

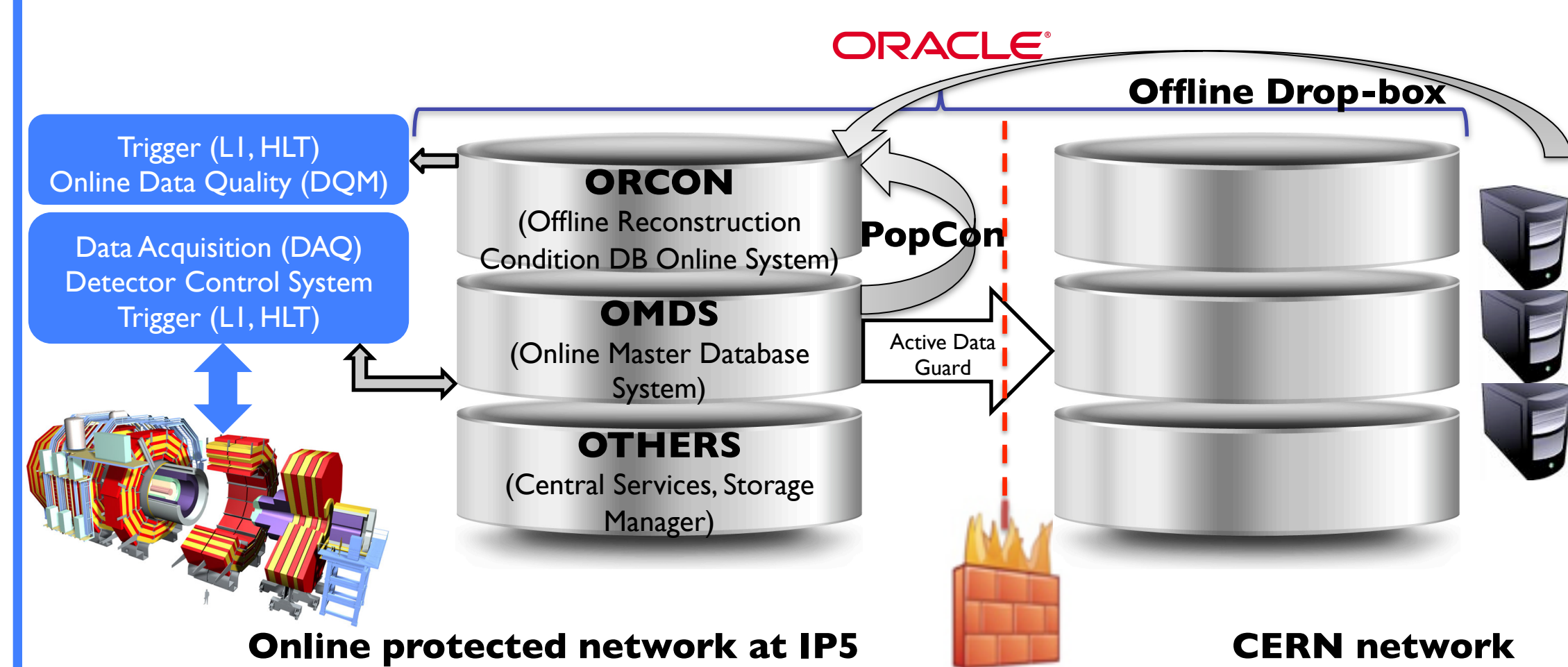
Monitoring and Alarm System for Time Critical Condition Data Handling in the CMS Experiment



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Abstract: With LHC producing collisions, CMS must be able to collect high quality data and process them reliably: these tasks need both correct and promptly available conditions. The CMS condition infrastructure relies on different components, such as hardware, networks, and services, which must be constantly monitored. We describe EasyMon, a fast web-based application for monitoring CMS condition infrastructure.

