

22nd International Conference on Computing in High Energy and Nuclear Physics, Hosted by SLAC and LBNL, Fall 2016

Highlights from Track 7
Middleware, Monitoring and Accounting

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68 abstracts: 25 oral

Monitoring

“The act of observing something (and sometimes keeping a record of it)”

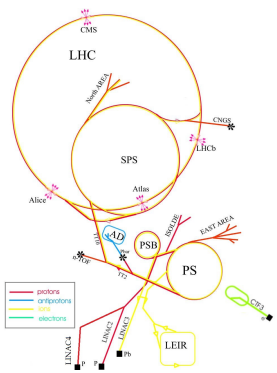
<http://www.thefreedictionary.com/monitoring>

“A systematic process of observing, tracking, and recording activities or data for the purpose of measuring program or project implementation and its progress towards achieving objectives.”

<http://www.investorwords.com/19314/monitoring.html>

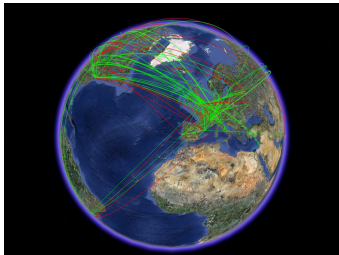
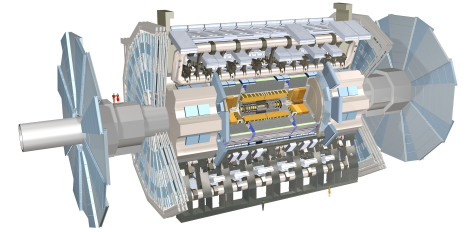
Accounting

“ (and sometimes keeping a record of it)”



Accelerator
Infrastructure

Detectors
Data quality



Workflow
Data management

Computing
facilities



WLCG infrastructure

Accelerator infrastructure

Technical Infrastructure: A lot of systems to control



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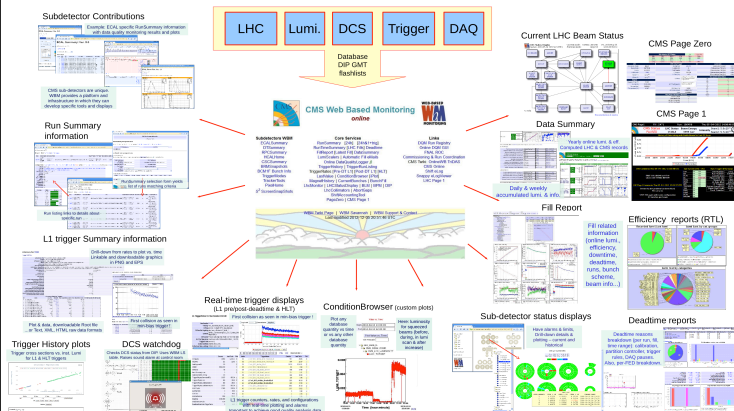
189 The CERN Control and Monitoring Platform (C2MON): a modern open-source platform for data acquisition, monitoring and control



CMS Web-Based Monitoring

Central place for integrated CMS online information

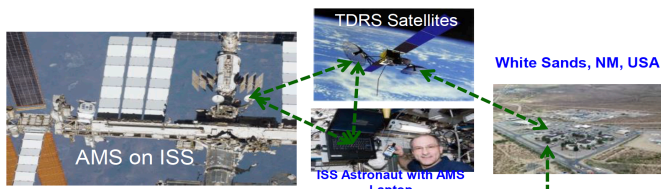
Jose Antonio Lopez-Fernandez, Fermilab, IL, USA from WBM team for CNEP 2016



521 Web Based Monitoring project at CMS experiment

AMS Data Flow

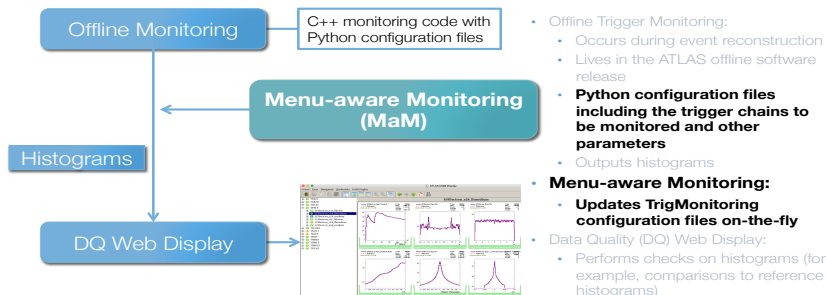
- Data transferred via relay satellites to Marshall Space Flight Center, then to CERN, nearly real-time, in form of one-minute-**frame**
- Preproduction:** Frames → runs (**RAW**): 1 run = ¼ orbit (~23 minutes)



