Web, Monitoring and Accounting in DIRAC

Zoltan Mathe

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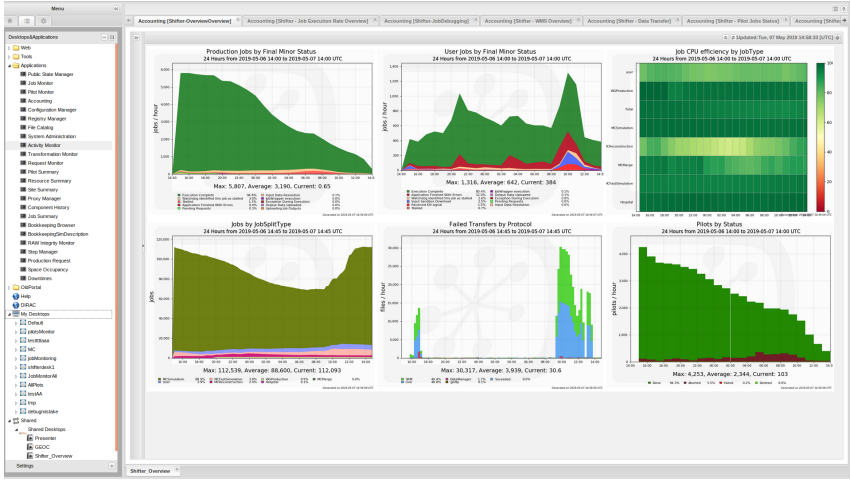
3. Summary

- It provides:
  - a secure (based on Grid certificates) web user interface, which hides the complexity of the DIRAC system.
  - the facility to develop, manage and test web applications.
- Design concepts:
  - User friendly
  - Fast and reliable
  - Customised web applications.
  - Browser independence; supported browsers:Firefox, Chrome, Safari, etc.
  - Limited access by anonymous user.
  - Application/desktop sharing.
- We distinguish between **application**, **desktop**,**state** and **theme**.

