Online Data Processing System for the BM@N experiment

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2022

Targets and goals

The purpose of online data processing system is selective data processing (digitization of events and fast reconstruction) and monitoring of the data of the ongoing experiment.

The system must have **high performance**, since the volume of data is large enough and the processes of digitization and reconstruction take a long time.

Choice of architecture

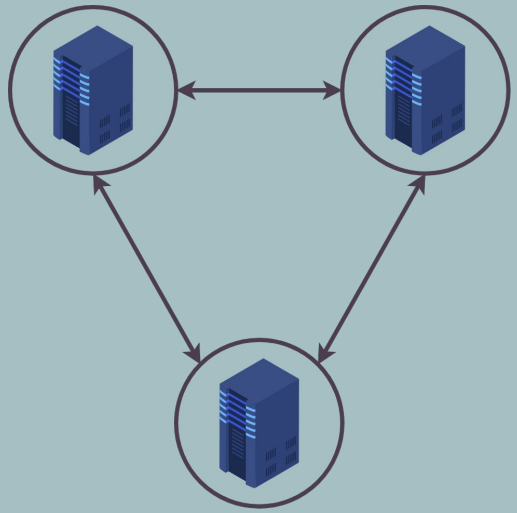
The most popular and efficient architecture for such systems is the **distributed architecture**.

Advantages:

+ scalability,
+ fault tolerance,
+ parallel computing.

Disadvantages:

− complex deployment process,
− maintenance and
− operation.



Choice of solutions for implementation

Message exchange

FairMQ* is a messaging library focused on building modular systems for data processing in high energy physics experiments.

It represents an abstraction over various messaging technologies such as ZeroMQ, Nanomsg, etc.

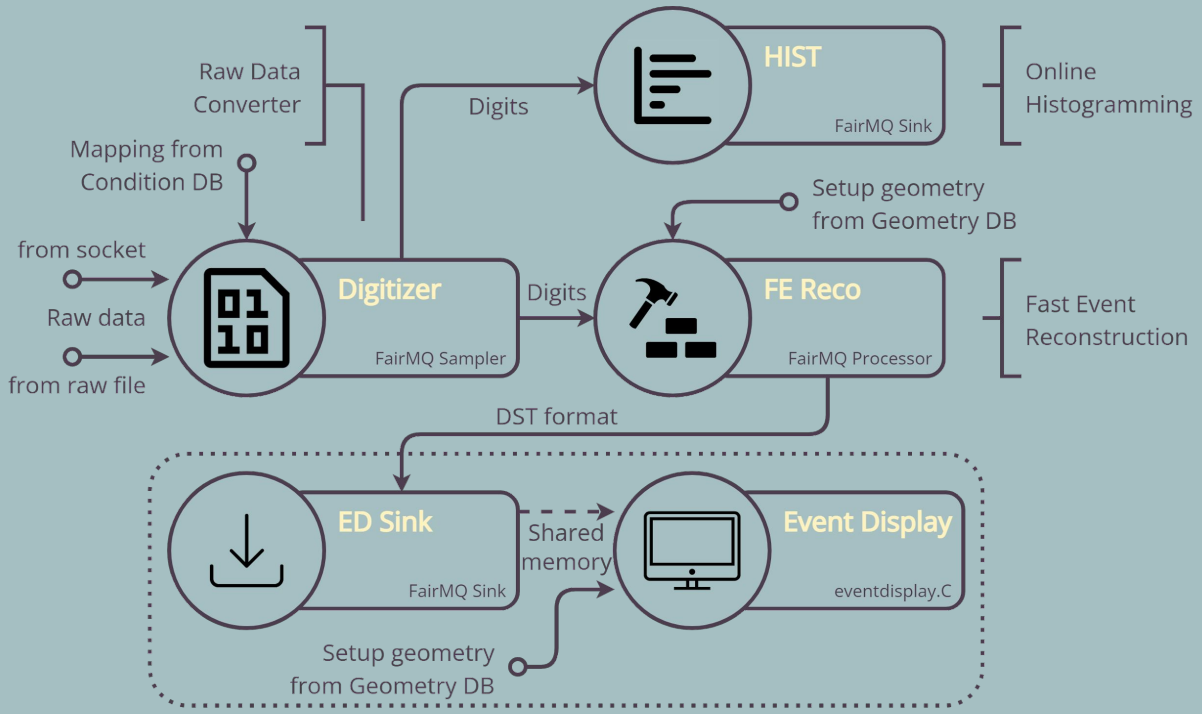
Deployment

DDS* (Dynamic Deployment System) is a set of tools that facilitates the process of system deployment.

As a Remote Manipulator System (RMS), it initially provides SSH or SLURM, but also allows you to use other methods.