49 Evolution of Monitoring System for AMS Science Operation Center

Detector

ATLAS Offline Trigger Monitoring

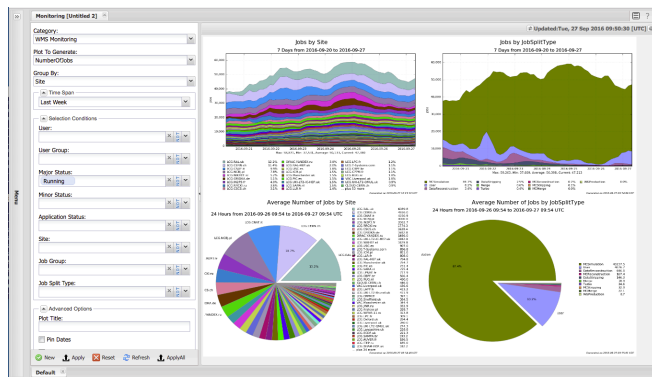


469 Trigger Menu-aware Monitoring for the ATLAS experiment



Data visualization within DIRAC

DIRAC Monitoring system



Monitoring performance of a highly distributed and complex computing infrastructure in LHCb

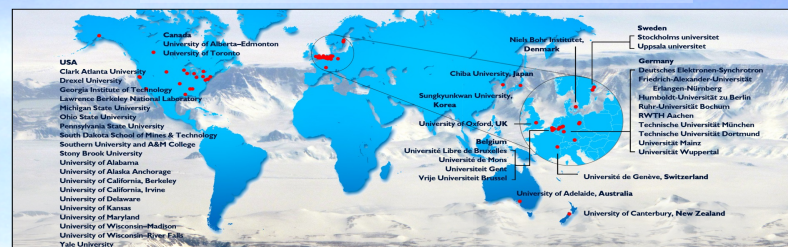
234 Monitoring performance of a highly distributed and complex computing infrastructure in LHCb

Work flow

IceCube Computing

Medium size collaboration

- 2 data centers and several smaller clusters
- Most CPU compute is opportunistic
- Diverse computing infrastructure

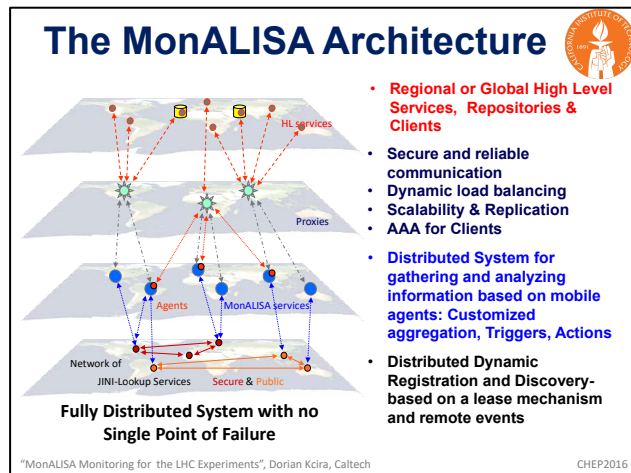


CHEP 2016



508 IceProd 2 usage experience

Local or experiment facilities



463 MonALISA, An Agent-Based Monitoring and Control System for the LHC Experiments

Numbers

CNAF resources in numbers

- Core ~22000.
- Disk storage ~20PB.
- Tape storage ~34PB.
- Racks > 180.
- kHS06 ~250.

