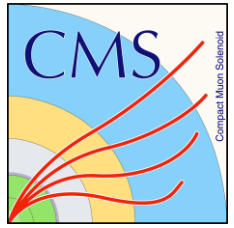
Activities of the NTUA-CMS Group on the Central Detector Control System of the CMS Detector

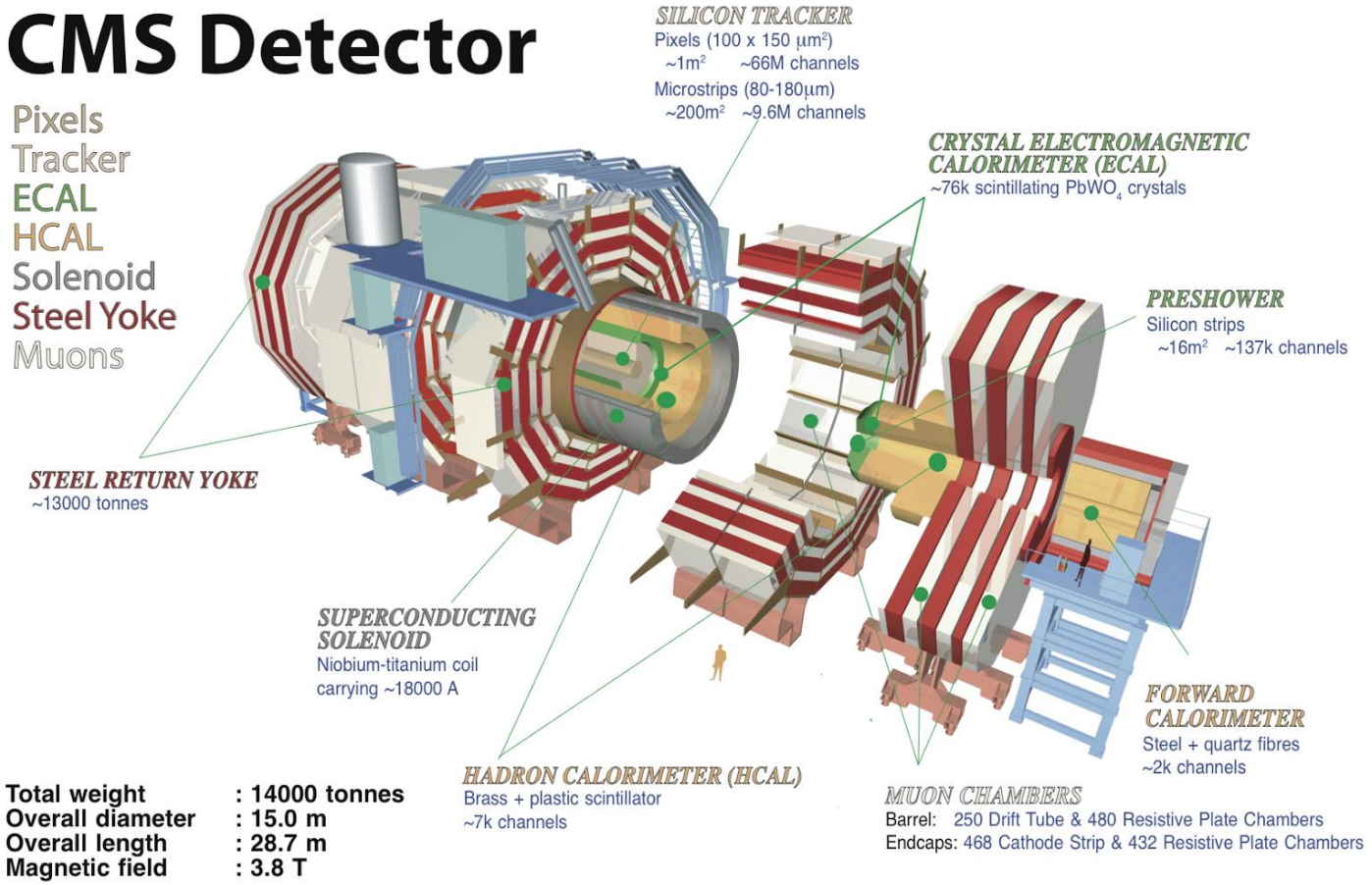


Papakrivopoulos Ioannis
for the
NTUA-CMS group

Outline

- Introduction to Control Systems
- CMS Detector Control System
- NTUA-CMS Activities

