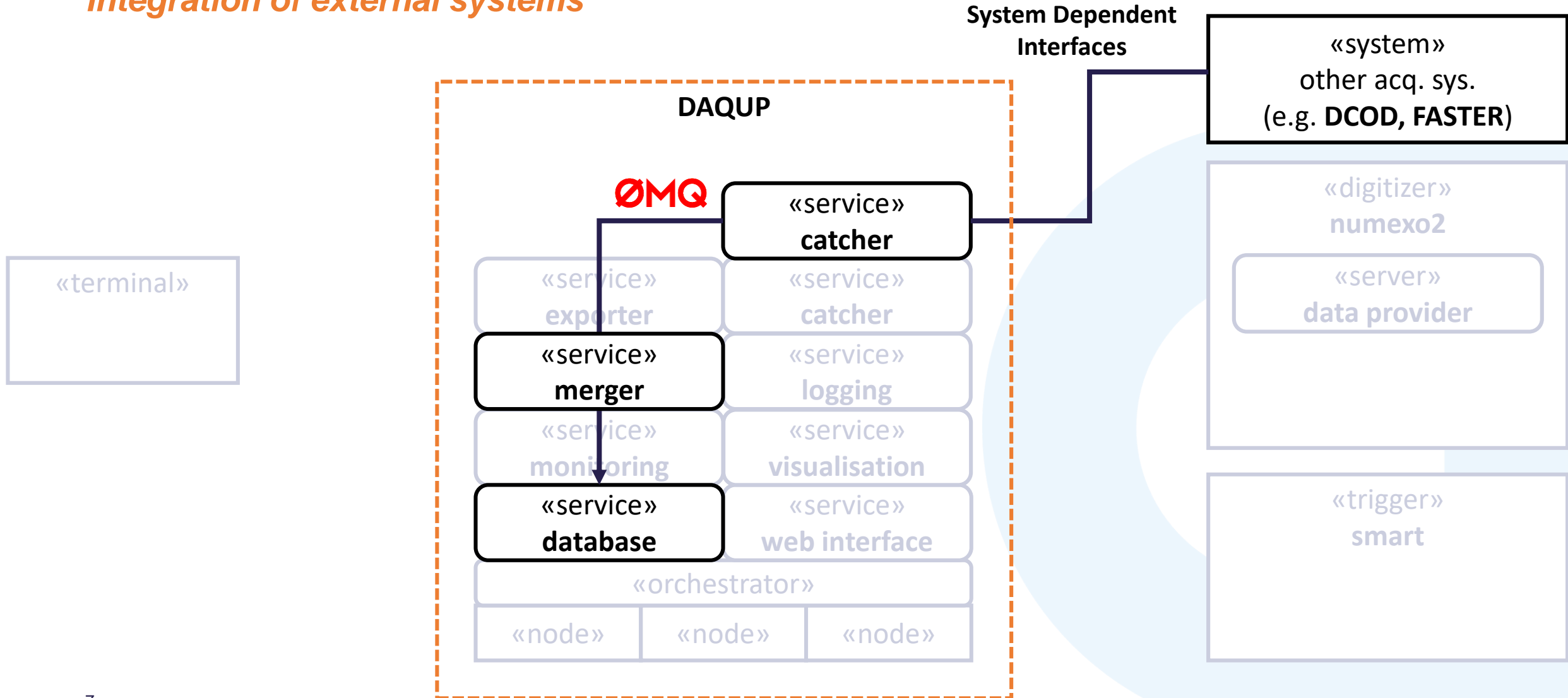
Architecture

Dataflow



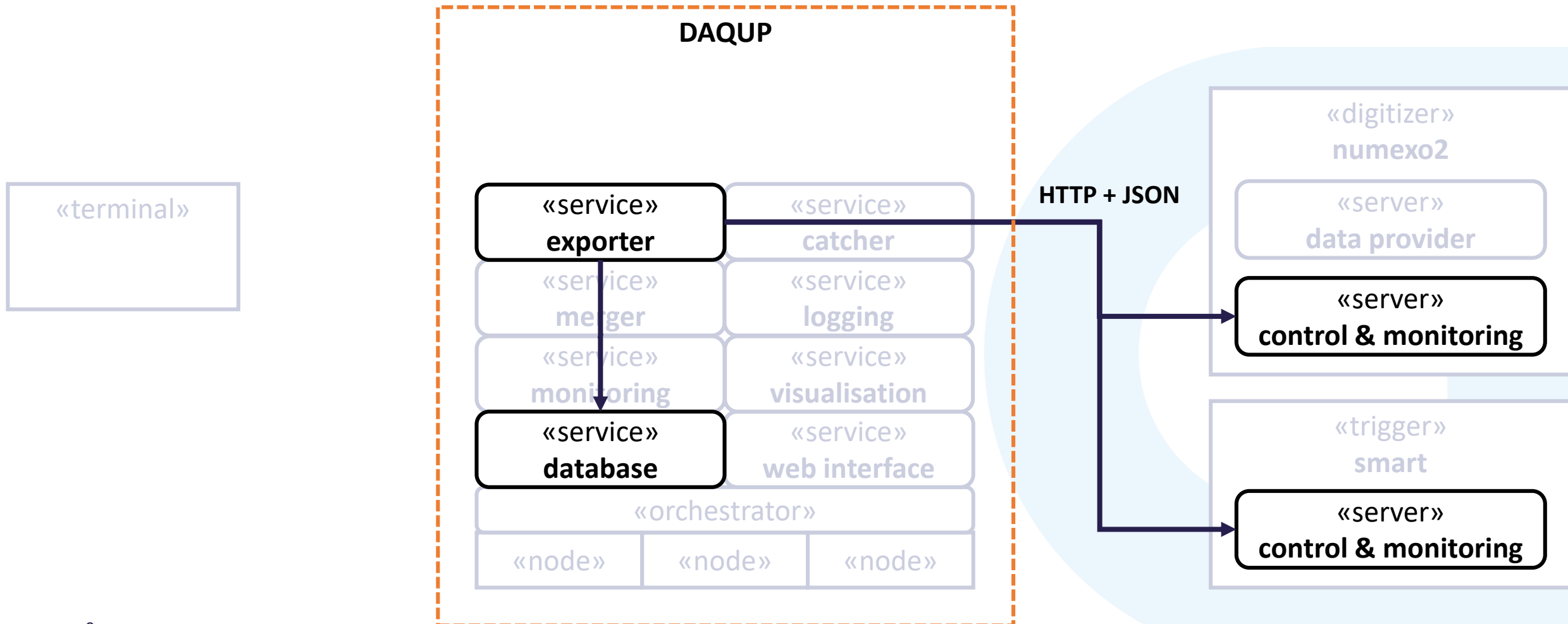
Architecture

Integration of external systems



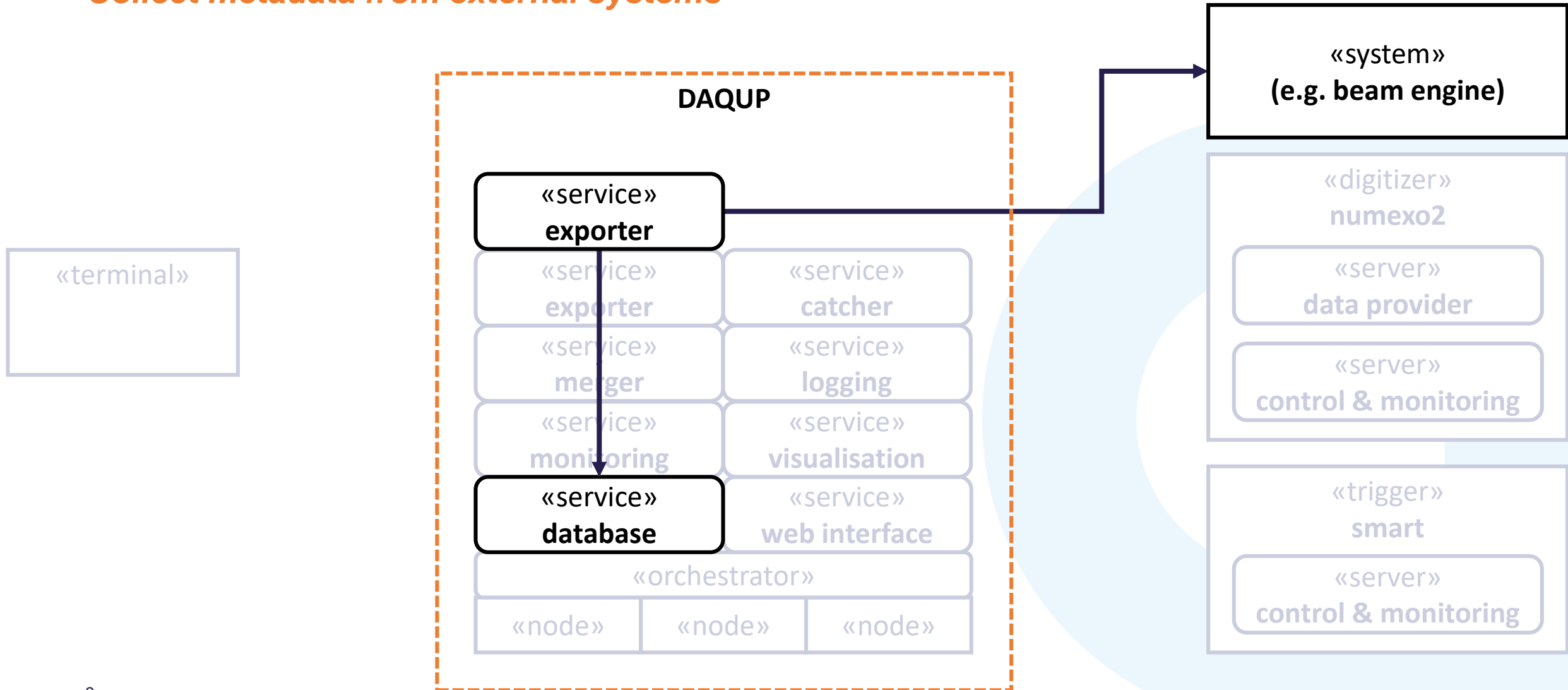
Architecture

Collect metadata from hardware



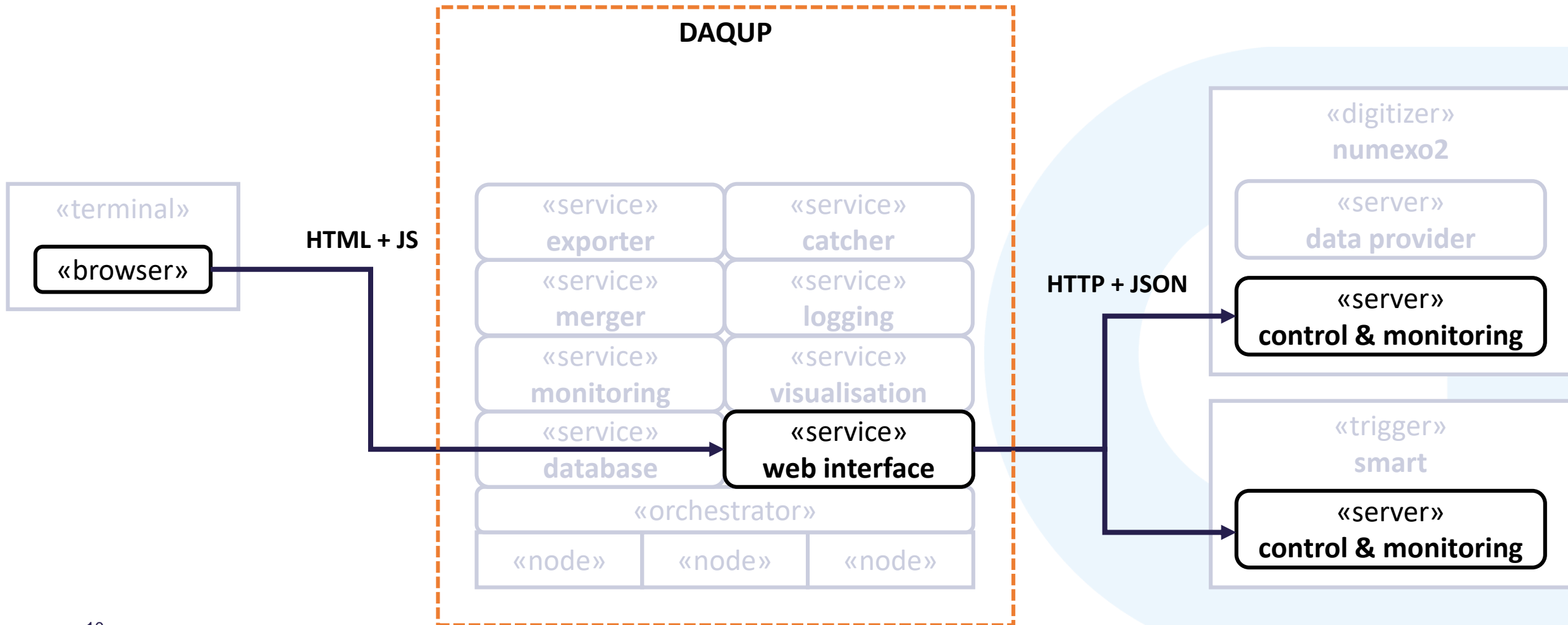
Architecture

Collect metadata from external systems



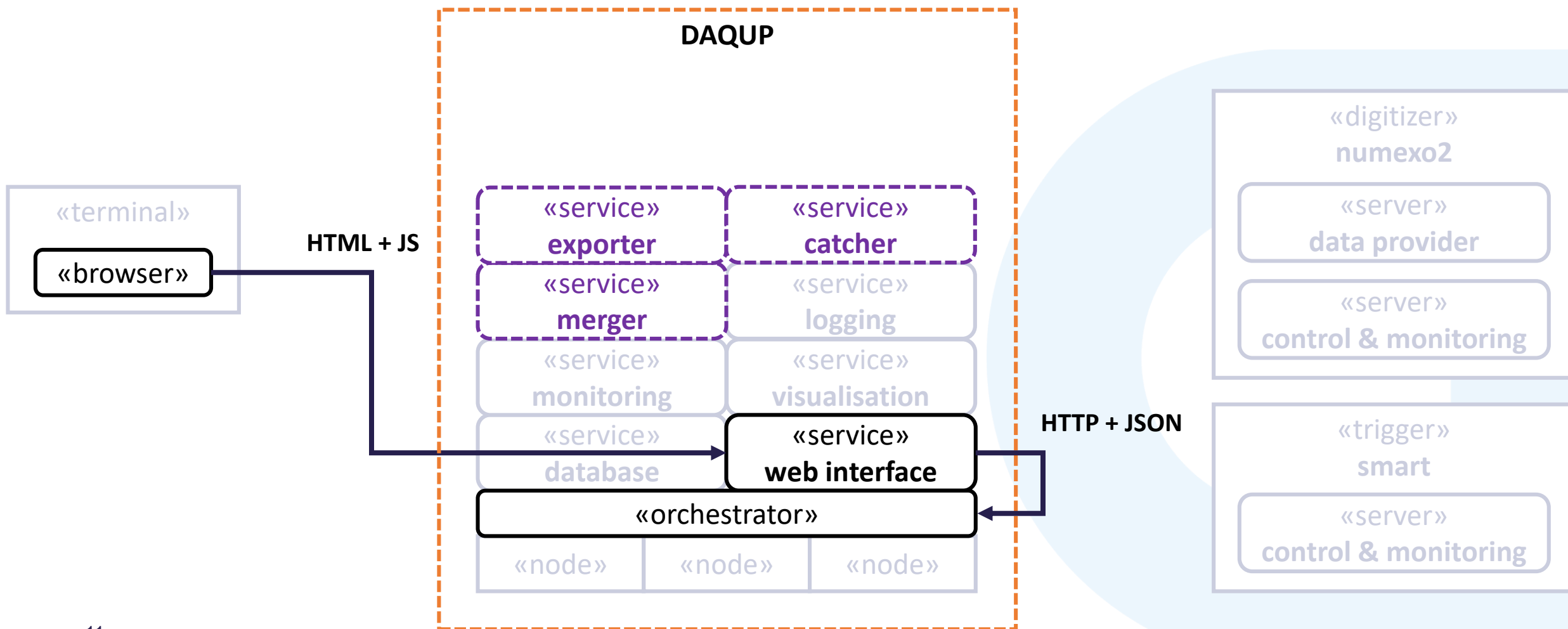
Architecture

Control hardware from a web service



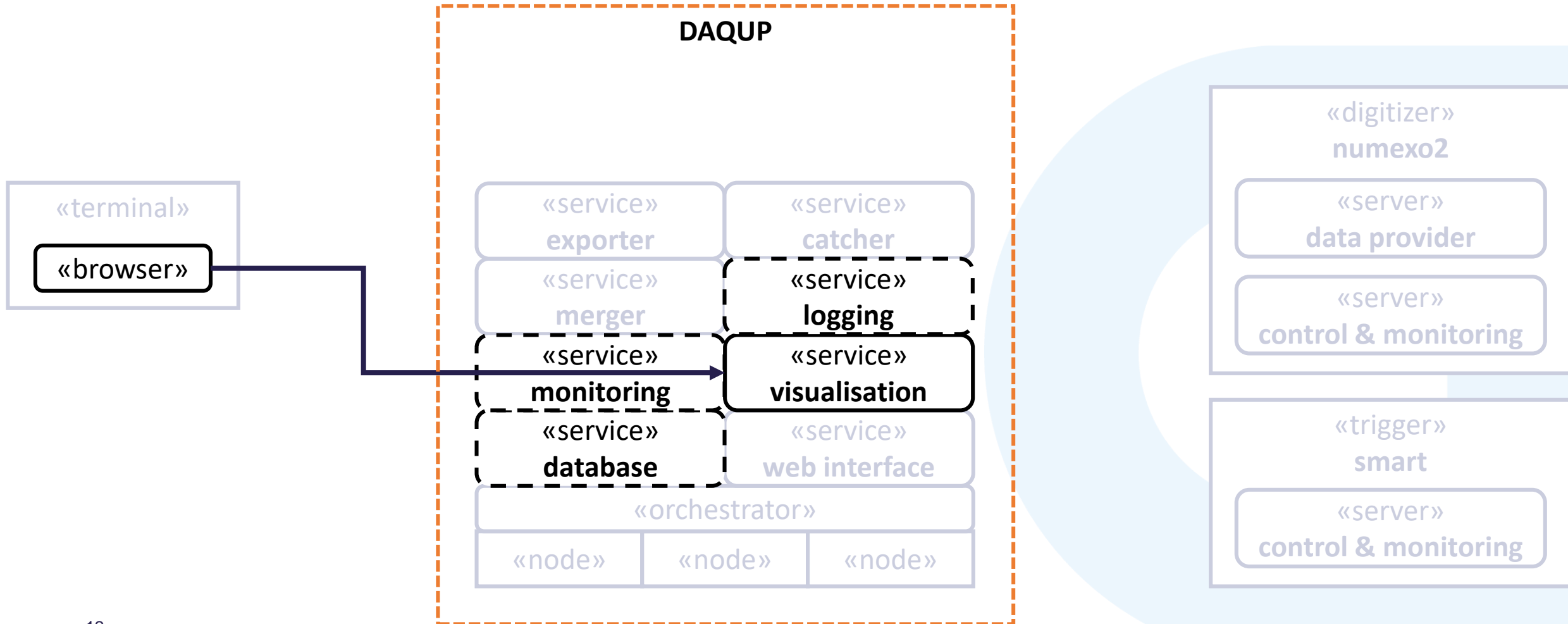
Architecture

Control the processing topology from a web service



Architecture

Visualise data



