Workflow services for distributed processing BM@N data

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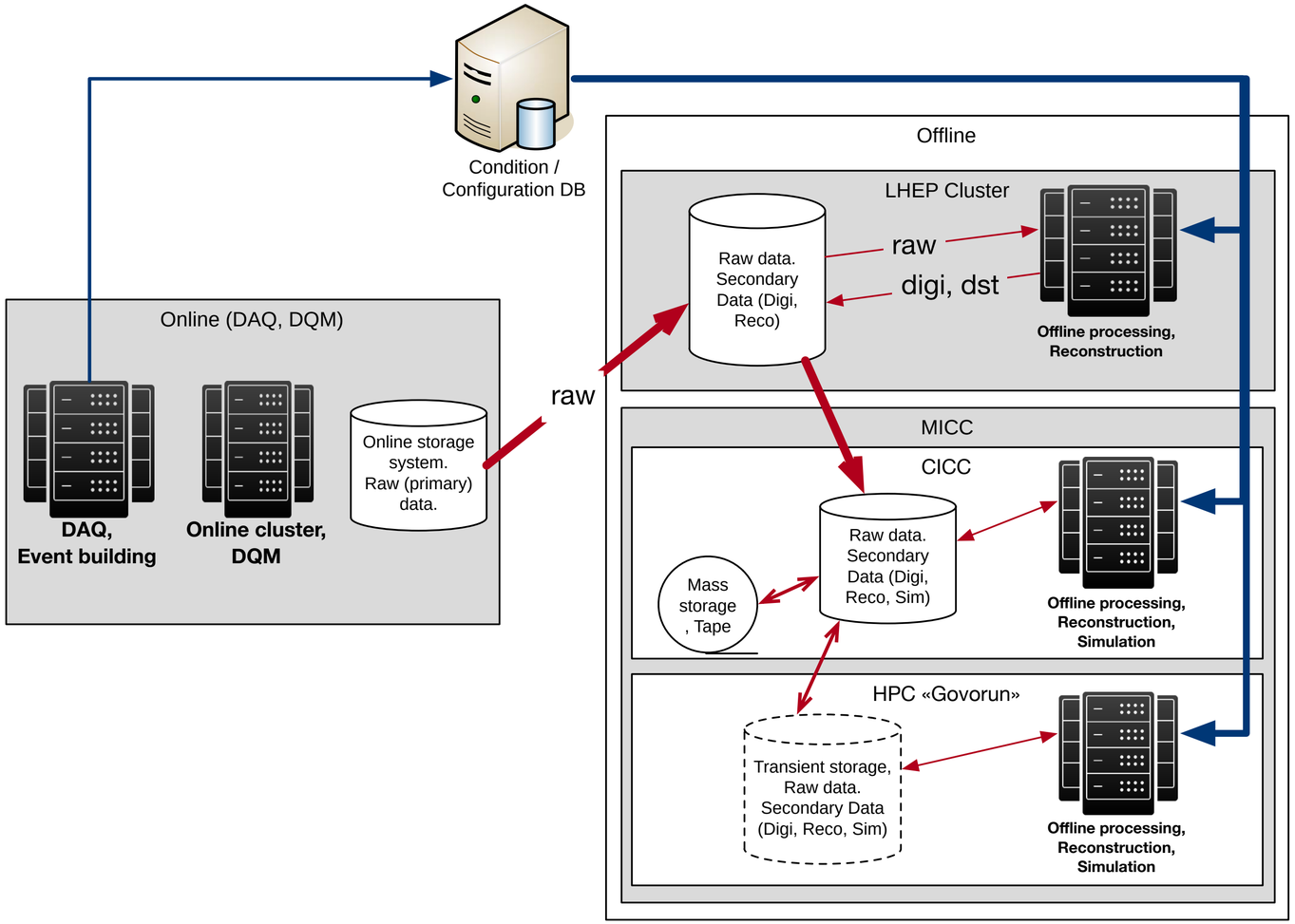
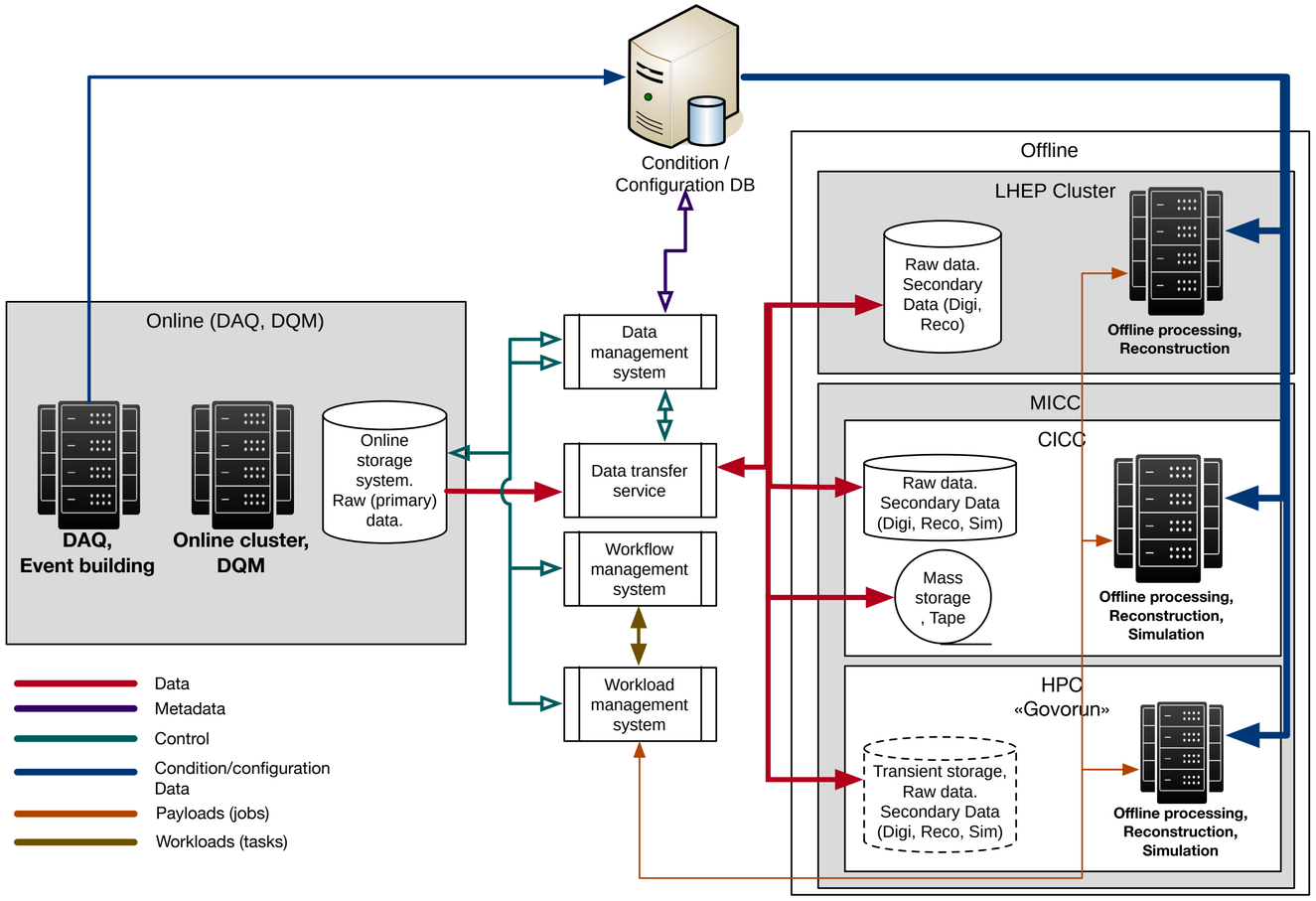
Why do we use the term ‘distributed processing’?