Compact Muon Solenoid

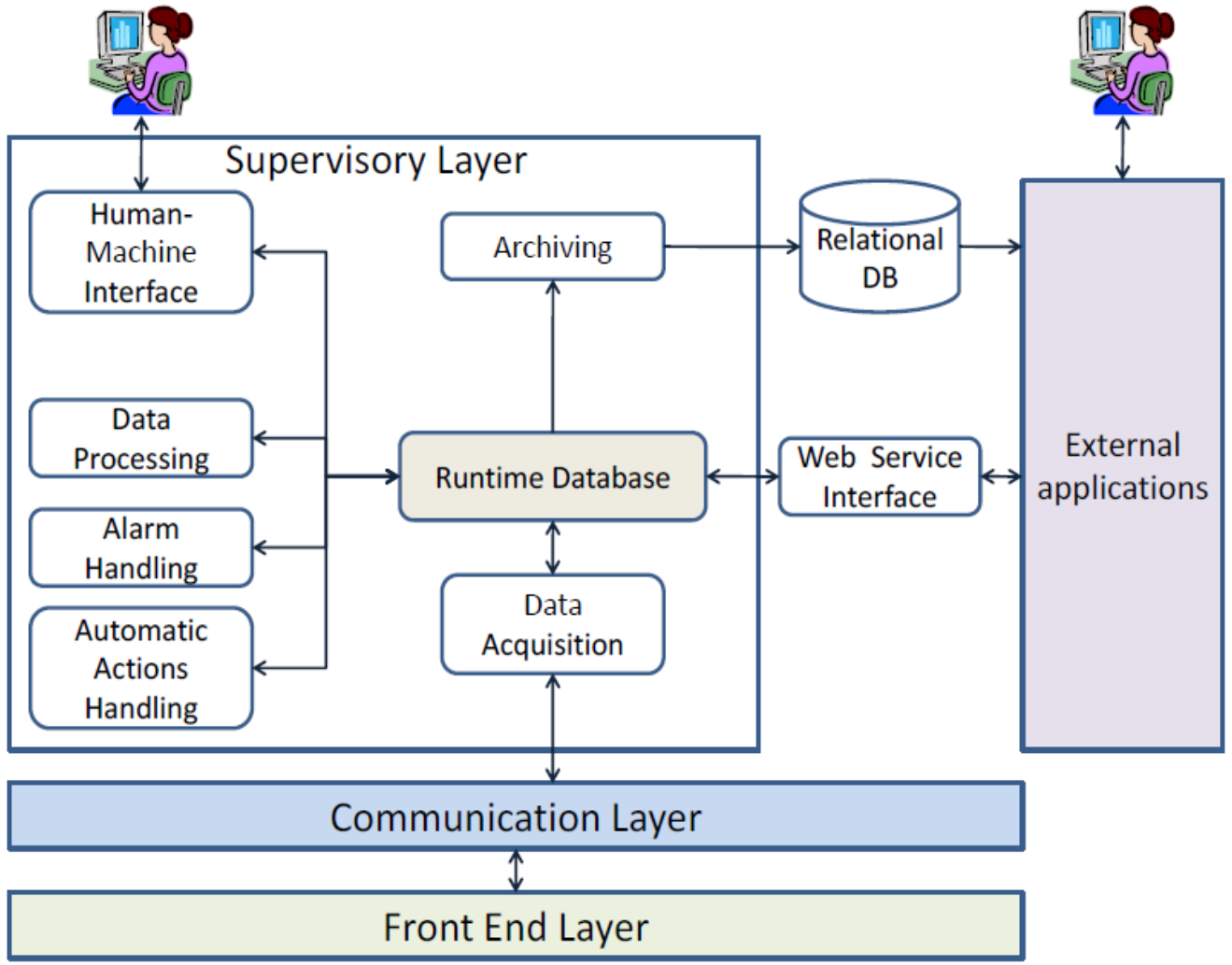


Detector Control System

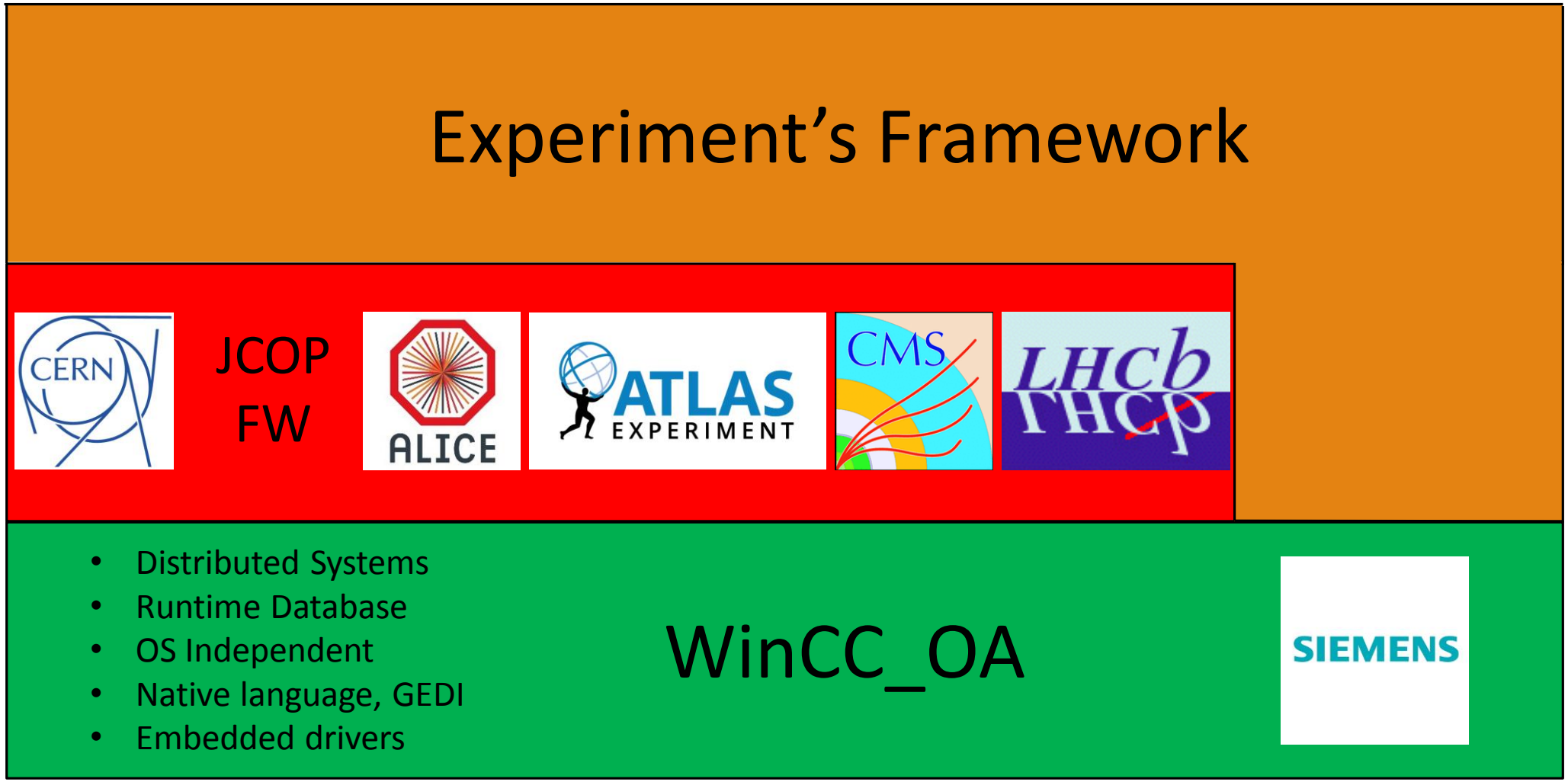
- Control the detector
- Monitor the conditions under which it operates
- Sophisticated and sensitive equipment (more that 6 million parameters)
- Take necessary actions
- Around 10% of the total readout channels
- Data used for data quality as well as reconstruction