Tools & Techs

- **HTTP**

- Many libraries already exist in many languages and for various environments.
- Many testing libraries already exist.
- It can be used to implement Application Programming Interfaces.
- It can also be used to implement graphical web services.
- It can be extended with
 - authentication mechanisms
 - encryption mechanisms
 - routing capabilities

- **ØMQ**

- Low overhead
- Provide automated connection and re-connection mechanisms.
- Far easier to implement than low level POSIX socket.

- **Container Management Tools**



- **The new system makes use of existing applications**

Requirements

How are they solved by the new architecture ?

- **Availability**

- The system is designed around bullet-proof tools and technologies.
- Containers benefits from restart mechanisms.
- **ØMQ** provides re-connection mechanisms.

- **Ease of use**

- Users are required to have access to a web browser, nothing more.

- **Monitoring**

- The system uses existing logging and monitoring applications.

- **Extendability**

- The micro-services architecture allows for the addition of new services.

- **Flexibility**

- The micro-services architecture allows services to be changed, added or removed.

- **Performance**

- Container orchestration enables the abstraction of physical resources behind a cluster of nodes.

- **Reproducibility**

- The configuration for a given experiment can be deployed from a collection of definition files.

- **Exportability**

- The environment is required to provide the container management tools used by the system.

In Conclusion

- **This proposal is a draft**
 - It is subject to change.
 - Feedbacks from our partners have yet to enrich it (GTA/G2I/IJCLab).
- **We aim at a smooth and gradual transition towards a modern infrastructure**
 - Any kind of change will happen gradually.
 - Anticipating (retro-)compatibility concerns.
- **We wish to make this project a joint effort**
 - Across the IN2P3, teams and individuals hold collective knowledge that can significantly contribute to this project.
- **A prototype with limited functionalities can be expected for next year**
 - The first major release is planned within the following 3 years.

- **Contact**

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GANiL

Thank you for your attention