CNAF staff

- 50 persons
- 5 functional units

Architecture

3 CHEP 2016 San Francisco US

INFN-CNAF monitoring

Diego Michelotto

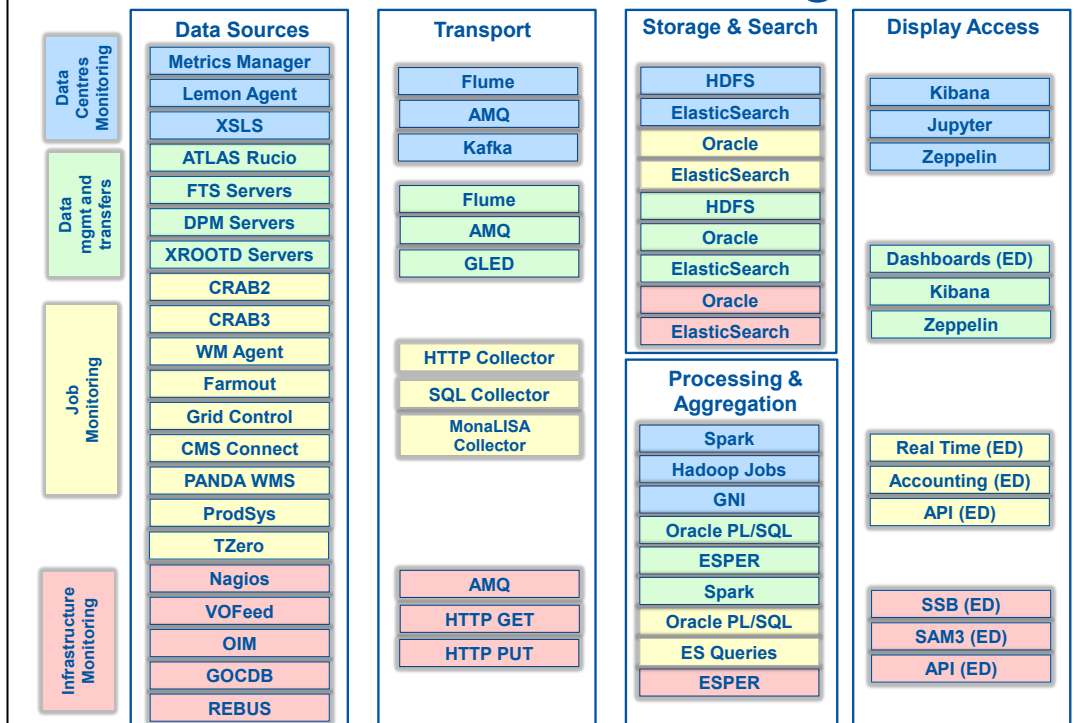
9 CHEP 2016 San Francisco US

INFN-CNAF monitoring

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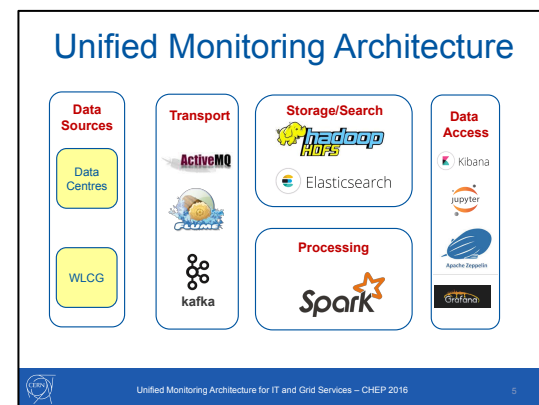
018- The evolution of monitoring system: the INFN-CNAF case study

Current Monitoring

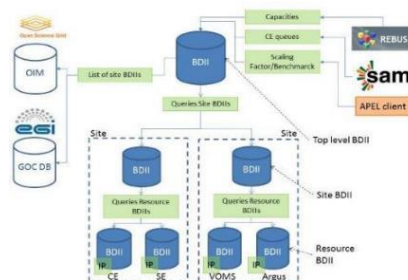


There are many sources of data and many options for monitoring

83 Unified Monitoring Architecture for IT and Grid Services



The Current WLCG IS



- The WLCG IS is needed for service discovery, operations, monitoring and accounting
- BDII is the main building block of the WLCG IS
- OSG will stop publishing in the BDII on 31.03.2017
- EGI will keep on relying on the BDII
- LHC VOs only rely on the BDII for computing information

Highlights

- CRIC consists of
 - Core CRIC: contains information of existing resources as they are provided by the sites
 - Experiment CRIC: contains the resources used by the experiment with extra configuration information to enable integration with experiment workflows and internal tools