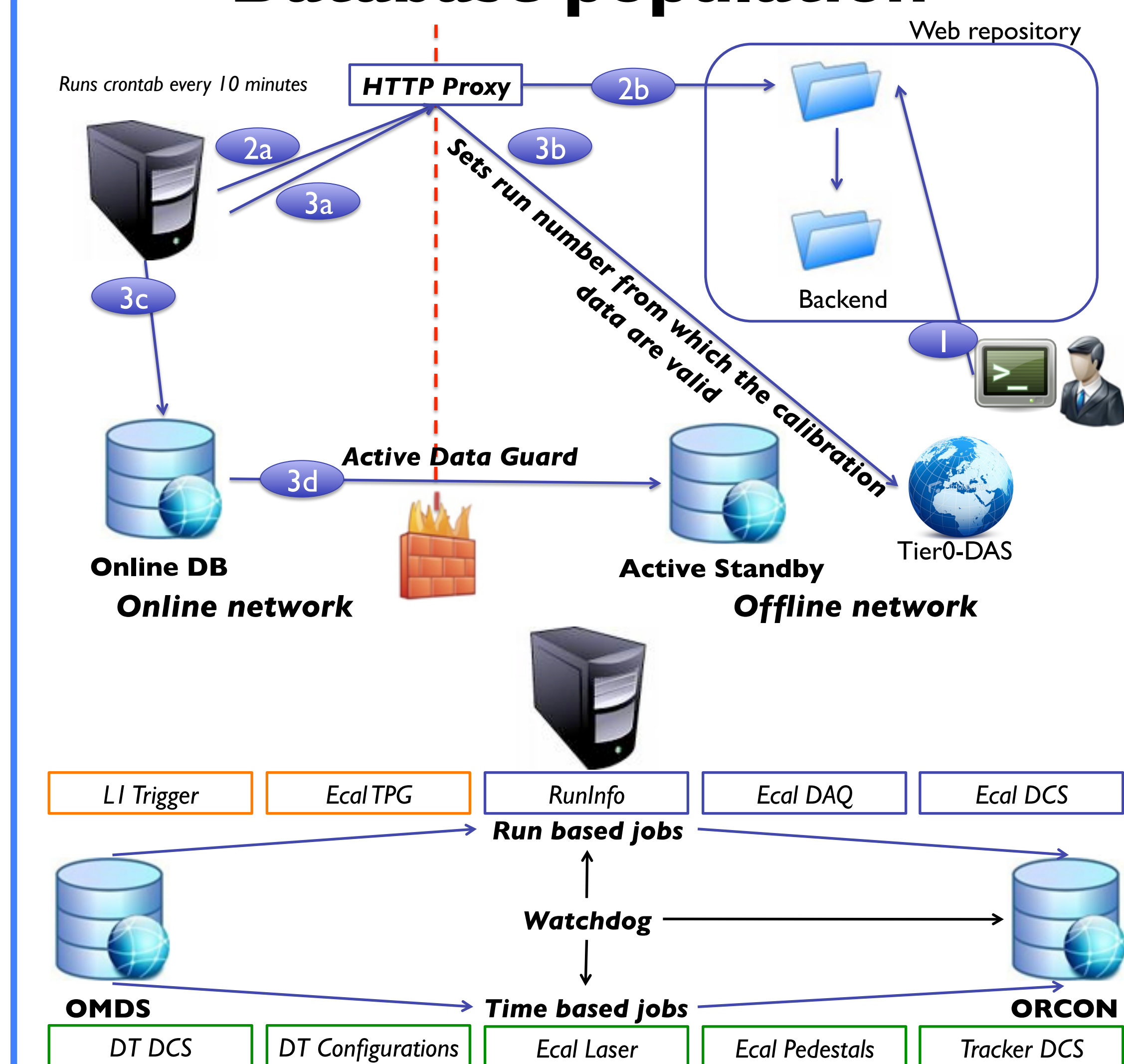
CMS Condition Database Model



The reconstruction of collision events makes use of detector condition data, such as alignment and calibration constants, that are stored in ORACLE Databases. The CMS Condition Database system relies on one ORACLE 11gR2 Real Application Cluster (RAC) and its Active Standby copy, housing two Database services:

- **OMDS** allows to handle the configuration and condition data produced online by the sub-detectors in relational tables: it *currently hosts 4.1 TB of data, with a growth of 150 GB/month in data taking*;
- **ORCON** serves a subset of condition data needed by HLT, DQM and offline reconstruction. Data are written and retrieved as C++ objects, thanks to Object Relational Mapping programming techniques, and using data compression: *data increase rate is approximately 5 GB/month, and the total data volume is 300 GB*.
- The offline reconstruction algorithms retrieve condition data as C++ objects from the active standby copy of the online RAC using FroNTier middleware based on Tomcat servlet and squid caching system.

Database population



The logs of any transactions of the jobs populating the condition DB with online conditions or offline calibrations are stored into dedicated tables, so they are checked by web applications designed for experts.

