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Data Management and Database Framework for the MICE Experiment

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The international Muon Ionization Cooling Experiment (MICE) currently operating at the Rutherford Appleton Laboratory in the UK, is designed to demonstrate the principle of muon ionization cooling for application to a future Neutrino Factory or Muon Collider. We present the status of the framework for the movement and curation of both raw and reconstructed data. We also review the implementation of a robust database system that has been designed for MICE.

A raw data-mover has been designed to safely upload data files onto permanent tape storage as soon as they have been written out. The process has been automated, and checks have been built in to ensure the integrity of data at every stage of the transfer. The data processing framework has been recently redesigned in order to provide fast turnaround of reconstructed data for analysis. The automated reconstruction is performed on a dedicated machine in the MICE control room and any reprocessing is done at Tier-2 GRID sites. In conjunction with this redesign, a new reconstructed-data-mover has been designed and implemented.

The processing of data, whether raw or Monte Carlo, requires accurate knowledge of the experimental conditions. MICE has several complex elements ranging from beamline magnets to particle identification detectors to superconducting magnets. A Configuration Database which contains information about the experimental conditions (magnet currents, absorber material, detector calibrations, etc.) at any given time has been developed to ensure accurate and reproducible simulation and reconstruction. A fully replicated, hot-standby database system has been implemented with a firewall-protected read-write master running in the control room, and a read-only slave running at a different location. The actual database is hidden from end users by a Web Service layer which provides platform and programming language-independent access to the data.

Tertiary Keyword (Optional)

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Data processing workflows and frameworks/pipelines

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