



Contribution ID: 358

Type: **Poster presentation**

MICE Data Handling on the Grid

Monday, 14 October 2013 15:00 (45 minutes)

The international Muon Ionisation Cooling Experiment (MICE) is designed to demonstrate the principle of muon ionisation cooling for the first time, for application to a future Neutrino Factory or Muon Collider. The experiment is currently under construction at the ISIS synchrotron at the Rutherford-Appleton Laboratory, UK.

The configuration/condition of the experiment during each run is stored in a Postgres-based “Configuration Database”, that has a read-only replica with a publicly-accessible web-services interface. Meanwhile the raw data from the DAQ (based on the DATE framework from ALICE) is written to a storage system close to the Control Room as a series of tarballs, one per run, each containing checksum information about the contents.

There are two main data handling projects for the MICE experiment which involve data distribution on the Grid:

- The RAW Data Mover
- Off-line and batch data reconstruction

The aim of the Data Mover is to upload RAW data files onto a safe tape storage as soon as the data have been written out by the DAQ system and marked as ready to be uploaded. The Data Mover actively watches the directories where new RAW files are to appear and copies them to an intermediate disk storage. This step is useful mainly to avoid bottlenecks in access to the DAQ disk, to which the DAQ has write priority.

After the initial copy is made and internal file integrity is verified, each file is uploaded to RAL Tier1 Castor Storage Element (SE) and placed on 2 tapes for redundancy. We also make another copy at a separate disk-based SE at this stage to make it easier for users to access data quickly. Both copies are check-summed and the replicas are registered with an instance of LCG File Catalog (LFC). On success a record with basic file properties is added to the Mice Metadata DB.

MICE standard reconstruction software (MAUS) has been installed on the Grid. The reconstruction process is triggered by new RAW data records filled in the Mice Metadata DB by the mover system described above. Off line reconstruction jobs for new RAW files are submitted to RAL Tier1 and the output is stored on a Castor disk. We are currently working on distributed submissions to MICE enabled Tier 2 sites. This is mainly aimed for data reprocessing when a new version of MAUS becomes available. In this case output files will be shipped back to RAL using File Transfer Service (FTS) based system.

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Session Classification: Poster presentations

Track Classification: Distributed Processing and Data Handling A: Infrastructure, Sites, and Virtualization