- Raw data is produced by DAQ of the detector and stored on the online storage system at LHEP site
  - Initial processing of data (DQM) started on “on-line” resources (dedicated cluster) at LHEP site
- Relevant raw data should migrate to permanent storage at DLNP site and to storages which close to computing facilities (both LHEP and DLNP sites)
- After processing, results should be stored for future analysis

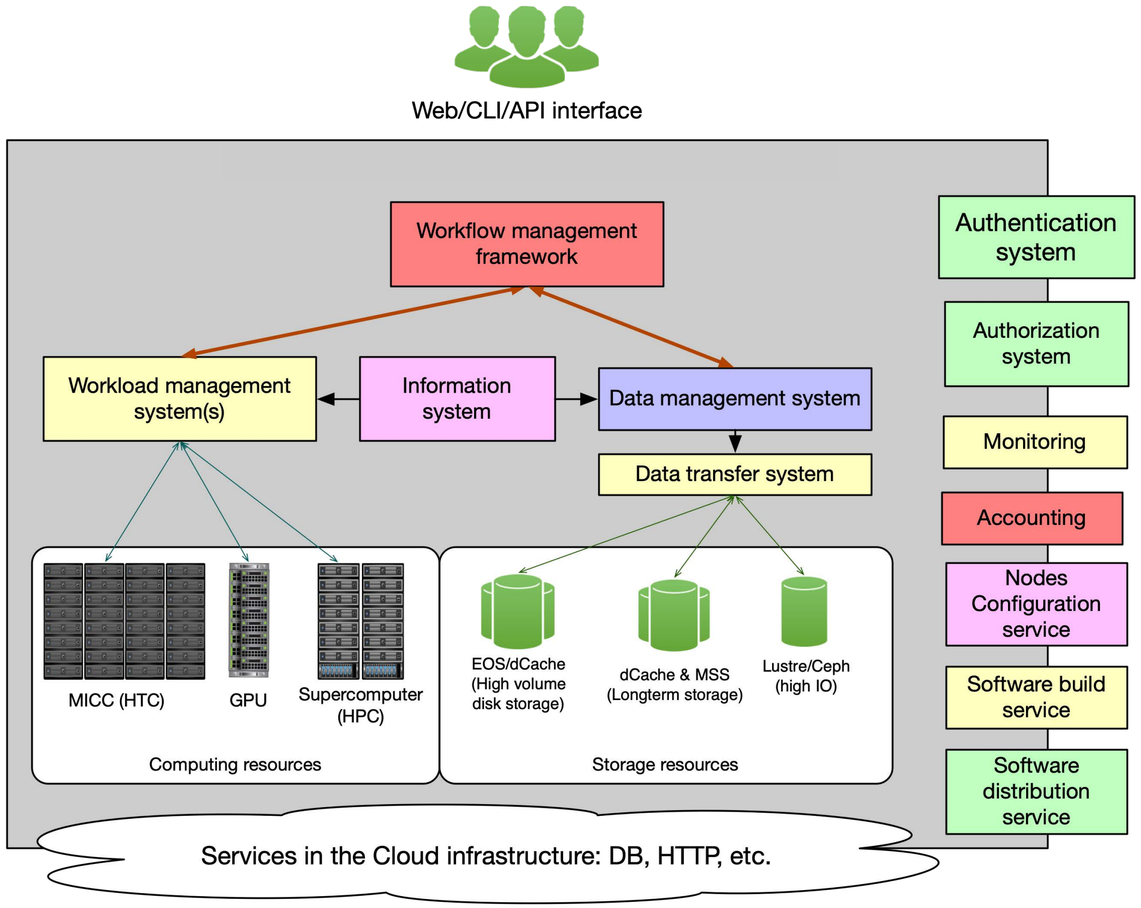


Automation of BM@N workflow

- Automation of the data processing means the sequence of transformations of source data to the data in the format which is used for final analysis
- Key components required for automation:
  - **Workflow management system** - controls the process of processing of data on each step of processing. Produces chains of tasks to process the certain amount of data, provides tasks management.
  - **Workload management system** - processes tasks execution by the splitting of the task to the individual jobs, where each job processes a small amount of data. Manages the distribution of jobs across the set of computing resources. Takes care about generation of a proper number of jobs till task is complete.
  - **Data management system** - responsible for distribution of all data across computing facilities and for data management (storing, replicating, deleting etc.)
  - **Data transfer service:** takes care about major data transfers. Allows asynchronous bulk data transfers.

