LHCb Online

&

the Conditions DB

Clara Gaspar, March 2005
LHCb Online

Detector Channels

Front End Electronics

Readout Network

Processing/Filtering Farm

Storage

External Systems (LHC, Technical Services, Safety, etc.)

DCS Devices (HV, LV, GAS, Temperatures, etc.)

Trigger

Experiment Control System

DAQ
Online Usage of CondDB

Two completely independent users:

- **As Publisher**
  - The Experiment Control System
    Writes Online Conditions to the DB

- **As Consumer**
  - The Event Filter Farm Algorithms
    Need Conditions for their processing/filtering tasks
Online Conditions Sources

- **DCS**
  - High Voltages, temperatures, pressures, etc.

- **DAQ & LO Trigger**
  - Pedestals, thresholds, zero suppression parameters, gains, etc.
  - DAQ & Trigger setup parameters

- **EFF (Event Filter Farm)**
  - Pedestals, Thresholds, Gain Calibration, Alignment Constants, etc.
  - Trigger setup parameters

- **External Systems**
  - Accelerator data: energy, luminosity, average bunch currents, etc.

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From the Control System point of view:

- Only output
- Only one interface:
  - from the ECS i.e. PVSS
- Clients (offline algorithms) determine:
  - Data organization
    - Data format: XML (?)
  - Data update rate
    - Data could be stored in the Cond DB only if it changed by more than X or every hour
    - independently of the PVSS read-out rate.
Conditions Data Types

- **Raw Data**
  Values read directly from hardware (ex.: HV readings, Temperatures, raw alignment data, etc.)
  ➔ No Versions, no Tags

- **Processed Data**
  Results of calculations done on raw data (ex.: calibration constants, alignment, etc.)
  ➔ Automatic Versioning, User Tags

  ➔ All Online data stored as "Raw Data"
Three Logical Databases in the Online System
Online Database Contents

- **Configuration DB contains:**
  - All data needed to configure the HW (or SW) for the various running modes
    - Ex.: HV V0 Settings, Pedestal settings, trigger settings, etc.

- **PVSS Archive contains:**
  - All monitoring data read from HW for monitoring and debugging of the Online System
    - Ex.: HV Vmon Readings, pedestal readings, etc.

- **Conditions DB contains:**
  - A subset of the monitoring data read from HW if it is needed for Offline processing
    - Ex.: HV Vmon Readings if changed by more than n Volts
  - Some configuration data once it has been used
    - Ex.: Trigger settings used by a particular run
Dataflow Example

Configuration settings for a running mode
Monitoring data (at regular intervals)

if Needed for next run settings (Pedestal Followers)
if Archive On
if Passes Conditions filter
To Offline

Experimental Equipment

PVSS

PVSS Arch.

Cond. DB

Conf. DB
Define filters in PVSS:
(per device type/device)
- Archive
- Condition:
  - filter
  - expressions

ECS CondDB Architecture

Uses LCG:
- COOL
- RAL
- SEAL
- POOL
- BOOST
- etc.

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CPUs run "Offline" Algorithms Online:

- Within Gaudi FW (interfaced to PVSS)

Need Conditions:
- The Control PCs will get a snapshot of the CondDB (at Start of Run) and distribute to CPUs
- A few well-chosen Conditions can be updated while running
Dataflow Example

Special filter for some conditions
- Trigger Farm Update

Validity Start = $t_0 + \Delta t$

New Condition Update ($t_0 + \Delta t$)

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Ex: The VeLo Alignment

[Diagram showing a network of nodes and connections]

Control PC
PVSS

Event Builder Switch

SFC
CPU
CPU
CPU

SFC
CPU
CPU
CPU

SFC
CPU
CPU
CPU

Control PC
PVSS

Control PC
PVSS

Cond. DB
Server

Cond. DB

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Online/Offline Synch

- Synchronized by Oracle Tools

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