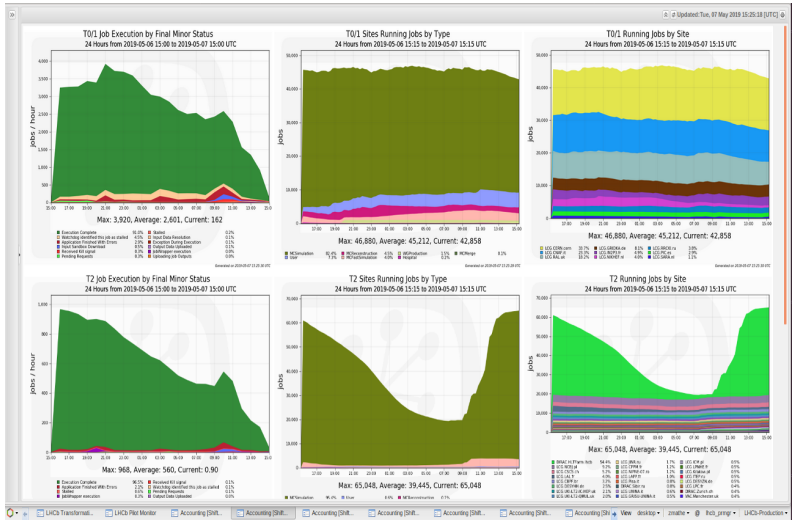
Themes

- Provides two graphical appearance

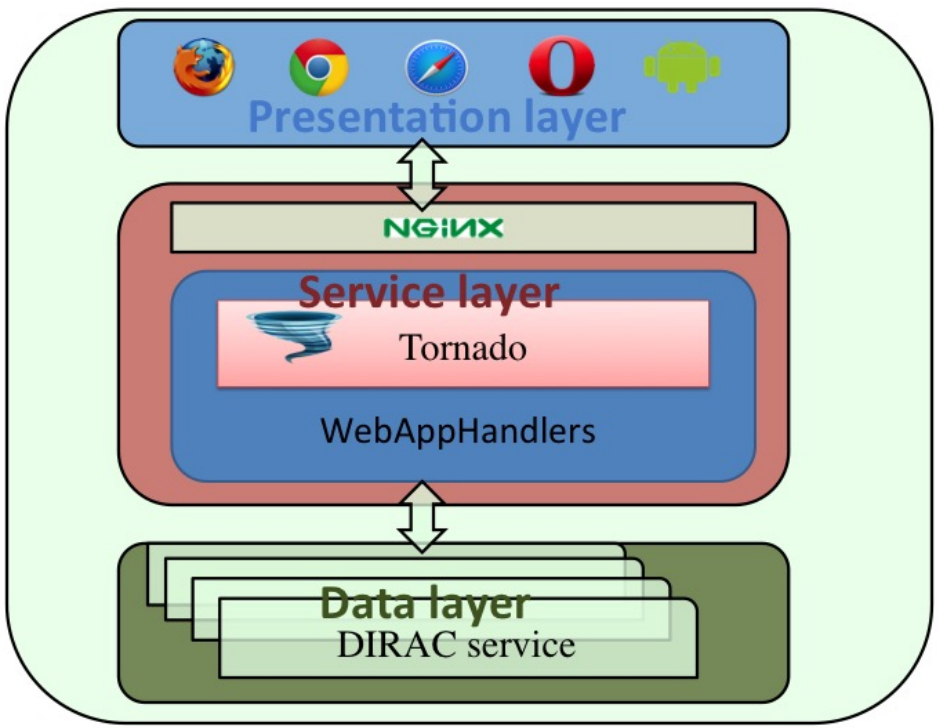
Tab theme



Desktop theme



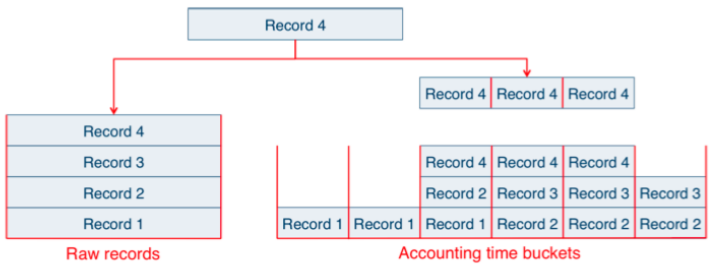
- Layered architecture
- Programming languages: javascript in client side and python in server side.



- Front-end:
  - ExtJS and Google Visualization API (only one application)
- Back-end:
  - Tornado non-blocking web server and web application framework, NGINX high-performance HTTP server.
  - openSSL for authentication, DIRAC CS for authorization. New type of authentication and authorization is being implemented (see Andrei presentation).

- will be used from DIRAC v6r22
- based on the latest Extjs 6
- JS compilation performs in the tar creation more info in this *link.*
  - dirac-distribution -r v6r22 -l DIRAC –extjspath=< *extjslibrarypath*
- using standard widgets
- almost all bugs and new requests are implemented
- How to migrate?
  - without Web extension will be transparent
  - with Web extension may require modification: method names are changed or new properties are introduced

- it is based on the DIRAC framework and designed for:
  - for collecting, storing and visualize time-binned averages and aggregates
  - records are stored in the AccountingDB, in "two" different formats:raw records, time buckets [1]