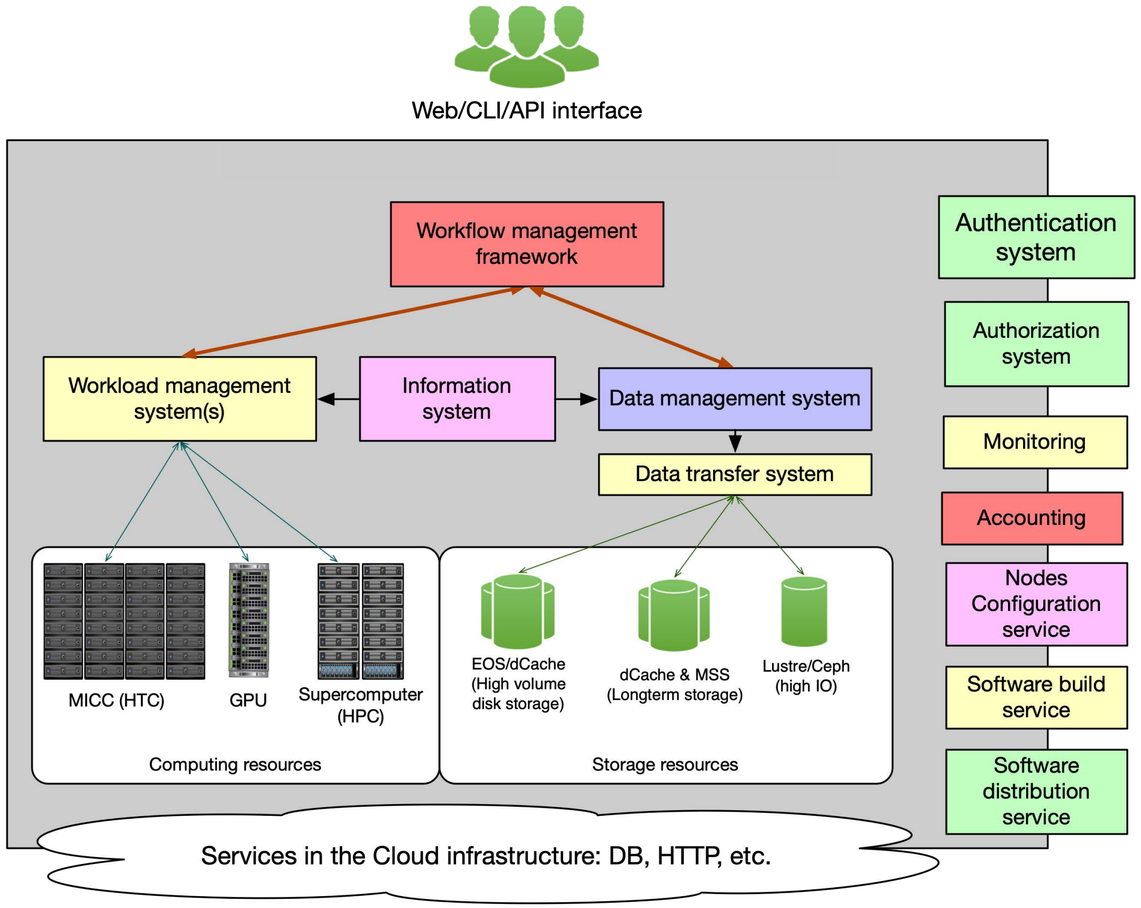


Services of the distributed computing infrastructure: ready



- Authentication system: Kerberos based, with SSO support for Web applications
- Authorization system: VOMS
- Software distribution service: CVMFS