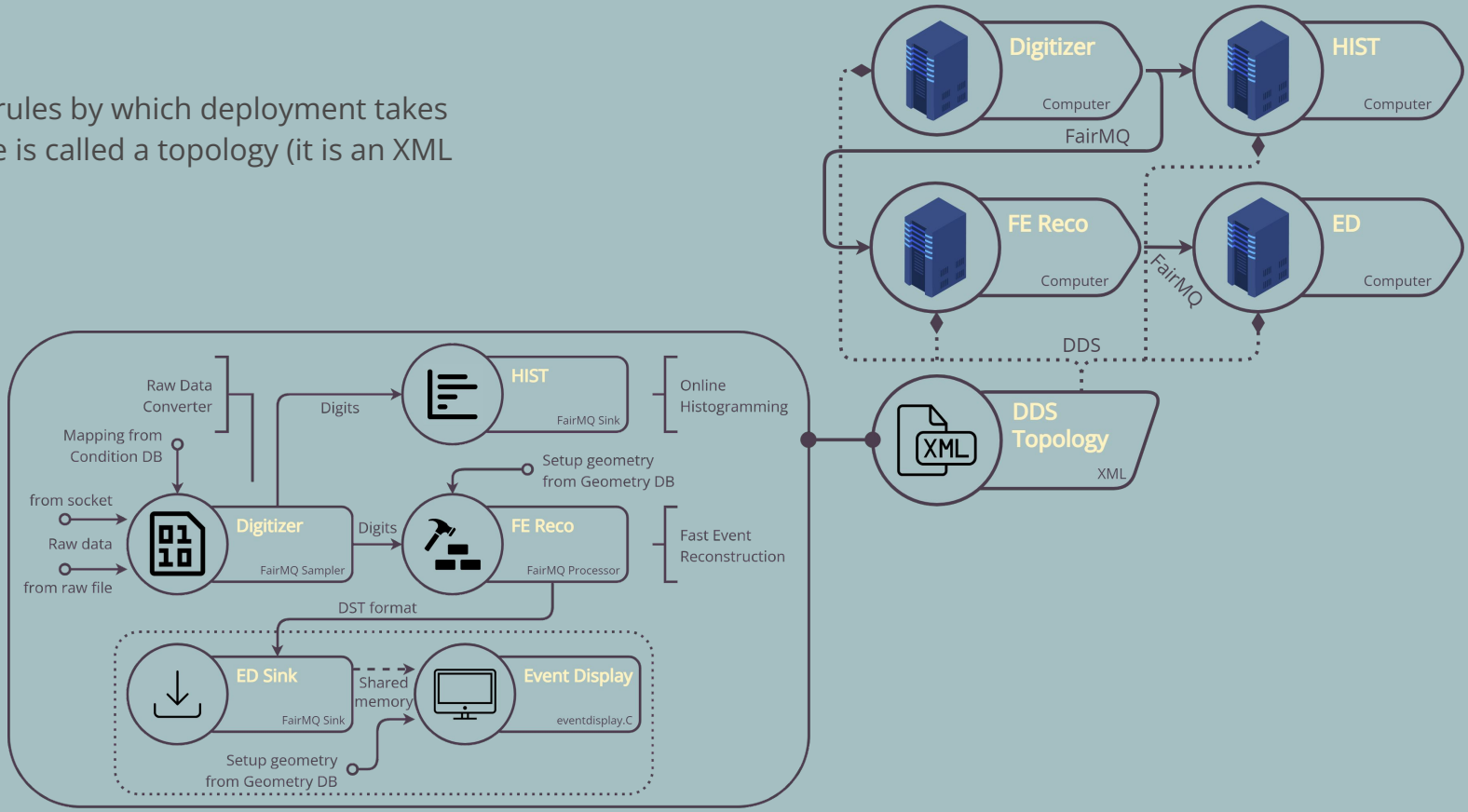
* Developed by the FAIR collaboration at the GSI Institute, Germany.

Diagram online data processing system

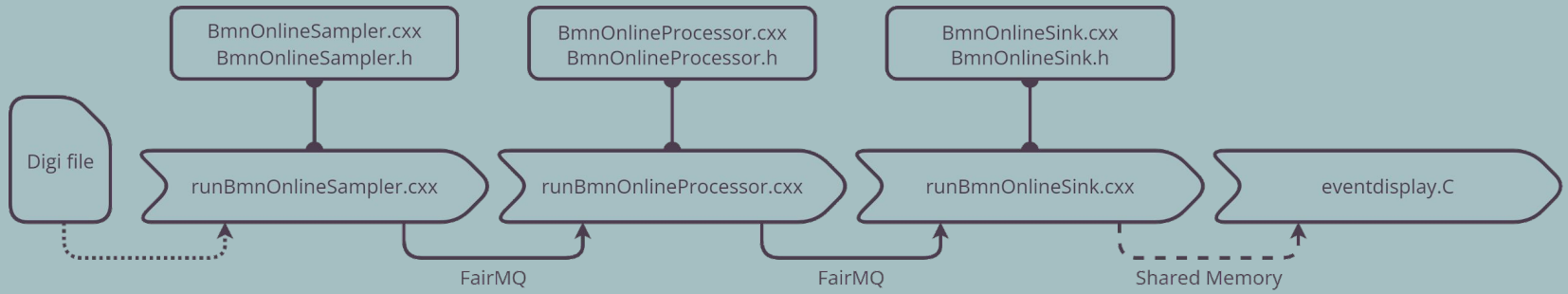


System deployment diagram

The rules by which deployment takes place is called a topology (it is an XML file).



Implemented solution



Future plans

- Develop a digitizer;
- Add the ability to transfer raw data to the digitizer via sockets;
- Create a convenient and simple tool for system deployment;
- Check the operation of the system on a real experiment 8 run.

Conclusion

- The architecture was developed and implementation tools (FairMQ, DDS) were selected.
- The following modules of the online data processing system were developed: Fast Event Reconstruction, Event Display Sink.
- Added system integration with Event Display through data transfer via Shared Memory.

Thank you for your attention!