

FairRoot, FairMQ and DDS



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Software for High-throughput Distributed Data Analysis

- Common system for simulation, reconstruction, and analysis
- Configuration tools

- A data-flow based model
- Unified access to configuration parameters and databases

Management and monitoring tools



Analysis Physics analysis of the reconstructed data leads to new discoveries

• Generic data transport layer





Reconstruction

Data analysis includes clusters and hits finding, tracks finding and fitting, Cherenkov ring reconstruction, particle identification



Detector Simulation

FairRoot provides tools to perform detector and physics simulations, using Geant3 or **Geant4 particle transport** through VMC engine

AliceO2 **R3BRoot PandaRoot** CbmRoot http://alice-o2.web.cern.ch/ https://www.cbm.gsi.de https://panda.gsi.de/ https://www.r3broot.gsi.de

Dataflow-driven Architecture

User code is organized into task topologies defined by their data inputs and outputs. The framework takes care of inter-task communication, File I/O, and task execution.



Unified **Online/Offline**

Whether you run on a laptop, a batch farm or a online farm, the same framework building blocks are used.

Switching Network Storage 33 Storage 250 FLPs 1500 EPNs Detectors Storage Servers Network 500 GB/s 1.2 TB/s 90 GB/s Input: 250 ports 1500 x 60MB/s 8100 Read-out Output: 1500 ports Links

Dynamic **Deployment System**

Concurrency

Multi-process/-threaded architecture, where entities communicate via generalized high-performance message queue system (FairMQ).



This work is available at the ESCAPE OSSR - Open-source Scientific Software and Service Repository.

| Open-source Scientific Software 00 and Service Repository



ALICE EPN workflow example

Generic transport layer (ZeroMQ, RDMA, shared memory) through which multiple simultaneously running processes pass messages within a node and across node boundaries efficiently.

automates and significantly simplifies a deployment of user defined processes and their dependencies on any resource management system