Control Systems

- SCADA system (Supervisory Control And Data Acquisition)
- Monitor and Control a remote process
- Factories, airports, physics experiments
- Toolkits
- Tools for developing the supervisory layer
- Ability to connect to hardware (communication layer, drivers)



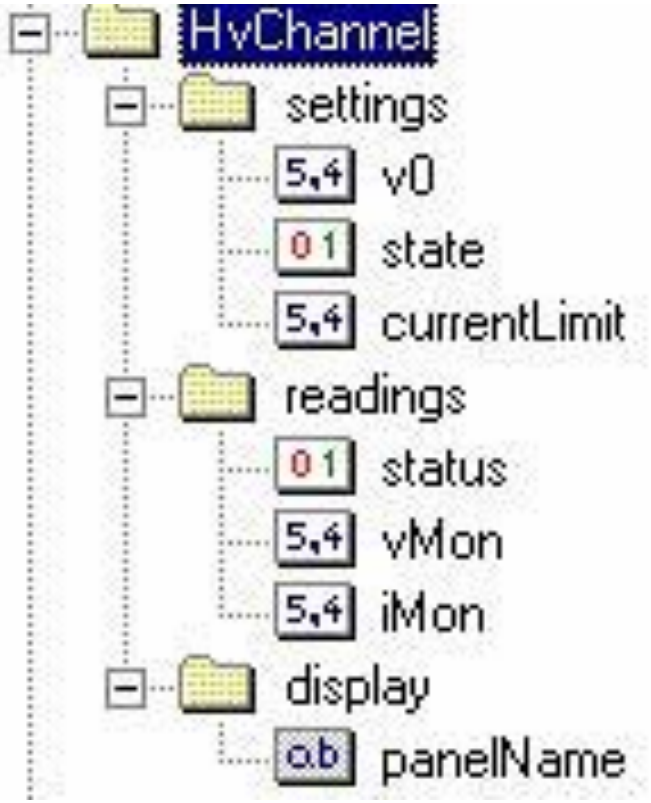
Control Systems at CERN



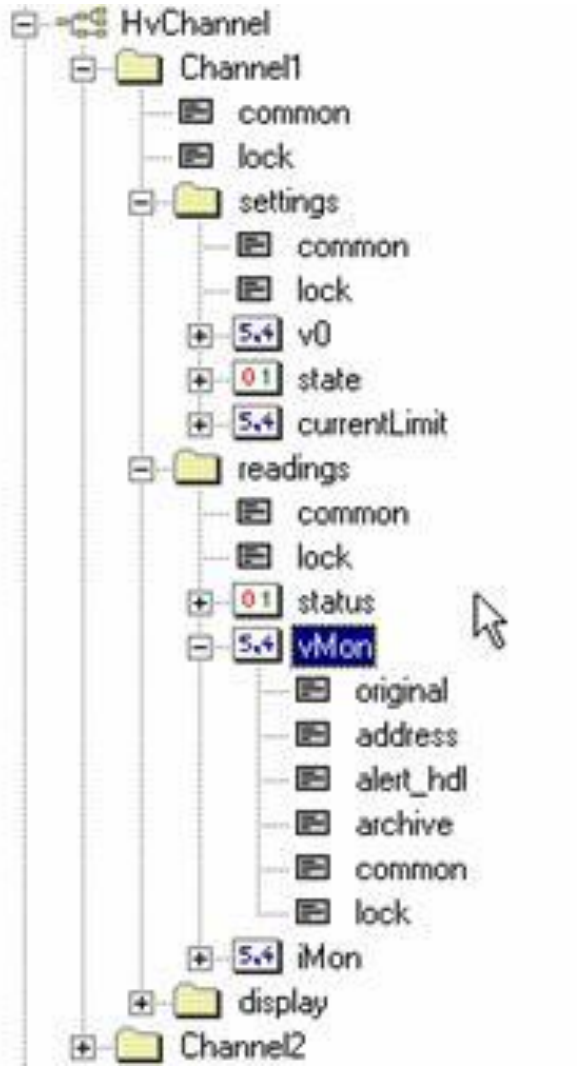
Runtime DB

- Current image of the control system.
- Store values and structures.
- Each element of the system is a data point (DP) of a certain data point type (DPT).
- A DPT is a structure used to model data such as devices (Object oriented way)
- A data point consists of Data point Elements (DPE) that can hold values