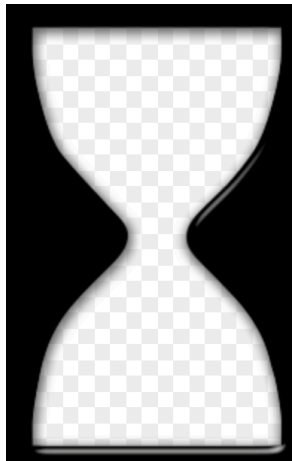
302 Consolidating WLCG topology and configuration in the Computing Resource Information Catalogue

Middleware

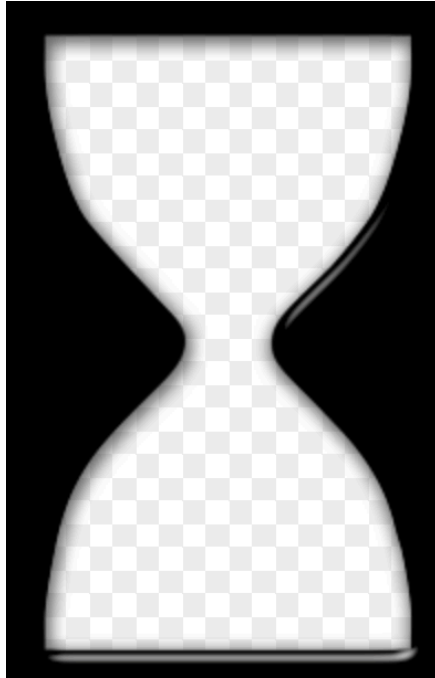
“Software that connects two otherwise separate applications”

“Middleware is used to describe separate products that serve as the glue between two applications”

<http://www.webopedia.com/TERM/M/middleware.html>



Existing infrastructure

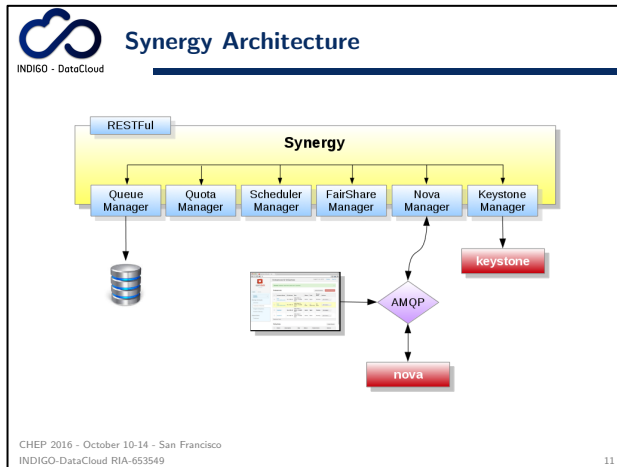


Middleware

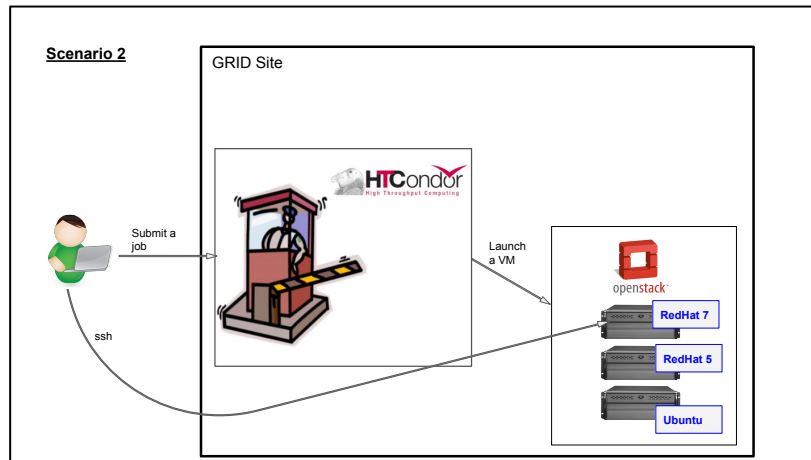
Enabling us to use non-HEP
facilities, clouds, HPC centres