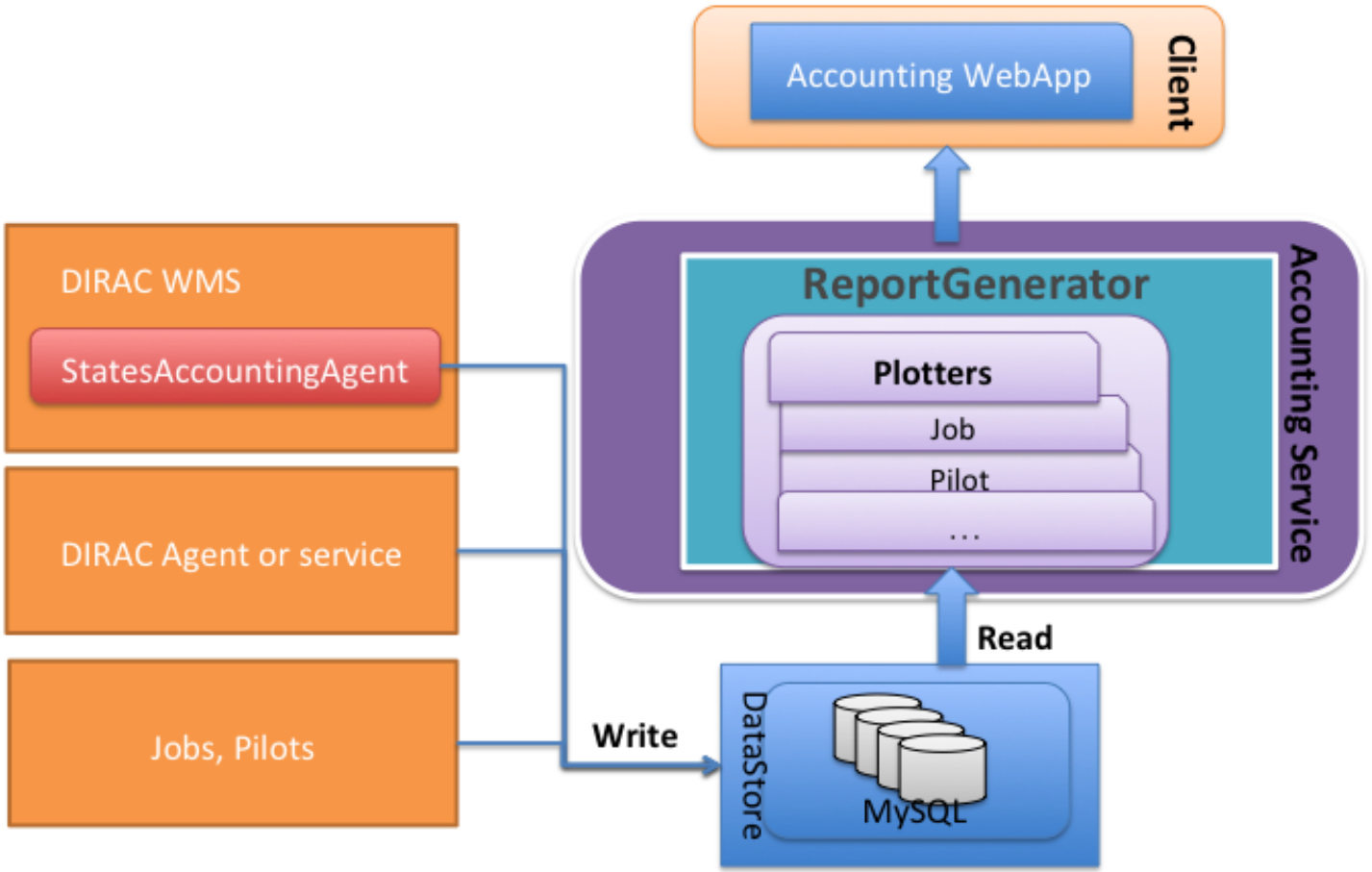
  - efficient for storing historical data, for real time monitoring is not recommended
  - the data can be accessible through the DIRAC web framework using the Accounting web application.

[1] figure taken: The LHCb Experience on the Grid from the DIRAC Accounting Data

Accounting types

- Pilot: for pilots jobs historical report for a given site, CE, etc.
- Job: for jobs historical report for a given site, etc.
- Data operation: data transfers, replication, etc.
- WMS History: for monitoring the DIRAC Workload Management System. It is "deprecated", replaced by WMS monitoring
- Network: for monitoring of network activities on the network layer

Overview of the system



Installation

- using dirac-admin-sysadmin-cli -H hostname, more details in [2]
  - install db AccountingDB;
  - install service Accounting DataStore;
  - install service Accounting ReportGenerator;
- for WMS history: install agent WorkloadManagement StateAccountingAgent
- DIRAC web framework[3] for visualize the data
- helper (DataStoreHelper) services can be installed (more details in the administrative guide) in case of high load

