Data Bookkeeping Service 3
A new event data catalog for CMS

• The Data Bookkeeping Service (DBS) provides an event data catalog for the Compact Muon Solenoid (CMS) Experiment at the Large Hadron Collider (LHC).
• It contains necessary information used for tracking datasets, their data-processing history, associations between runs, files and datasets on a large scale of about 10^5 datasets and more than 10^7 files.
• DBS is an essential part of CMS, all data-processing like Monte Carlo production, processing of recorded data and physics analysis done by users relies on the information stored in DBS.
• DBS 3 development was driven by:
  • lessons learned from its predecessor DBS 2
  • the ongoing revision of the data management and workload management (DMWM) software.
• Thus the main foci of the development were:
  • the adaptation of the database schema to better match the evolving CMS data-processing model
  • the achievement of a better scalability
  • better integration into the DMWM software.

DBS 3 - A RESTful Web service
• DBS 3 has been completely re-designed and re-implemented in Python using CherryPy.
• Improved scalability is achieved by its RESTful (Representational State Transfer) design:
  • using lightweight APIs (Amdahl’s law scaling limits)
  • a stateless client-server communication.
• API is chosen by the path in the URI, whereas the operation is chosen by the HTTP method.
• GET, POST and PUT operations are supported. The deletion of data inside the catalog is not provided to ensure perpetual traceability.
• JavaScript Object Notation (JSON) data format is used for interchanging information with its clients.
• Oracle Database backend provided for CMS is utilised as persistent storage (improved schema).

All these tools are commonly used within CMS computing, therefore DBS 3 is well integrated in new DMWM architecture and one can profit from synergistic effects.

Testing using LifeCycleAgent
• LifeCycleAgent was originally developed by the PhEDEx team to drive a realistic simulation of the CMS data transfer system (PhEDEx).
• It turned out to be extremely useful for other DMWM projects as well.
• LifeCycleAgent is used to stress test DBS 3. Currently only a read-only analysis workflow has been implemented.
• In cooperation with the developers of the Data Aggregation System (DAS) and PhEDEx, integration test are currently in development.

Simulated Analysis Workflow:
• Initial request creates a task for each dataset.
• Tasks get processed in parallel using N threads.

LifeCycle Agent Setup:
• Starting using one node setup.
• Extendable using a batch system.
• Realistic simulation possible using NxM virtual clients.
• Well suited for doing stress/performance tests of DBS 3.

References:
3. Tony Wilde. "From toolkit to framework - the past and future evolution of PhEDEx", CHEP 2012, Poster id. 188.