LHCb Online Configuration Database

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System overview

Experiment Control System (ECS)

LHCb configuration database

PVSS (SCADA)

Experimental Equipment

Operator
Objectives & requirements

• **Store information about all controllable devices**
  – their properties
  – the links between them
  – their hierarchy

• **Keep necessary information for the ECS**
  – to configure equipment
  – to operate the experiment
  – to monitor the system

• **Database design key issues**
  – schema
  – completeness
  – performance
  – maintenance
DATABASE SCHEMA
Timing & Fast Control (TFC) dataflow

Information from the schema
List of devices
Connectivities between devices
Use cases

• Collect use cases:
  Given a VELO card, find a free readout supervisor and determine the routing table of the TFC switch

• List the keywords: device type, device, link, path...

• Define them: a link is a cable between a device output number and a device input number

• Find connections between keywords: a path is a sequence of links
Entity relationship model

- Find the type of relation between tables

- Convert them into constraints
DATABASE IMPLEMENTATION
Implementation features

- Use of Oracle technology
- Use of ProC/C++ to access the database and C/C++ to encapsulate the SQL and PL/SQL statements to communicate with PVSS
- Use of JCOP configuration database tool
- Implementation of a tool (cdbVis) to edit and navigate through the database in Python
- Use of CVS to keep versions of projects and softwares
Integration of the JCOP configuration database tool

- **Joint Control Project**: offers common tools and framework for PVSS
- Ensure compatibility between JCOP tables and LHCb tables
- Avoiding redundancy in the tables:
  - JCOP tables contain device properties
  - LHCb tables store connectivity and hierarchy information
- Adaptation of JCOP configuration database panels
Communication:

PVSS System

Configuration DB

provided by JCOP

fw_recipes
fw_recipes_properties
fw_components
device

PL/SQL scripts

LHCb tables
Navigator editor tool: cdbVis

Display the connectivities of a selected device on its inputs and outputs.

View of a path from the readout supervisor to the Throttle.
Ex. of concrete implementation:
TFC system
TFC requirements

• select subdetectors and an activity

• get the **connectivities** between subdetectors and TFC switch

• List of free readout supervisors and allocate one

• **save/load** activities into/from the conf. DB
Conclusion

• Design schema for TFC and DAQ tables completed
• Production TFC control system (PVSS) now uses the configuration database

Future work
• Table Design for LHCb other subdetectors
• Extension of the cdbVis functionalities
• Design an API to enable clients to interact with the database