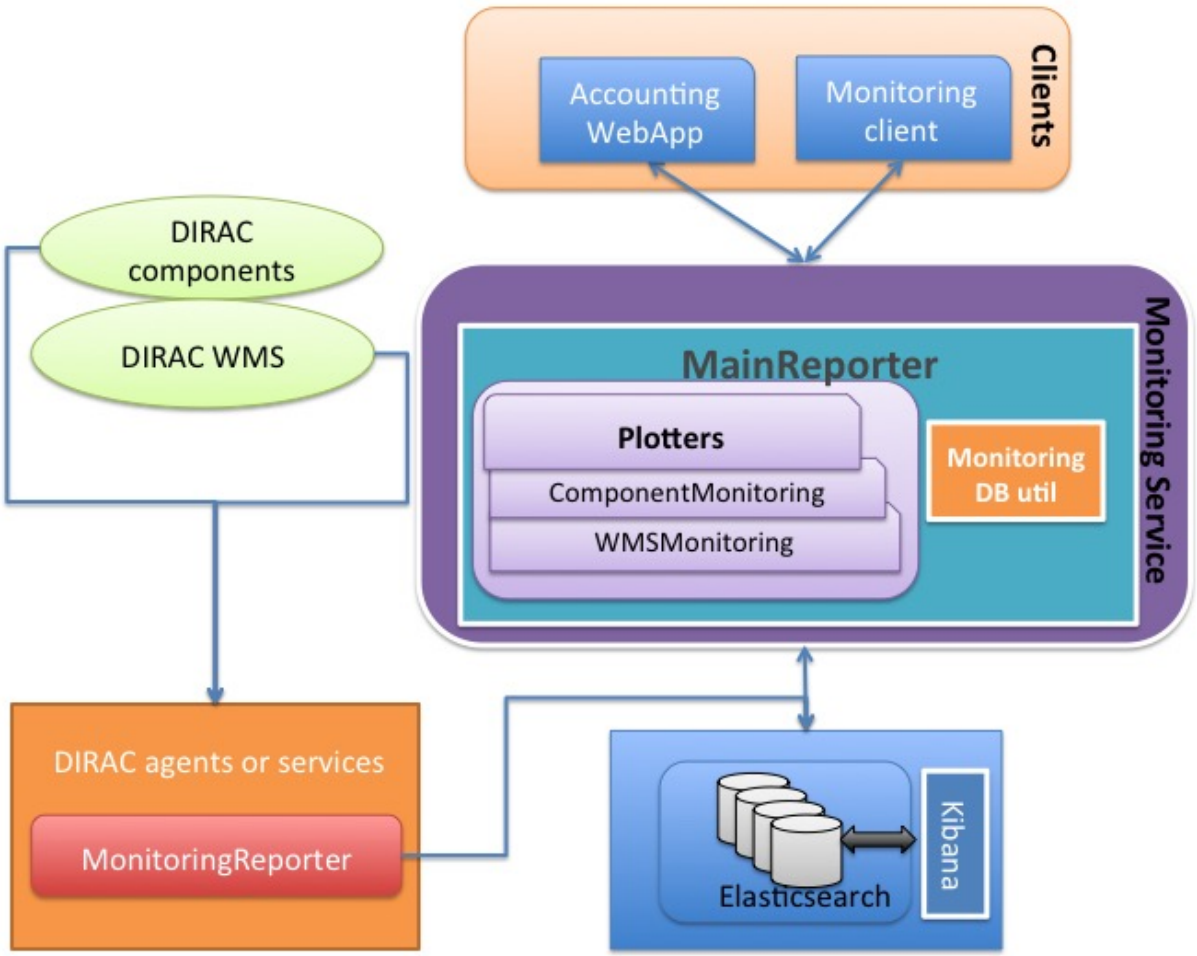
[2] `http://dirac.readthedocs.io/en/integration/AdministratorGuide/Systems/Accounting/index.html`

[3] Web `http://dirac.readthedocs.io/en/integration/AdministratorGuide/InstallingWebAppDIRAC/index.html`

