

Data Bookkeeping Service 3

A new event data catalog for CMS



Data Bookkeeping Service 3

- The Data Bookkeeping Service⁽¹⁾ (DBS) provides an event data catalog for the Compact Muon Solenoid (CMS) Experiment at the Large Hadron Collider
- 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

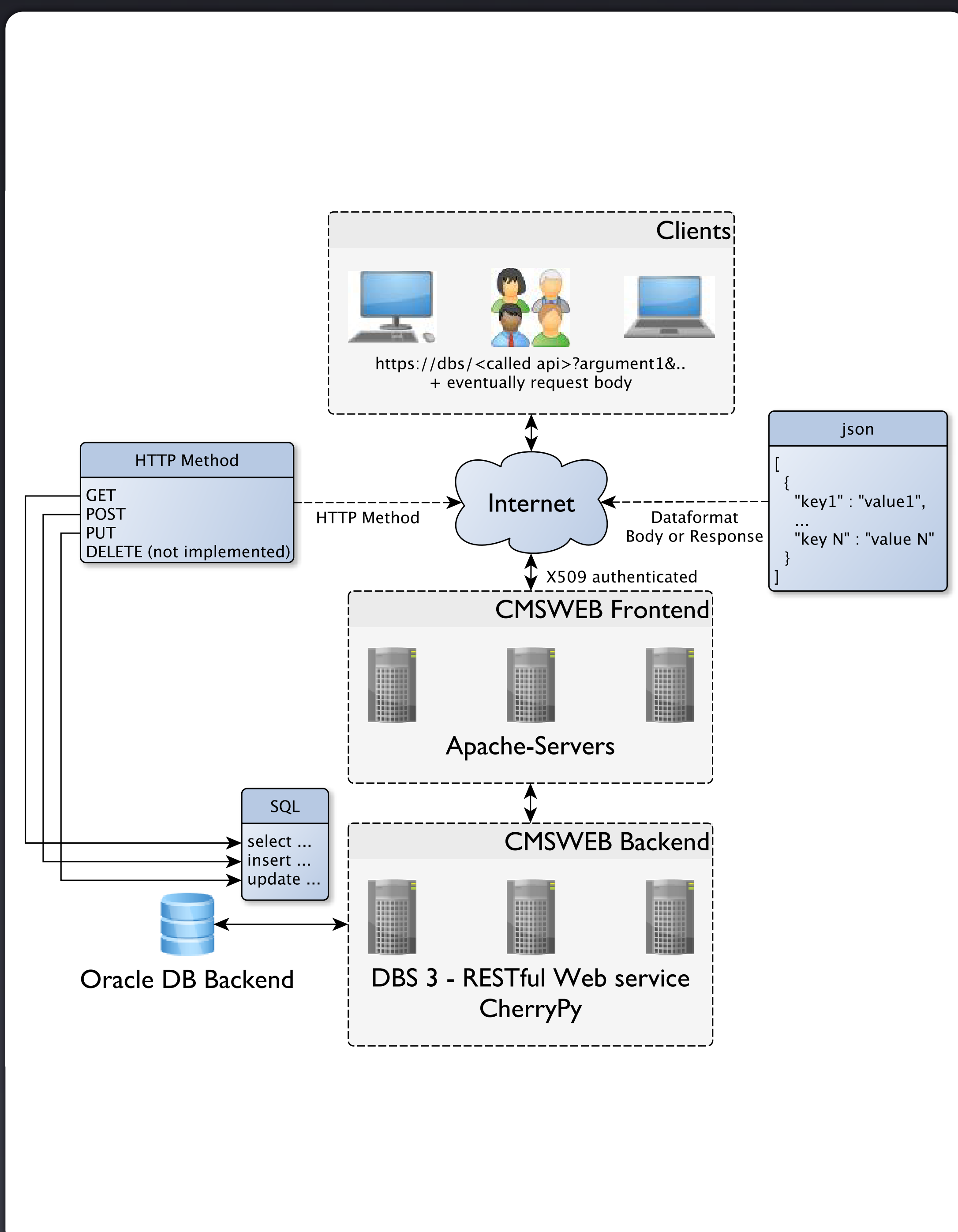
DBS3 Deployment and Packaging

- Deployment on CMS core system for web services (CMSWEB), which is developed, managed and operated centrally by the HTTP-Group
- Deployment and management scripts based on a common infrastructure and validated by the HTTP-Group ensuring a reliable deployment and operation of DBS 3 on their systems
- Packaging is done using common tools provided by the DMWM group for a semi-automated rpm building
- DBS 3 is following the monthly release cycle of CMSWEB to introduce new features
- Intensive testing using sophisticated test suites and procedures in a production like environment are ensuring a well-functioning system, before deployment on CMSWEB is requested