Data point type HvChannel

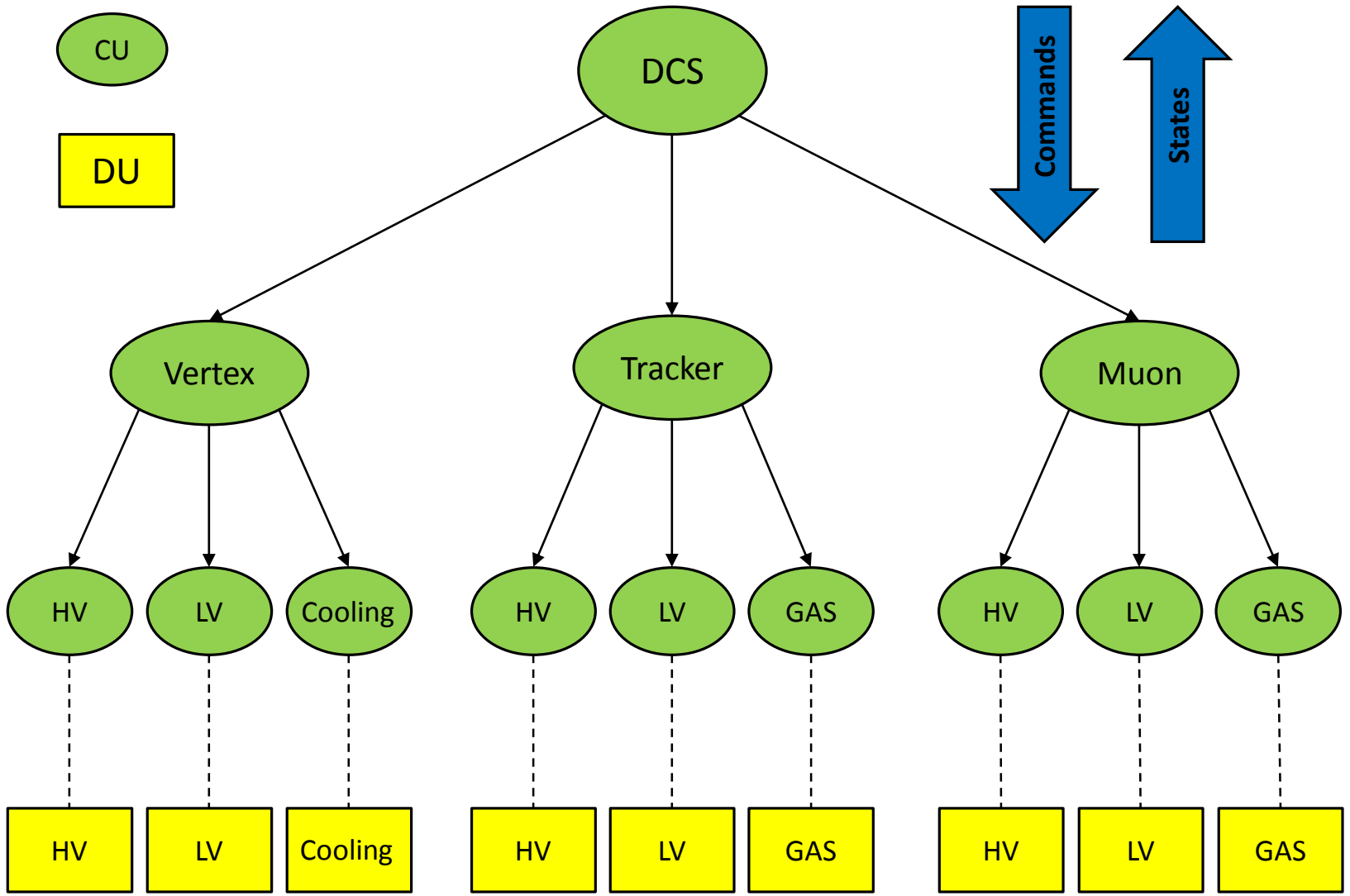


Data point of type HvChannel



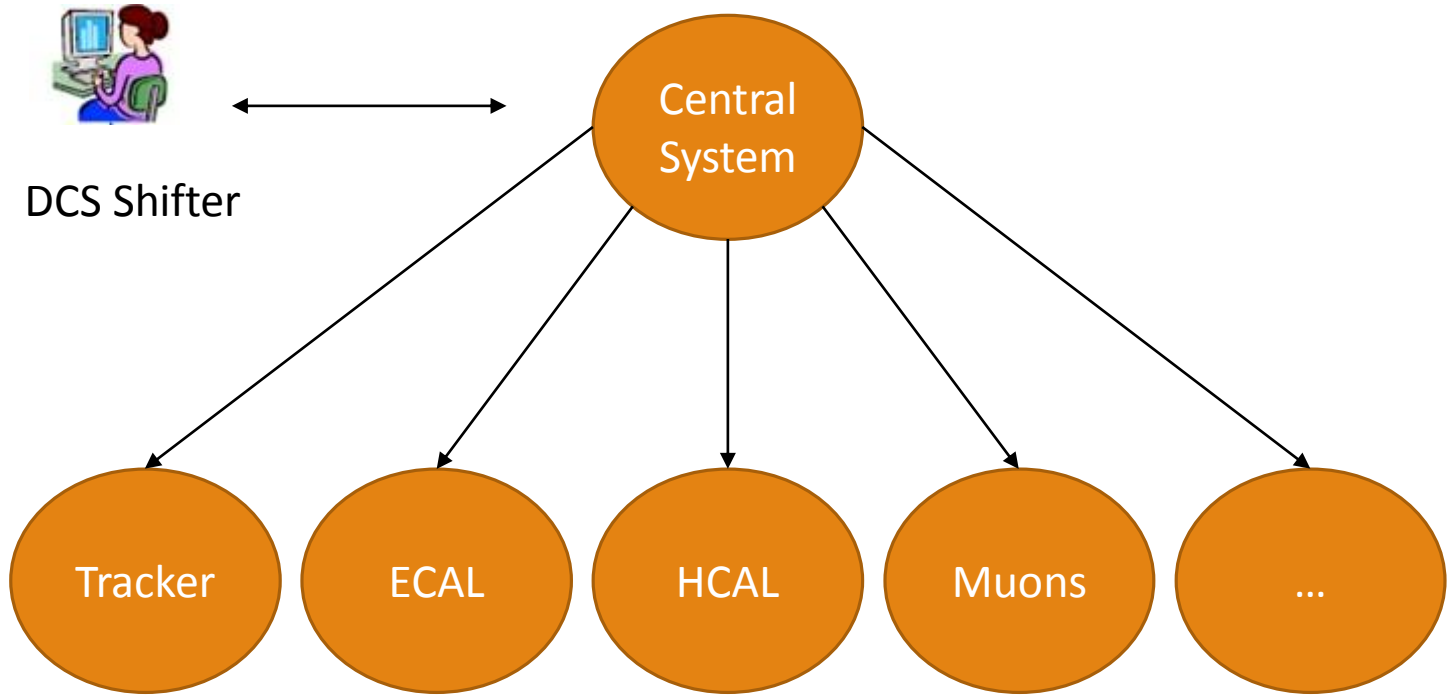
Finite State Machine

- Efficiency in detector operation.
- Division of system in nodes
- Set of states and Actions
- States from bottom up
- Commands from up to bottom



