

CMS data quality

Overview of Online DQM Operations

Dmytro Volyanskyy
DESY, Hamburg

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⇒ *The CMS Data Quality Monitoring system:*

- a homogeneous monitoring environment across various applications related to data taking at CMS.
- C++ based system embedded in CMSSW

⇒ *Primary purpose:*

- control and display the detector status and the quality of data collected by the CMS DAQ in real time during online data taking.



Online DQM

⇒ *Another important task:*

- monitor the CMS data quality in the various areas of the offline processing of event data.



Offline DQM



A brief introduction (2)



⇒ *The CMS DQM Framework:*

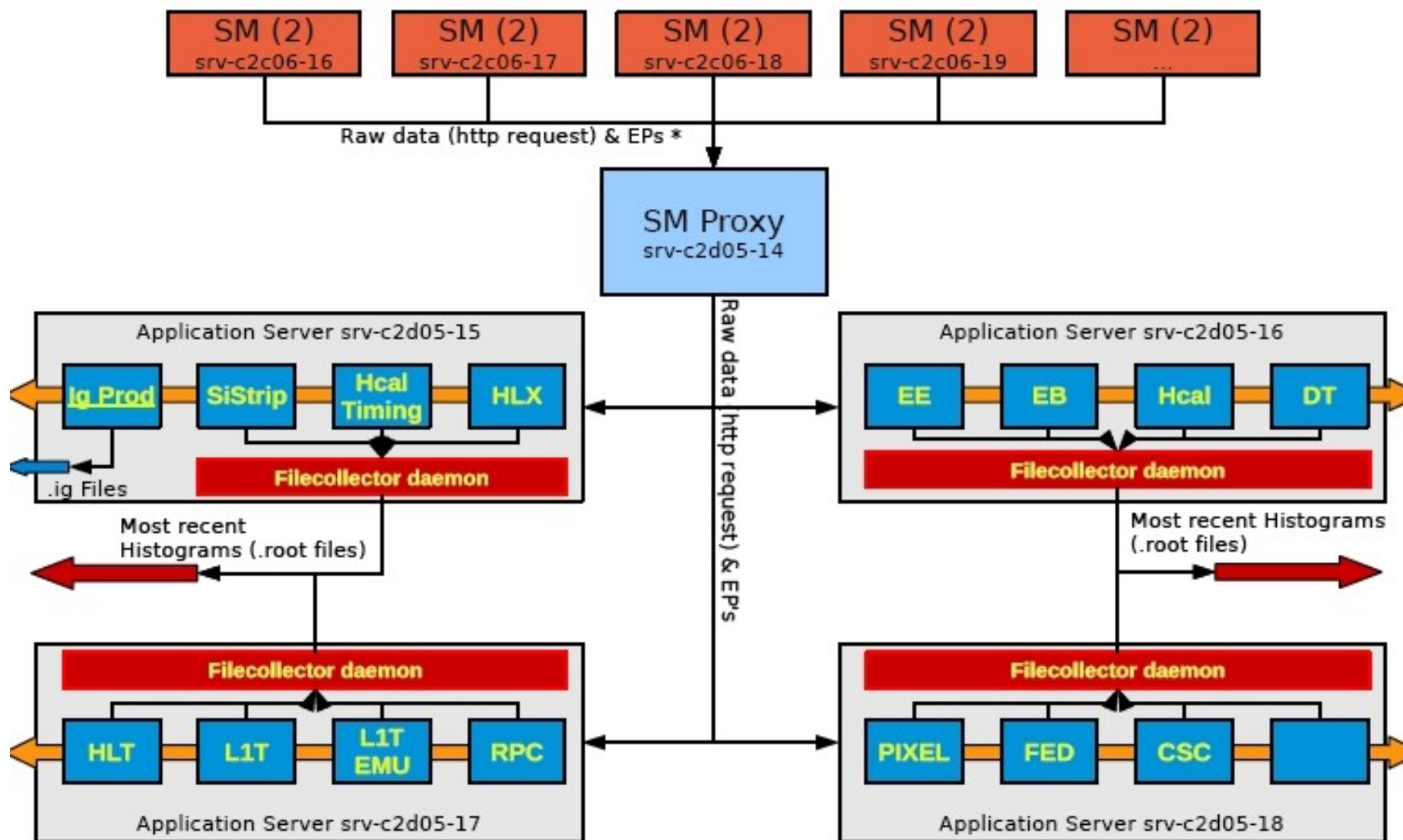
- embedded in CMSSW (DQMService package)
- all necessary tools for creation, filling, transportation and visualization of MonitorElements (e.g. histograms, floats), uses ROOT functionality for histogramming.