Monitoring System

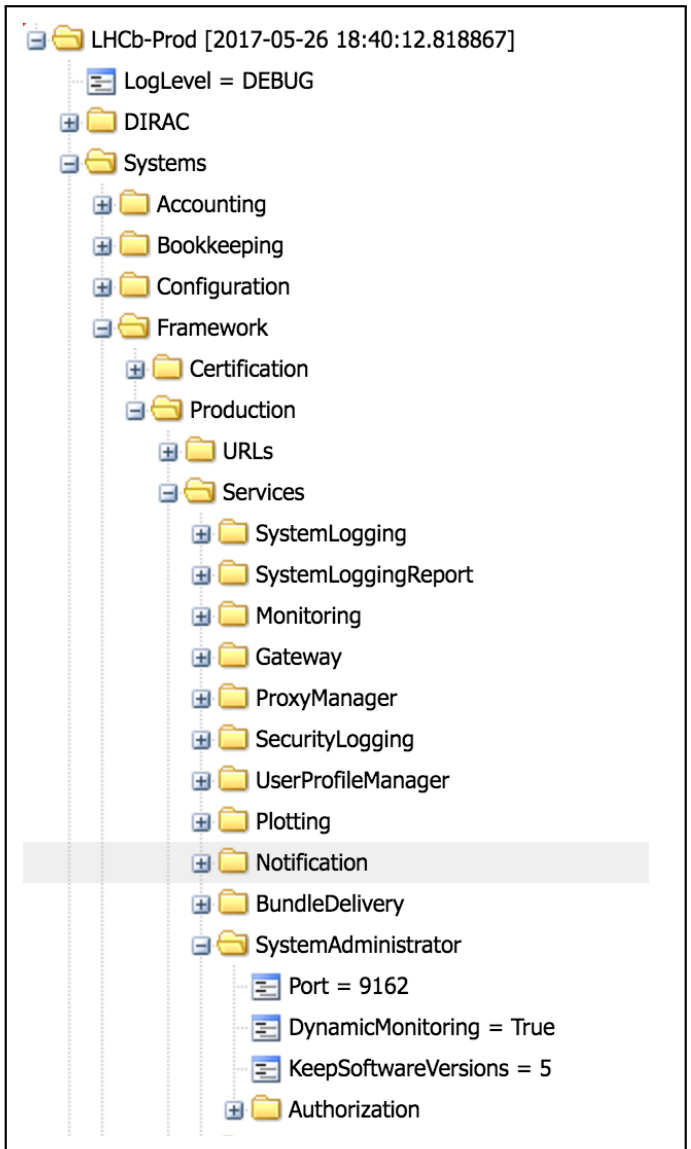
- It is based on DIRAC framework and designed for:
  - real time monitoring (WMS jobs, DIRAC components, etc.)
  - managing semi-structured data (JSON)
  - efficient data storage, data analysis and retrieval
  - provide high quality reports