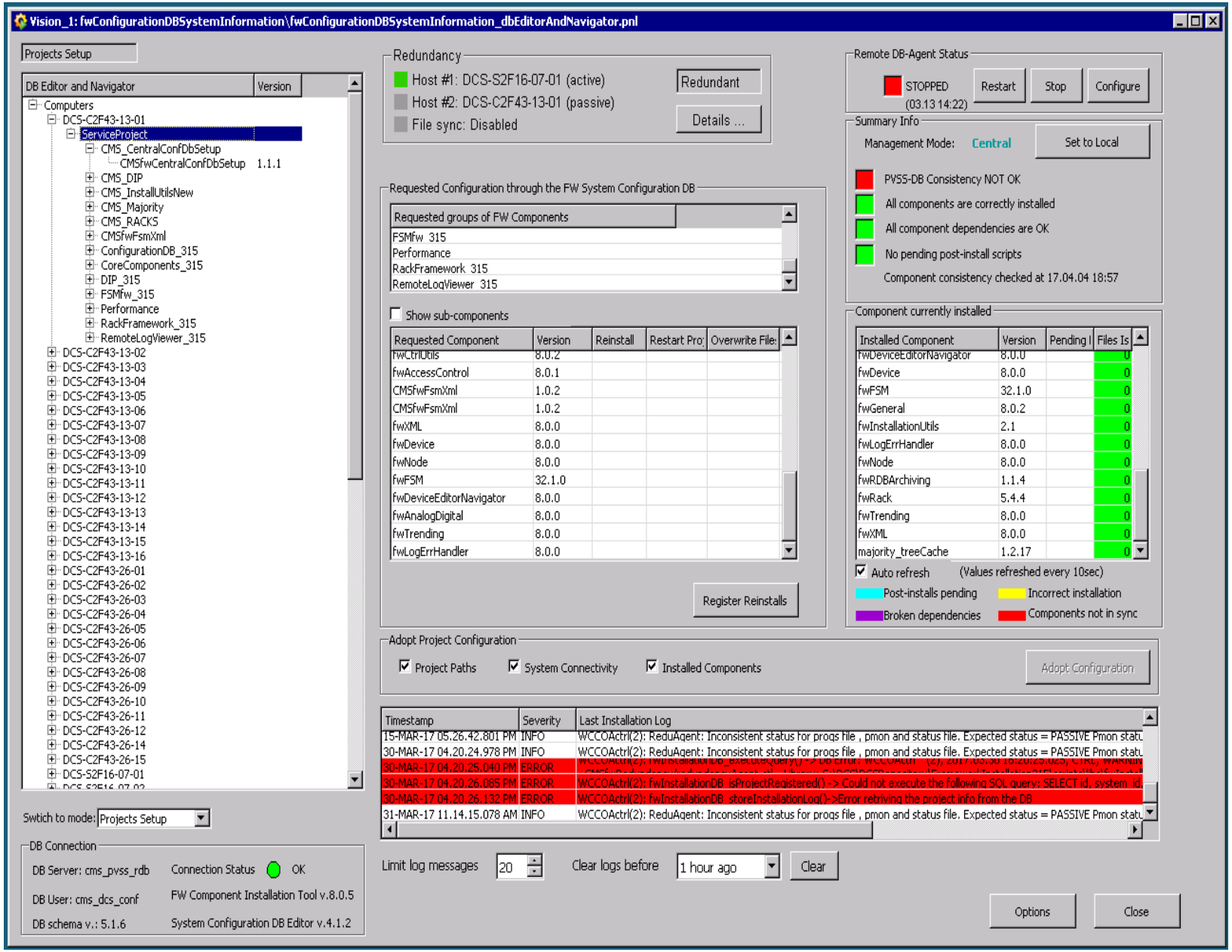
CMS Detector Control System (DCS)

- More than 35 individual systems
- Minimal systems modified by a bunch of JCOP-like CMS components
- Centralized
- Central DCS responsible for the maintenance of all the projects

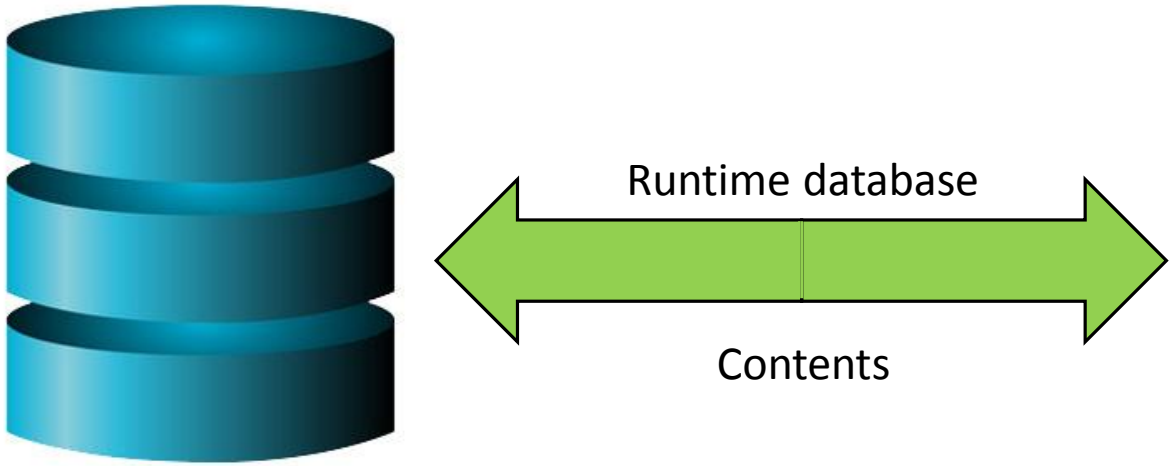


DB editor navigator

- Administer all CMS systems
- Store the system information in a Database
- Completely reworked to fit CMS needs
- Merged with the CMS installation utilities