- Online DQM applications access events from the SM ProxyServer (at the rate of $\sim 25\text{Hz}$)
Also, possible to run at the HLT Filter Unit accessing events accepted by the L1 trigger (at the rate of up to 100kHz)
- **DQM Producers:** pluggable modules, where the histograms are created and filled !
 - Access event information to perform Raw Data Monitoring (the basic event info), Digitisation Monitoring (amplitudes/pedestals, number of digis), ...
- **DQM Clients:** periodically access the histograms already created by the Producer and perform further analysis on them (e.g. QualityTests)
 - summarizes the results in a standardized output format

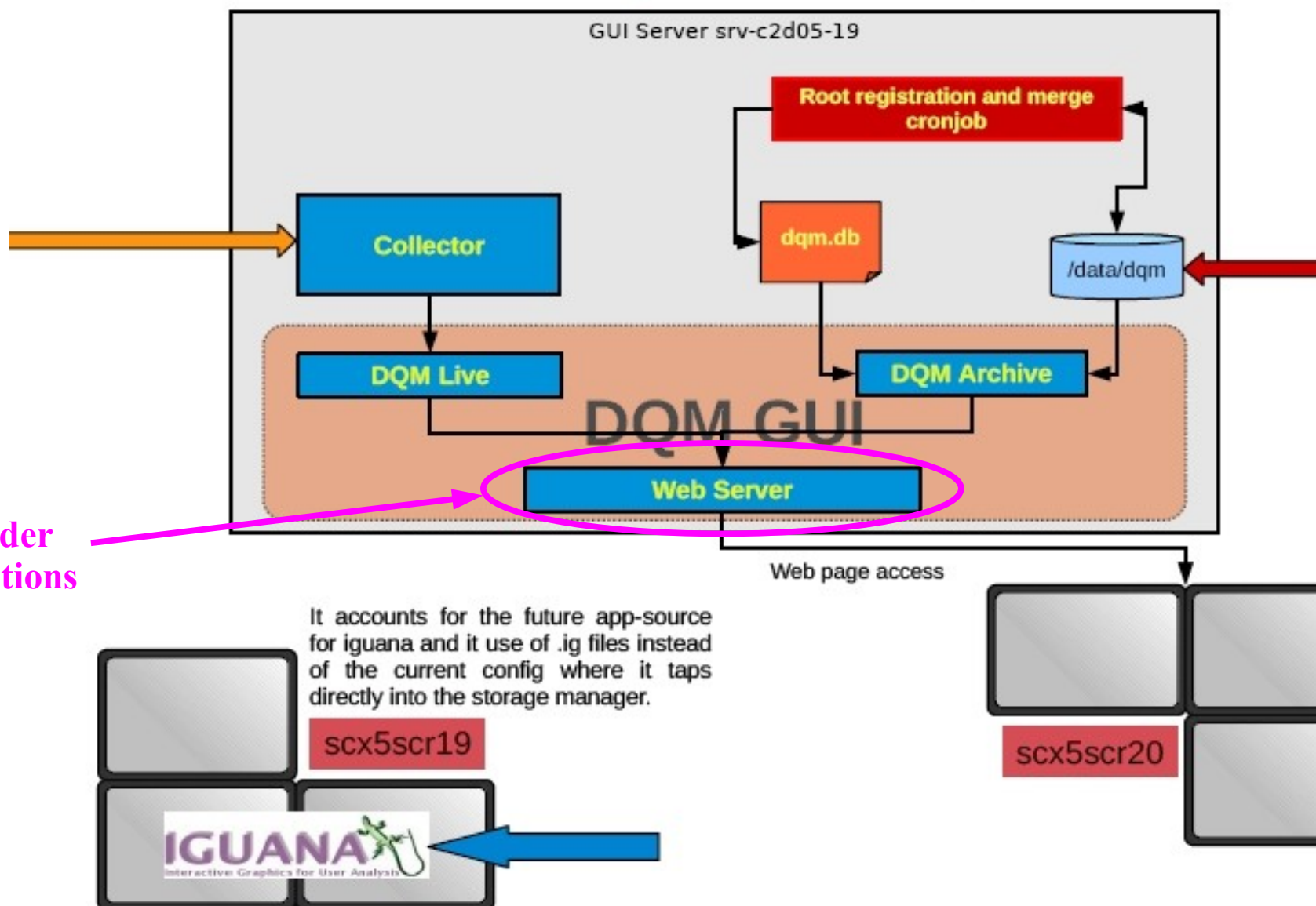
Focusing on Online DQM + DQM core support/development (e.g. QualityTests code)

