Overview of Database Framework for GEM Detector at CERN

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In this paper, we give an overview of the database framework which we have developed for the Gas Electron Multiplier (GEM) Detector at CERN. The GEM constitutes a powerful addition to the family of fast radiation detectors; originally developed for particle physics experiments, and has spawned a large number of developments and applications. The GEM database framework comprises four components. The first component is the database itself. There are two instances of the database which have been deployed. One is for the development purpose which has test data, and other one is for the production purpose which has real data. The database further comprises various schemas and each schema has different tables in it. We use separate schemas for various types of tables. The second component of the database framework is called DB Loader. The DB Loader is used to load data into database. This has been written in the java language. The data is prepared in the predefined format which is in the XML form. Then the xml file is copied into a spool area of a server in which DB loader is running. Once the file is copied, the DB Loader loads the file into the database. The loader returns status codes after performing database insertion/updation operations. The status of the database operations is checked with the status code which is returned by the loader. The loader also accepts zip files and extract XML files from the zip file and loads them into database for batch data upload.

The third component of the database framework comprises graphical user interface (GUI). This is a web-based interface which can be accessed from the internet. This interface is used to generate XML files and send them to the DB Loader for data loading. This interface is basically used for the detector construction and to perform various quality control tests on the detector and its components. In the first stage, individual components of the detector are registered such as foils, electronic boards, readout boards, drift boards, VFATS, external frames, opto hybrids, cooling plate circuits, temperature sensors and radmon sensors etc. In the second stage, the chamber is constructed using these individual components. In the next step, super chamber is constructed using two chambers. The various quality control (QC) tests are performed on individual components, chambers and super chambers. The GUI is used to load the data for various QC tests. Currently, the GUI has the data loading facility from QC1 to QC8. The last component of the database framework is called online monitoring system (OMS). The OMS is data visualization framework for the various detectors of the CMS experiment at CERN. It is also used to display data for the GEM. It enables users to view and retrieve database contents without having to learn database specifics.

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