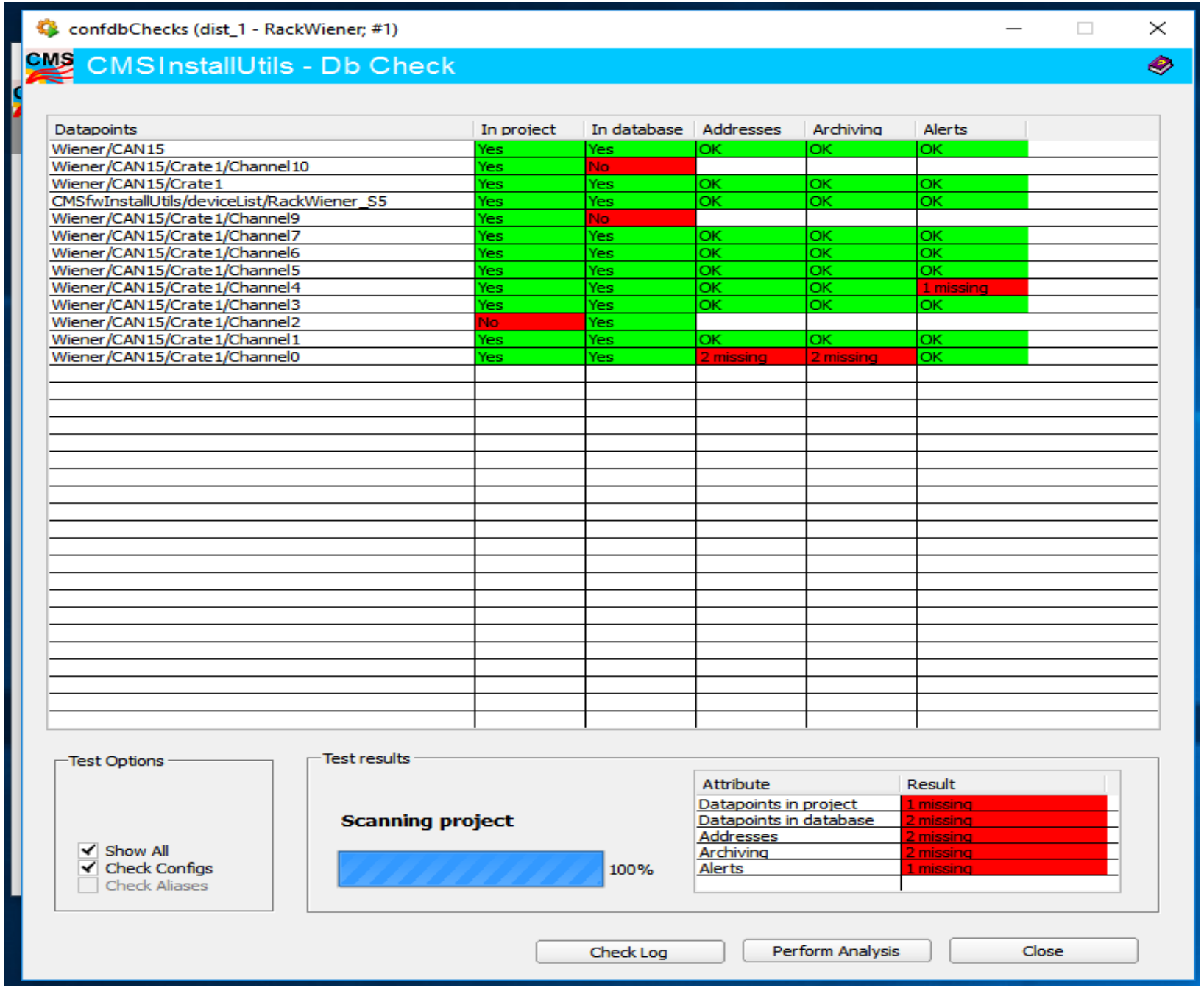


Configuration DB

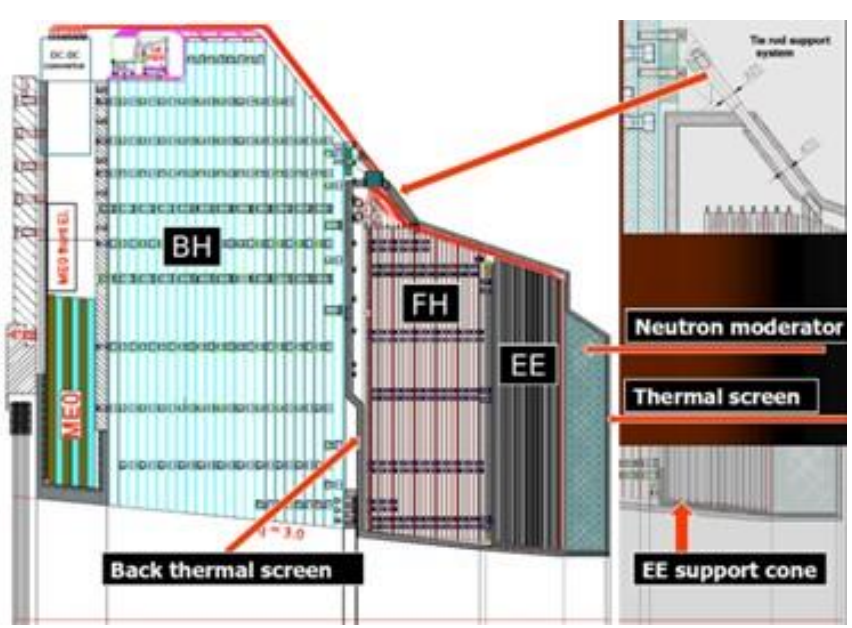


CMSfwInstallUtils

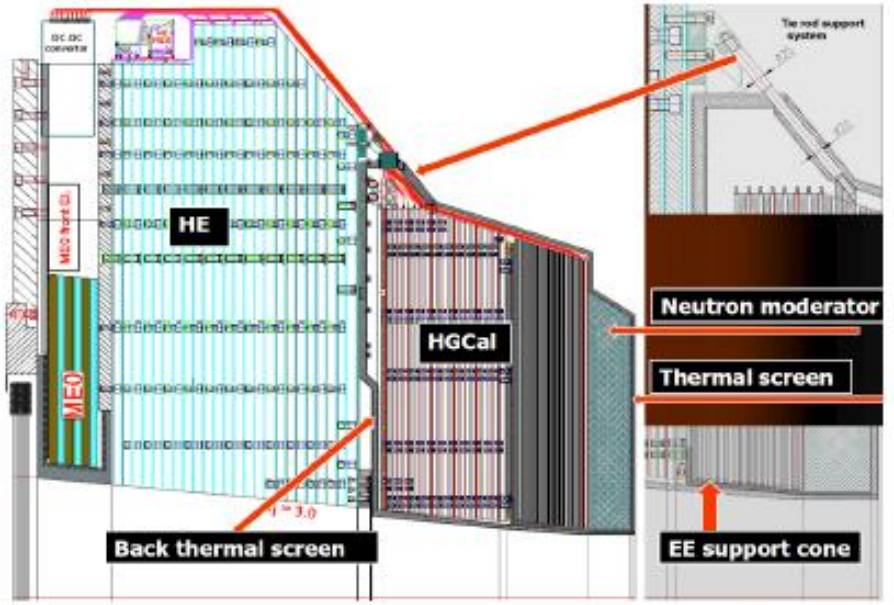
- CMS extension to the JCOP configuration DB tool, CMSfwInstallUtils.
- Quick and flexible way of selecting the datapoints.
- Save all information in a single click.
- Comparison mechanism between system and database



High Granularity CALorimeter (HGCAL)