Monitoring tools

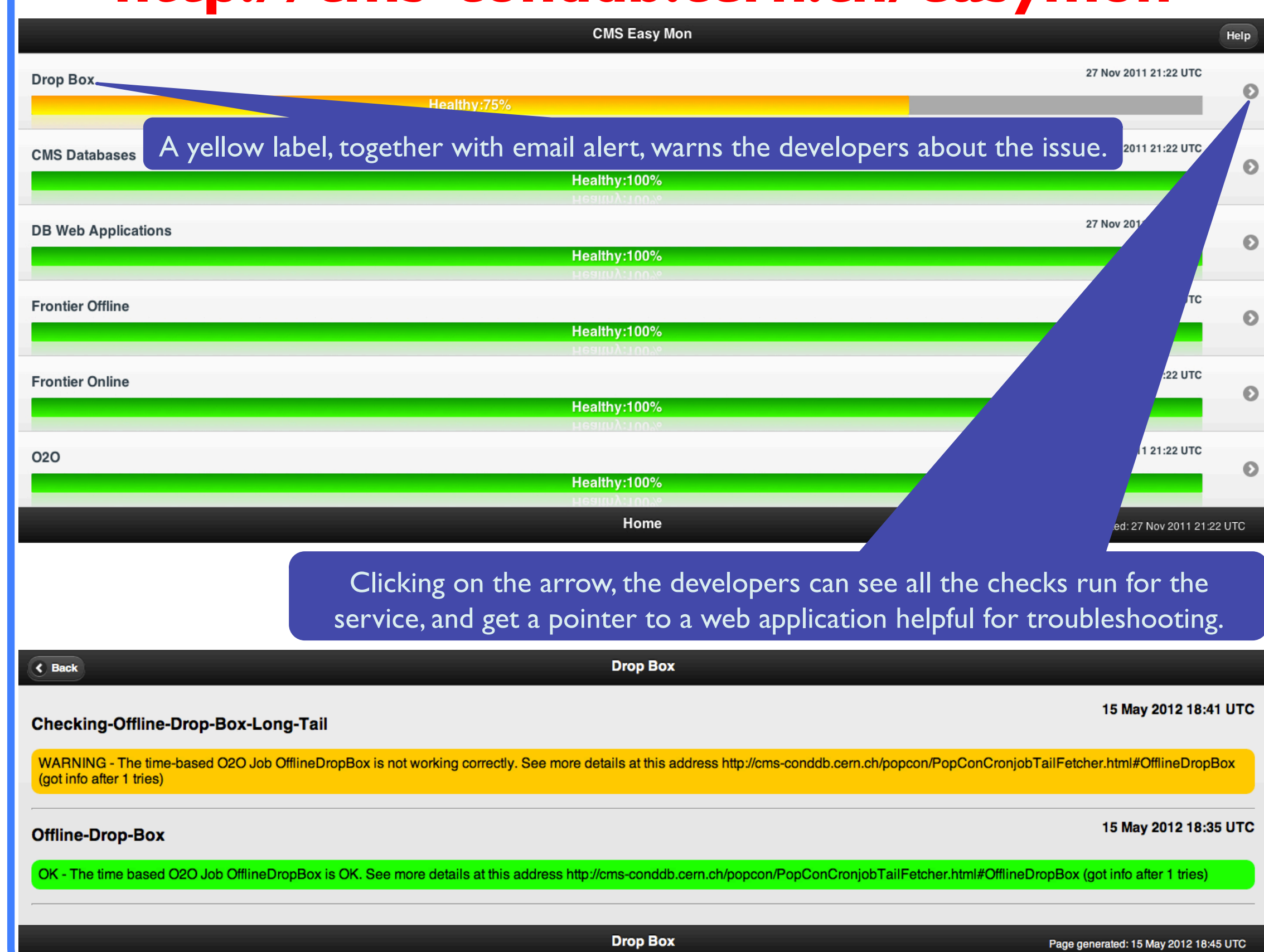
In the context of WLCG, several tools are available in order to check the status of the different parts of the CMS Condition Database infrastructure:

- A web tool displaying monitoring information on the online RAC (OS and CPU load, I/O, session auditing, data size) provided by DBAs;
- LHC Era Monitoring (LEMon) allows to define metrics for monitoring the availability of each single hardware component (e.g. instances of DB RACs, online and offline servers), and to retrieve them using web services either on web browser or via CLI;
- Service Level Status (SLS) is a web tool that dynamically shows availability, basic information and/or statistics about IT services, as well as dependencies between them.
- *EasyMon* is a web-based application for monitoring the CMS condition Database infrastructure.

EasyMon features

EasyMon is based on the Nagios framework, where all the checks of each components of the infrastructure are implemented, and from whence it retrieves their status. The web GUI is able to display, even on mobile devices, the results of the checks: different colors show clearly the severity of any issues. In this way, experts involved in CMS condition operations are easily informed on the status of the system.

<http://cms-conddb.cern.ch/easymon>



Related presentations at CHEP

Pfeiffer A.: CMS experience with Online and Offline Databases [163].

Govi G.: Handling of time-critical Conditions Data in the CMS experiment - Experience of the first year of data taking [351].

Dykstra D.: Operations with Frontier in CMS [220].