Opportunistic resources

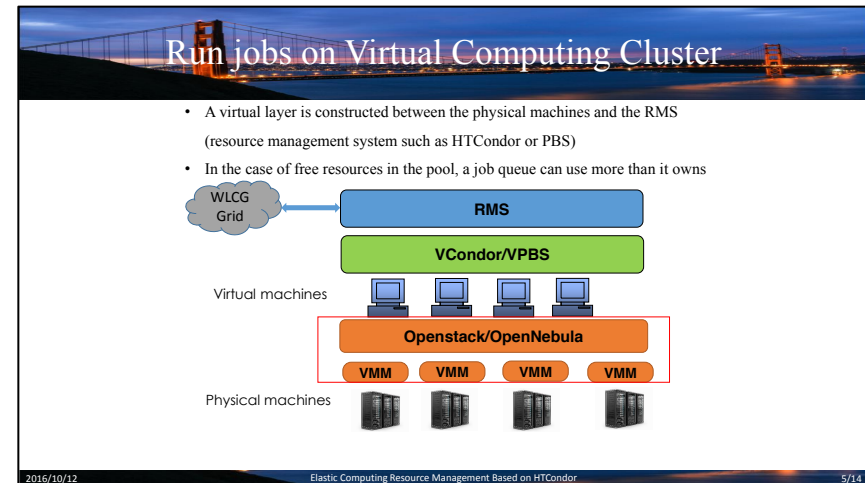
Exploiting cloud computing



367 INDIGO-Datacloud

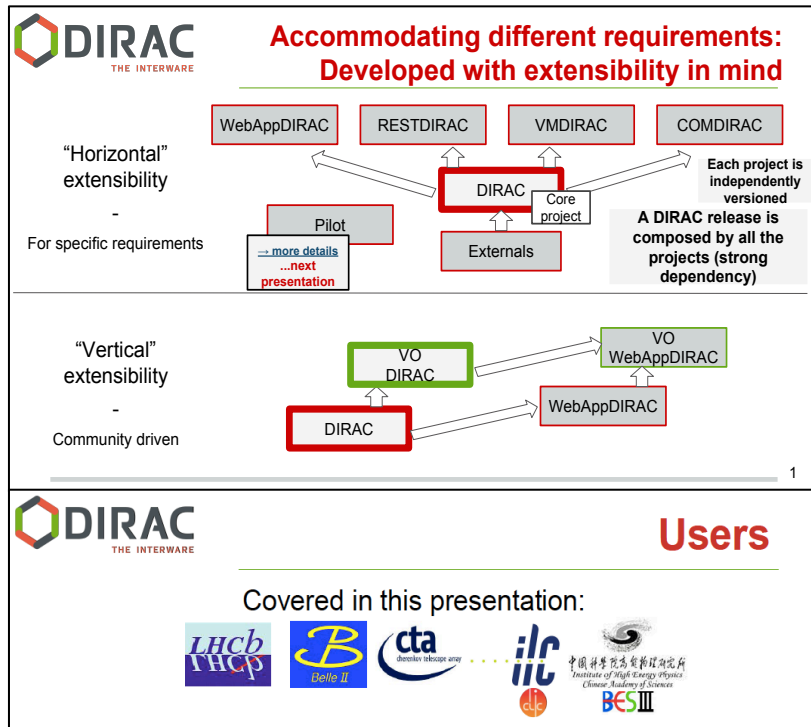


98 Interfacing HTCondor-CE with OpenStack



288 Elastic Computing Resource Management Based on HTCondor

Work load management systems that can utilize all types of resources



217 DIRAC in Large Particle Physics Experiments

Utilizing HPC resources





CMS use of allocation based HPC resources

Dirk Hufnagel (FNAL) for CMS Offline&Computing
CHEP 2016 San Francisco
13th October 2016



563 CMS use of allocation based HPC resources



#3  **TOP500[®]**
SUPERCOMPUTER SITES

27 PFlops (Peak theoretical performance). Cray XK-7
18,688 compute nodes with GPUs

194 Integration of Titan supercomputer at OLCF with ATLAS production system

Integrating Containers in the CERN Private Cloud

Ricardo Rocha
(on behalf of the CERN Cloud team)

Goals and Timeline

- Integrate containers in the CERN cloud
 - Shared identity, networking integration, storage access, ...
- Agnostic to container orchestration engines
 - Docker Swarm, Kubernetes, Mesos
- Fast, easy to use

227/918 Integrating Containers in the
CERN Private Cloud

Track 7 Summary

- Significant development of monitoring capabilities
 - Trend toward the use of open-source tools
 - Exchange of information between the different systems
 - Active, intelligent, context-aware, self-healing systems
- Middleware
 - Focused on software that is helping us integrate opportunistic resources into our infrastructure