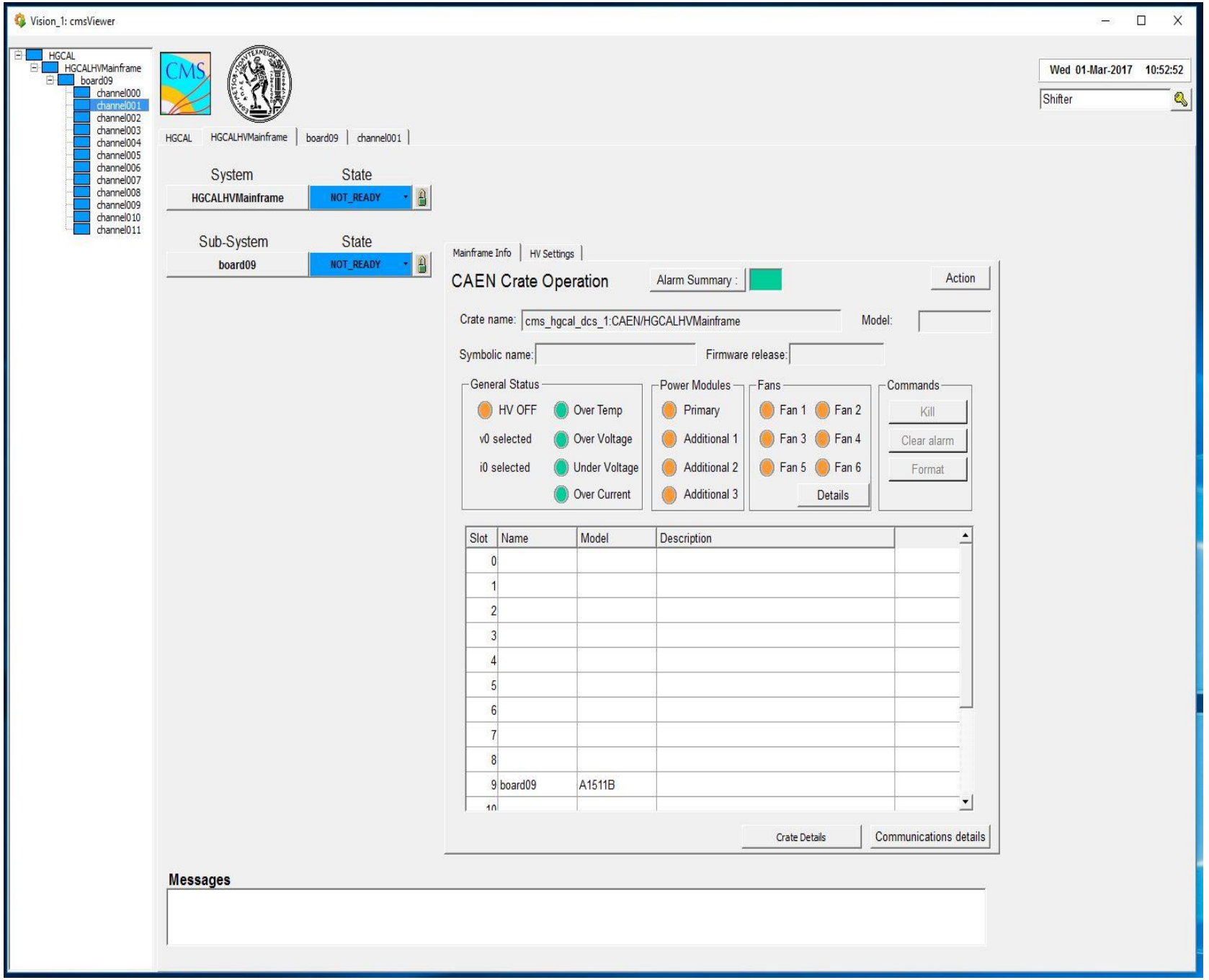


Phase 2 Upgrade

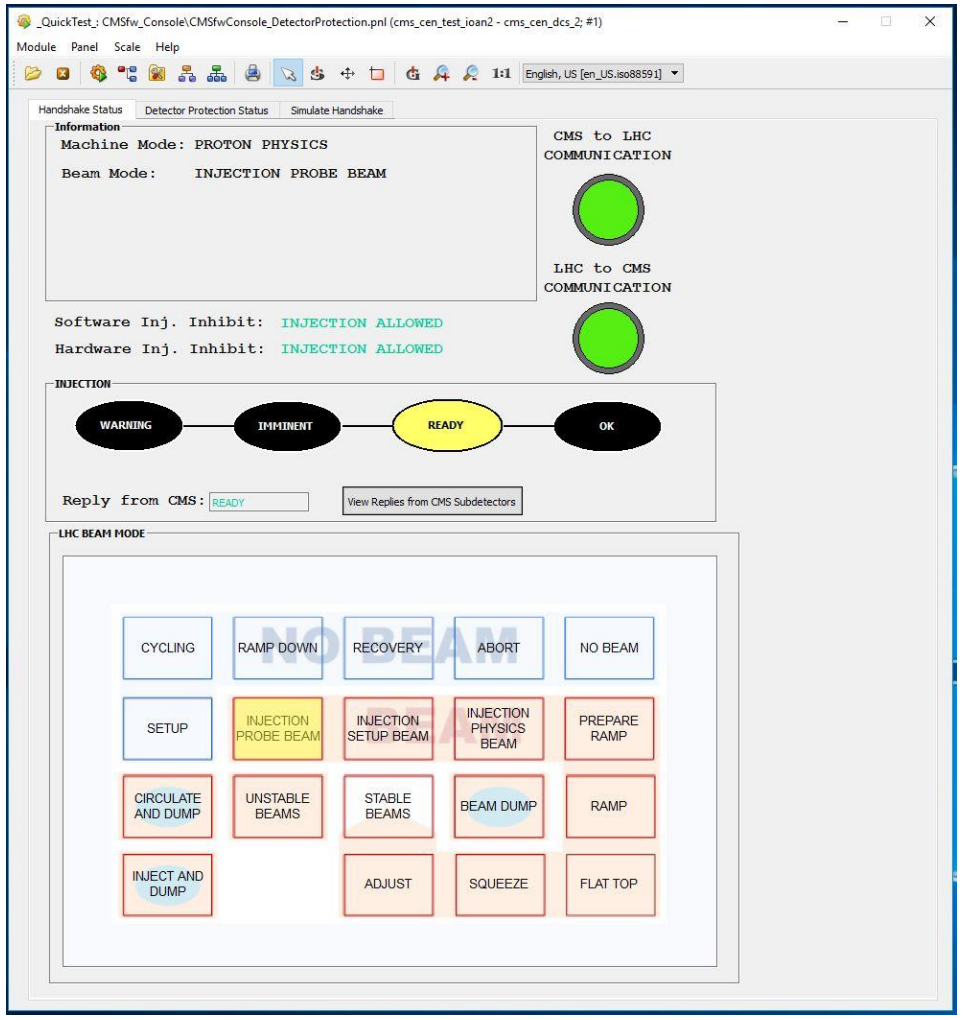


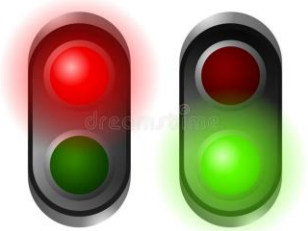
HGCAL DCS

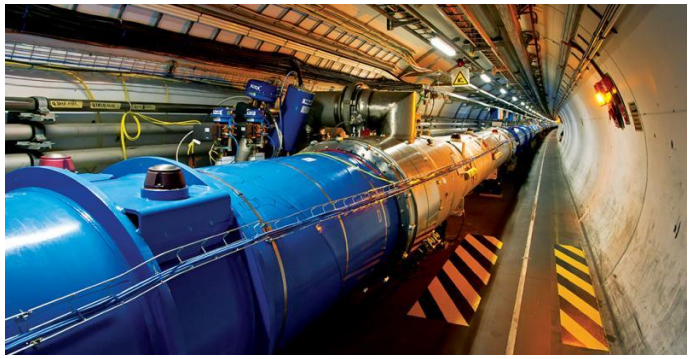
- Wrapped in a component
- FSM approach
- Oracle DB archiving
- Access Control

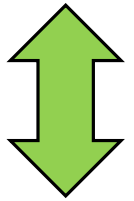


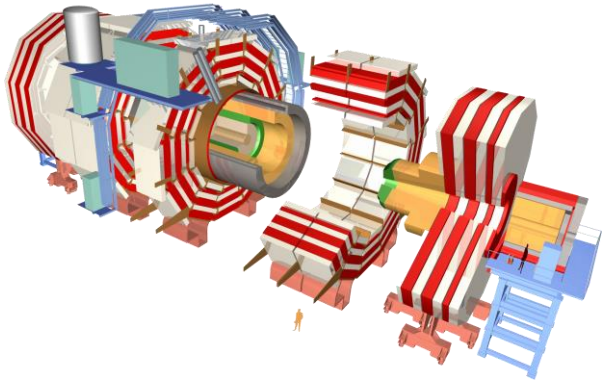
CMS LHC Communication











Conclusions

- Overview of the Detector Control System of CMS
- Involvement of NTUA-CMS group in DCS
- Improvement and maintenance of the system
- CMS upgrade

THANK YOU FOR YOUR ATTENTION!