DBS 3 - A RESTful Web service

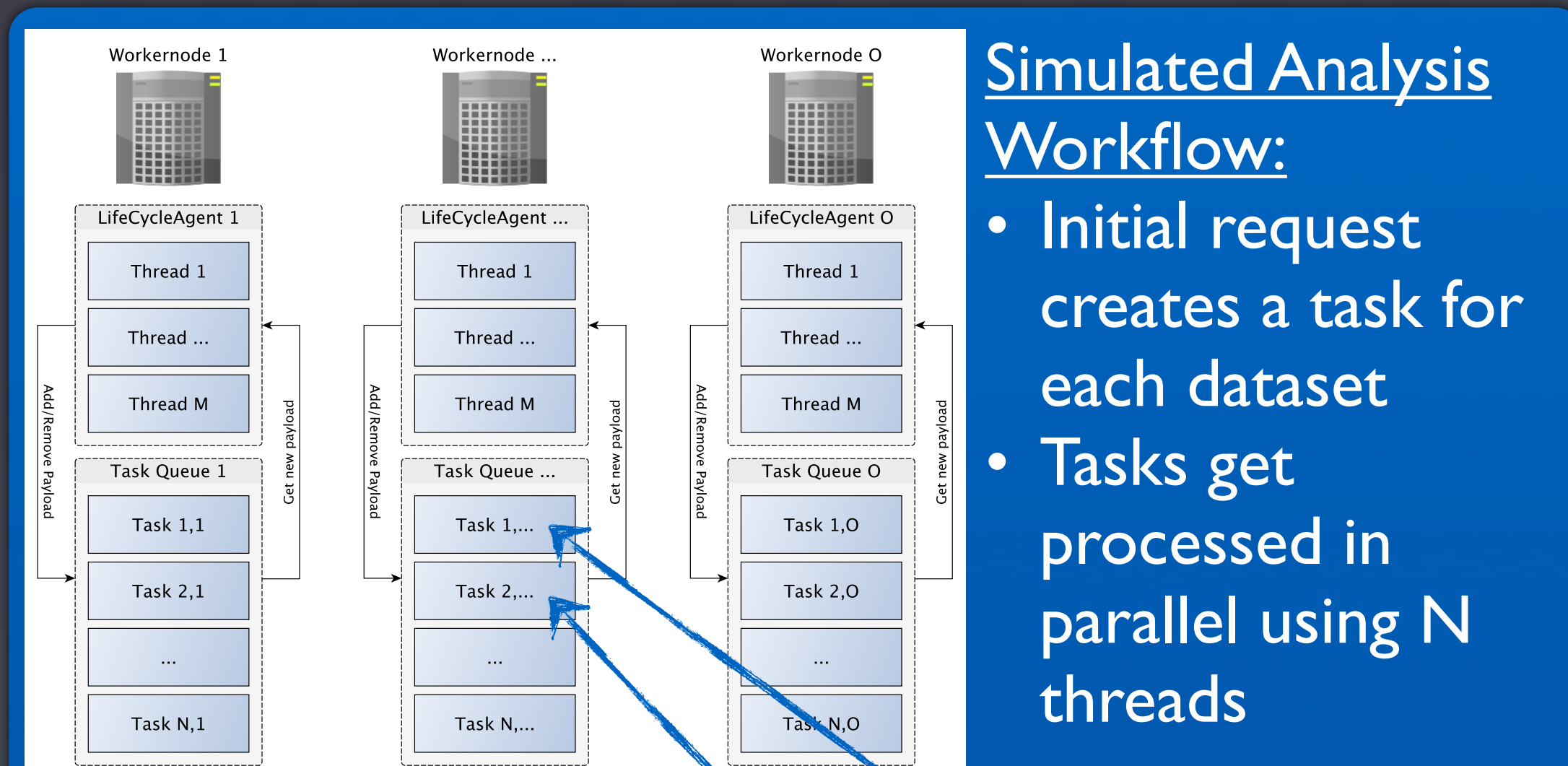
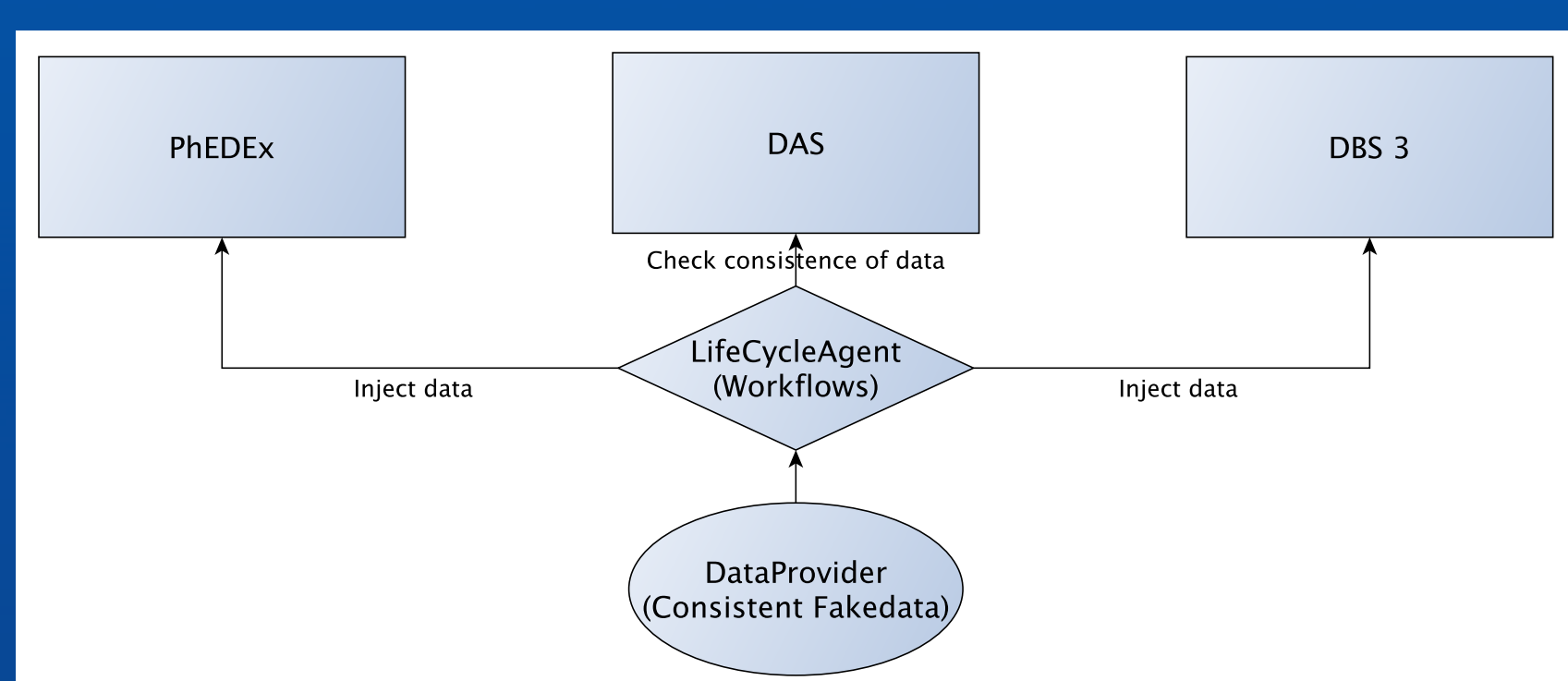
- DBS 3 has been completely re-designed and re-implemented in Python using CherryPy
- Improved scalability is achieved by its RESTful (Representational State Transfer) design
 - using lightweight APIs (Amdahl's law scaling limits)
 - a stateless client-server communication
- API is chosen by the path 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
- Java Script Object Notation (JSON) data-format is used for interchanging information with its clients
- Oracle Database backend provided for CMS⁽²⁾ 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⁽³⁾ 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

LifeCycleAgent 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