Data Flow of Production System at P5 (1/2)

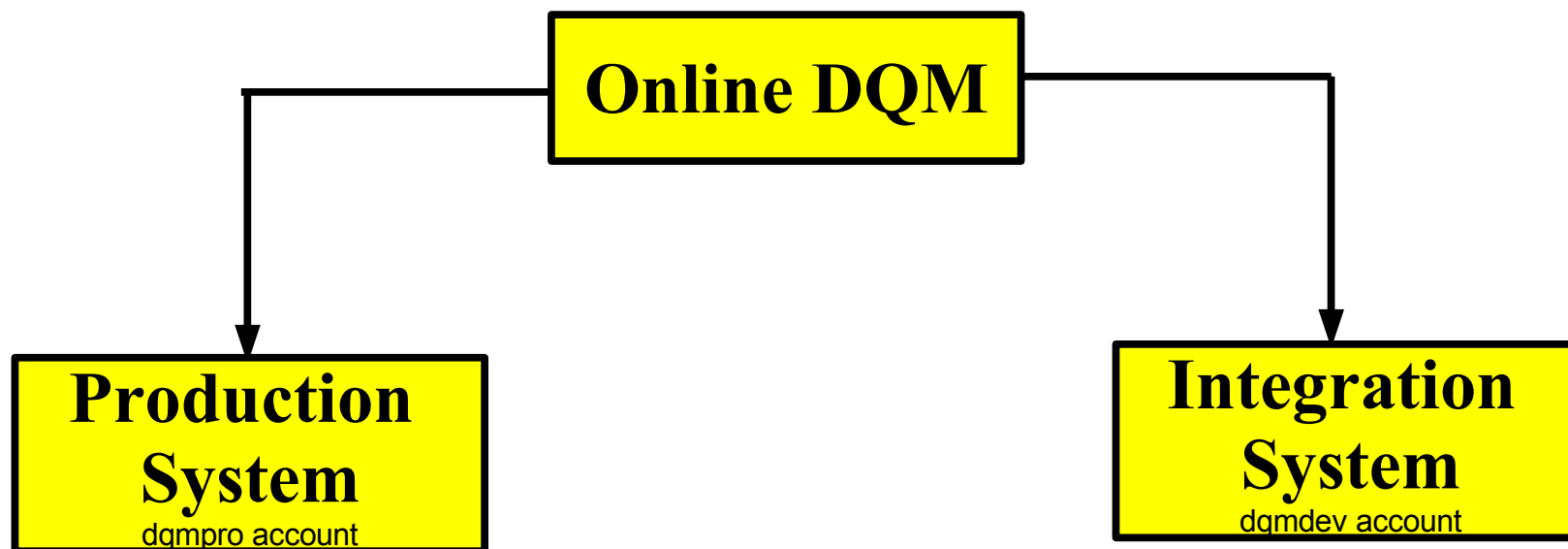


* EP's: HLT's Event products

Data Flow of Production System at P5 (2/2)