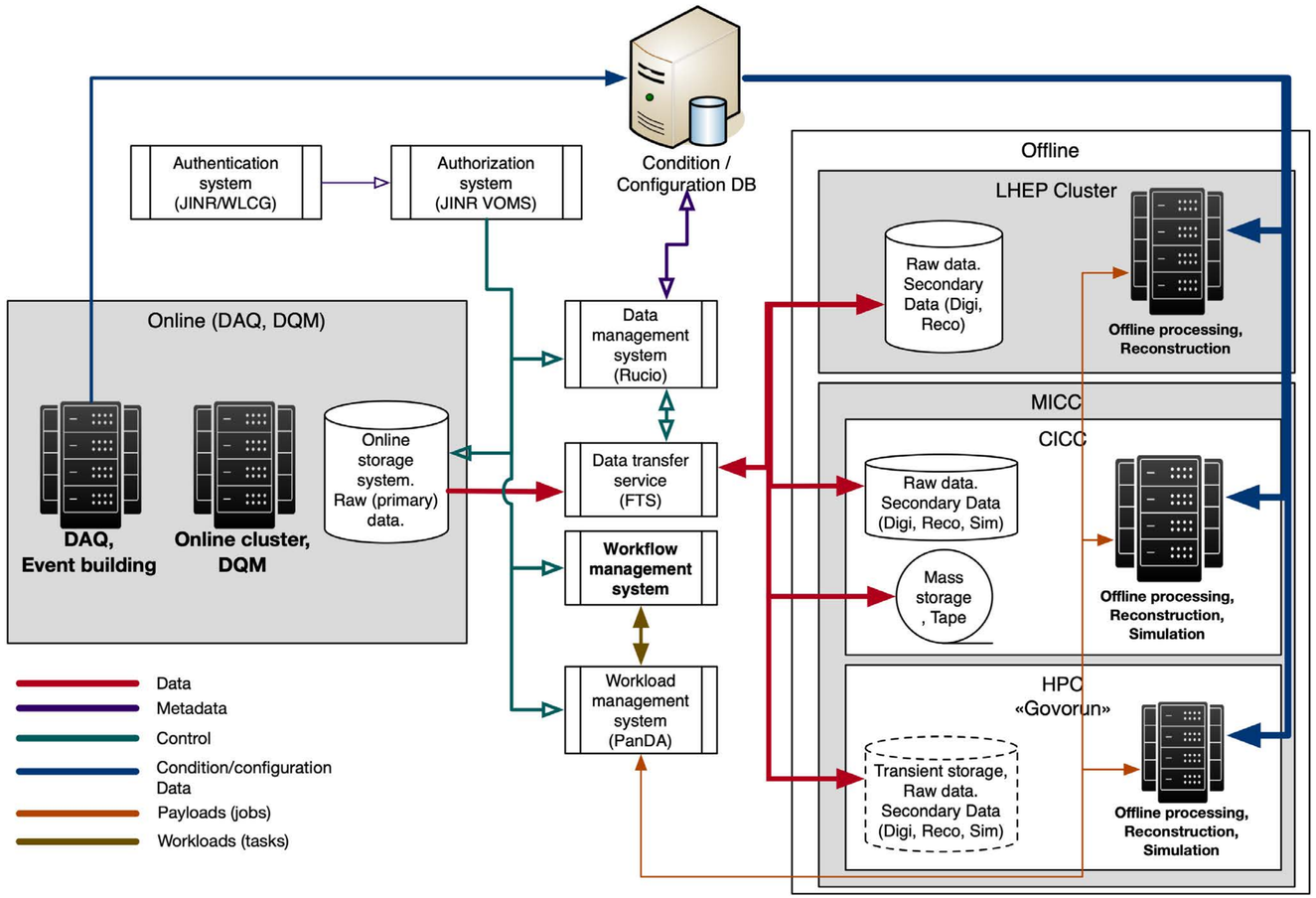
Services of the distributed computing infrastructure: in progress



- We already have some infrastructure monitoring which covers LIT computing resources
- FTS instance was deployed
- An instance of Rucio, a distributed data management system, was deployed
- An instance of workload management system was deployed
- An instance of Apache Airflow as a framework for workflow management system already deployed

BM@N distributed computing infrastructure with services

- Workflow management system is a key component that manages the rest of the distributed infrastructure services
- All deployed components are redundant for the expected load in order to guarantee reliability and scalability of the infrastructure during operation



Current activity

- Workflow
  - Workflows implementation in Airflow: digi, reco of the real data, MC gen and reco
- Workload
  - Airflow and PanDA integration
  - PanDA will be used to integrate computing resources and to build a central queue
- Data management
  - Definition of data structures, which will be crucial for future data processing and storage organisation and management
  - Rules for each data type are being prepared in Rucio to enable automatic data management on storages

Status and plans

- Status
  - Services for distributed processing are ready
  - Workflow and data flow chains are being described
- Next steps
  - Tests on the real data via implemented workflow chains using prepared infrastructure

Thanks!