Overview of the system

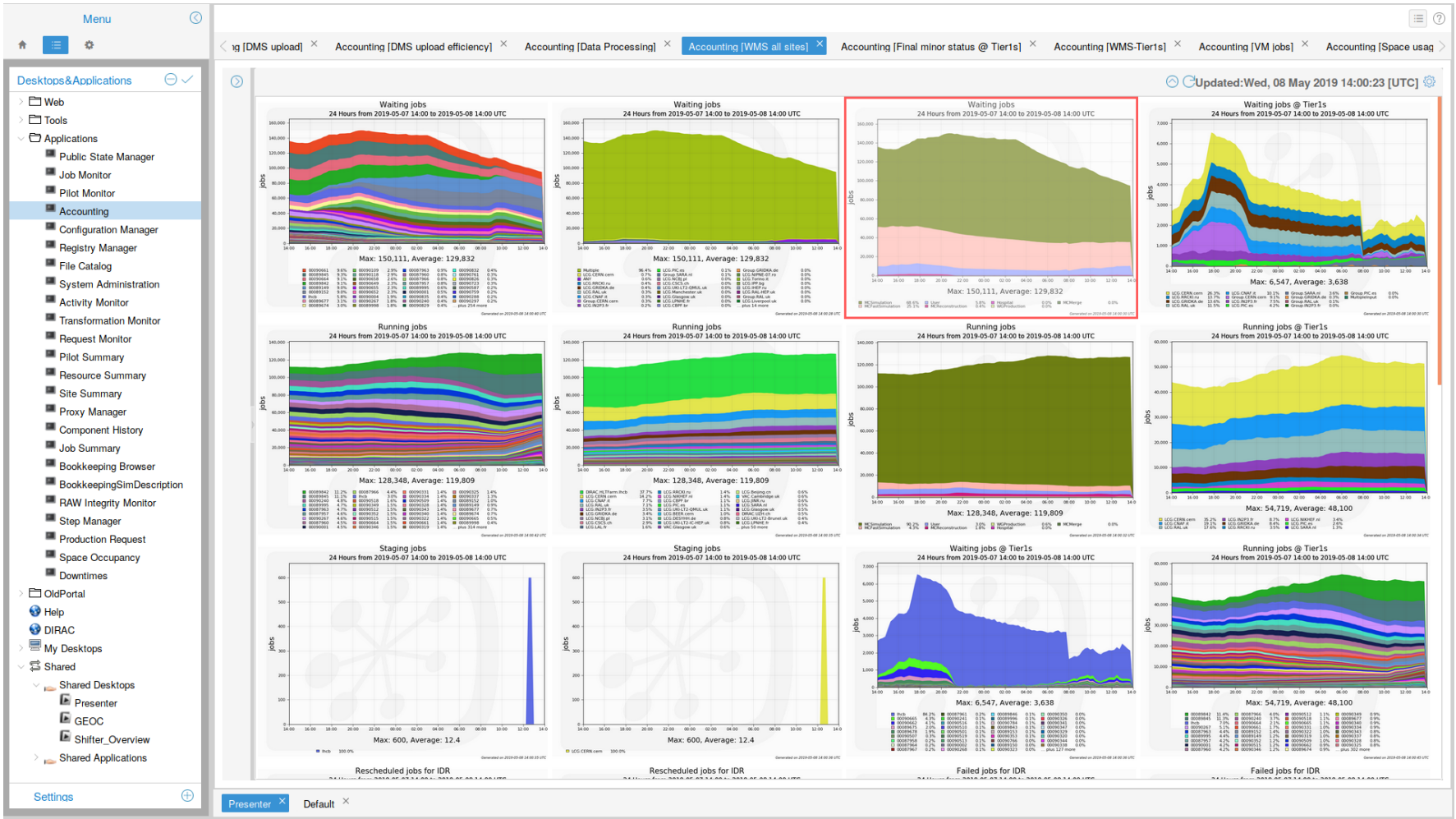


Enabling the Monitoring System

- Requirements:
  - Elasticsearch
  - RabbitMQ,ActiveMQ or STOMP supported Message Broker (optional)
  - WMS Monitoring:
    - StatesMonitoringAgent (WMS)
  - Component Monitoring:
    - DynamicMonitoring = True (SystemAdministrator)
- Accounting web application (WebAppDIRAC)



WMS Monitoring



Component Monitoring

Installation

- using dirac-admin-sysadmin-cli -H hostname, more details in [4]
- install db MonitoringDB;
- install service Monitoring Monitoring;
- Elasticsearch follow in `https://www.elastic.co`
- RabbitMQ for failover, follow in `https://www.rabbitmq.com`

[4] `http://dirac.readthedocs.io/en/integration/AdministratorGuide/Systems/MonitoringSystem/index.html`

LHCb Monitoring experience

- Since October 2016 LHCb is using the Monitoring System
- Elasticsearch clusters are provided by CERN (one for production, one for certification)
- Size: 1 TB, 922 indexes, $7 * 10^9$ documents
- 8 nodes cluster: 3 master, 2 search and 3 data nodes (more details in the 'Monitoring performance of a highly distributed and complex computing infrastructure in LHCb' 2016 CHEP paper)
- moving from ES 5 to ES 6

Technologies used

- Accounting and Monitoring:
  - DIRAC Graph library, which is based on Matplotlib and used to create high quality plots
  - DIRAC web framework based on Tornado
- Monitoring:
  - Messaging Queue system, we are using RabbitMQ for high availability
  - Elasticsearch distributed search and analytic engine
- Accounting
  - MySQL (AccountingDB)

- DIRAC web frontend can be used to interact with DIRAC
- v6r22 is based on Web 4.0
- Two different systems for accounting and monitoring are aviable

Thank you! Questions?