accessible under
certain conditions



- ⇒ *The idea is to have two twin systems !*
 - running on different servers but using the same software
- ⇒ *New software updates are tested within the Integration System first and then, after a while, are deployed in the Production System (if no problems were occurred)*
- ⇒ *Integration system uses SM test event playback server*
 - continuously playing 2k events of a selected run

BOTH SYSTEMS MUST BE SUPPORTED CONSTANTLY !!!



Maintenance Issues (1)



- ⇒ *The online DQM system comprises around 70 (!!!) different packages*
- *software updates arrive very frequently and require testing and deployment within a short while after the delivery.*

A hot time especially before the Global Runs :-)

DQM OPERATIONAL TASKS:

- ***deploy and test new software updates*** (including cfg files + GUI layout files):
 - *provide feedback to developers and/or fix problems if any !*
- ***constantly check that the system*** (DQM applications, DQM GUI server, ...) ***runs stably and uses reasonable amount of memory and CPU.***
- ***migrate the Production & Integration Systems to a new CMSSW release***
 - *a lot of fun..*
- ***support the Playback Event Server***
 - *regularly upgrade the server with a new run (often)*
 - *migrate the server to a new CMSSW release (less frequent)*
- ***document any changes in the system configuration***



Maintenance Issues (2)



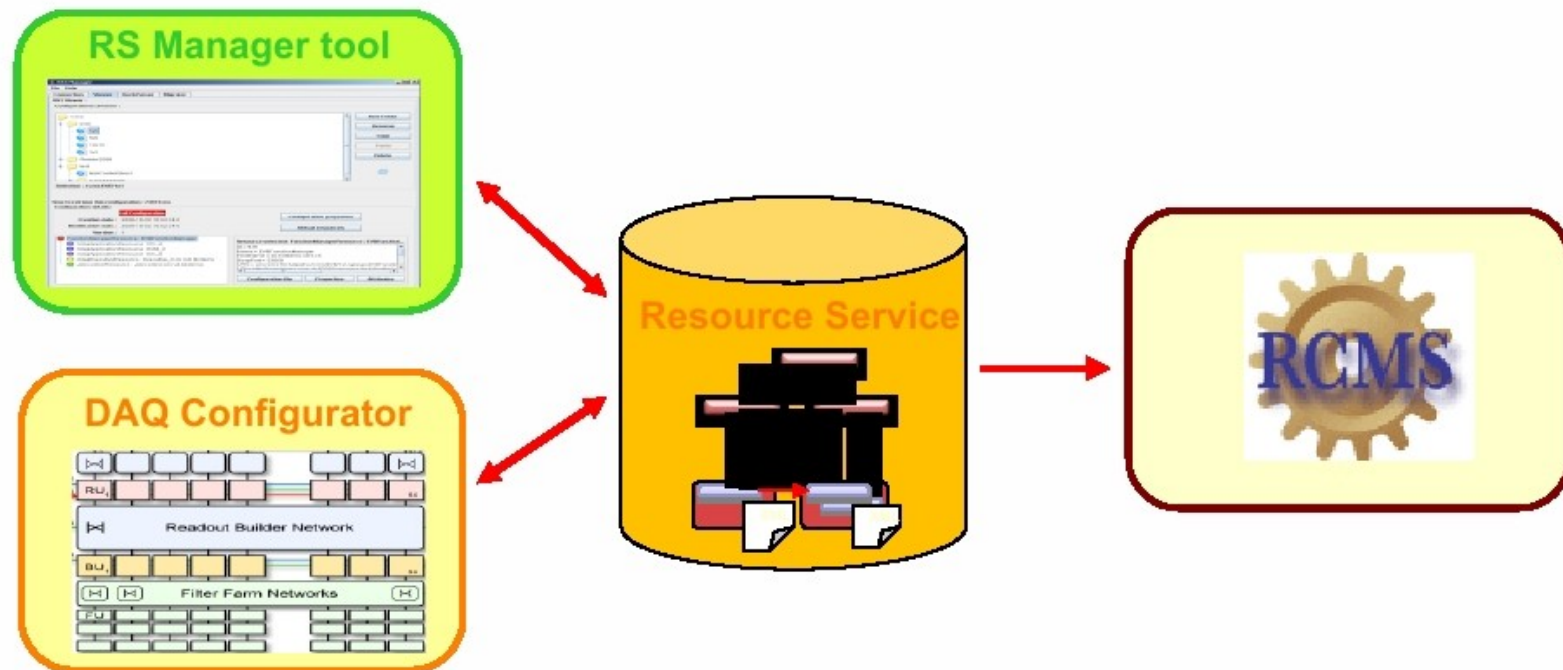
⇒ To be able to do Online DQM operations, one needs to be proficient with:

- CVS
- C++ / Python (to debug the code/fix bugs)
- CMS RCMS:

- part of the CMS online system
- controls and monitors the DAQ components!
- based on a tree of Function Managers (a java application running in the RCMS framework)

State	Name	Type	URI
Running	/DQMtest	FM	http://cmsrc-dqm:22000/rcms/gui/servlet/FMPilotServlet?groupID=4113
Enabled	/DQMtest/JobControl	XDAQ	http://srv-c2d05-10.cms:9999/urn:xdaq-application:lid=10
Enabled	/DQMtest/JobControl	XDAQ	http://srv-c2d05-11.cms:9999/urn:xdaq-application:lid=10
Enabled	/DQMtest/JobControl	XDAQ	http://srv-c2d05-12.cms:9999/urn:xdaq-application:lid=10
Enabled	/DQMtest/JobControl	XDAQ	http://srv-c2d05-13.cms:9999/urn:xdaq-application:lid=10
Enabled	/DQMtest/JobControl	XDAQ	http://srv-c2d05-14.cms:9999/urn:xdaq-application:lid=10
Enabled	/DQMtest/JobControl	XDAQ	http://srv-c2d05-15.cms:9999/urn:xdaq-application:lid=10
Enabled	/DQMtest/JobControl	XDAQ	http://srv-c2d05-16.cms:9999/urn:xdaq-application:lid=10
Enabled	/DQMtest/JobControl	XDAQ	http://srv-c2d05-17.cms:9999/urn:xdaq-application:lid=10
Enabled	/DQMtest/JobControl	XDAQ	http://srv-c2d05-18.cms:9999/urn:xdaq-application:lid=10
Enabled	/DQMtest/SMProxy Server	XDAQ	http://srv-c2d05-14.cms:22100/urn:xdaq-application:lid=30
Enabled	/DQMtest/SMProxy Server	XDAQ	http://srv-c2d05-11.cms:22100/urn:xdaq-application:lid=30
configuring	/DQMtest/evf::FUEventProcessor	XDAQ	http://srv-c2d05-12.cms:22101/urn:xdaq-application:lid=50
configuring	/DQMtest/evf::FUEventProcessor	XDAQ	http://srv-c2d05-13.cms:22101/urn:xdaq-application:lid=50
configuring	/DQMtest/evf::FUEventProcessor	XDAQ	http://srv-c2d05-15.cms:22101/urn:xdaq-application:lid=50

→ CMS Resource Service



- The RS stores configurations of the Online system.
 - The XML configuration file for each XDAQ application.



Another important task for a DQM operation expert !



Summary



Your contribution to the project
would be greatly appreciated !

Welcome on board !!!