The Common Infrastructure Control of the ATLAS experiment

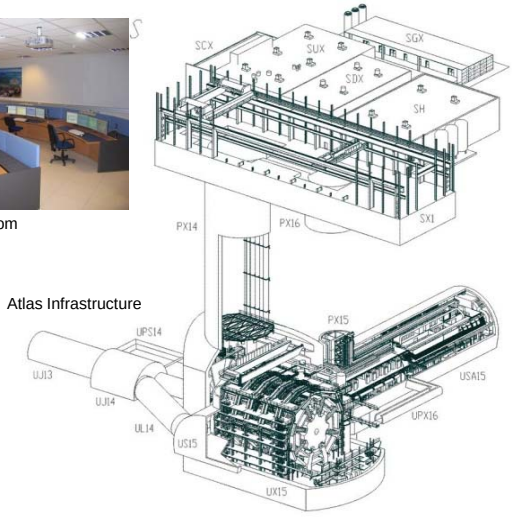
Olivier GUTZWILLER

Introduction

The Detector Control System (DCS) of the ATLAS experiment has the task to ensure safe operation of the detector and the hardware. The DCS is a highly distributed system based on the SCADA software package PVSS and is hierarchically represented by a Finite State Machine (FSM) mechanism allowing for standardized operation and error handling in each functional layer. The DCS also uses the JCOP framework, which consists of a set of guidelines, components and tools designed to facilitate the implementation of homogeneous controls applications for the LHC experiments.

An important role of the DCS is played by the Common Infrastructure Control (CIC). It supervises all parts of ATLAS which are not under the direct responsibility of a sub-detector, in the counting rooms and in the experimental cavern. During the last year, the technical infrastructure and the common services of ATLAS have continuously been supervised by a human operator in the control room using the CIC.

Atlas Control Room



Atlas Infrastructure

ELMB read-out

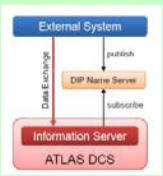
The Embedded Local Monitor Board (ELMB) are electronic boards designed to standardize the I/O of a large variety of sensors and therefore simplify their integration in the DCS. The communication with the DCS is handled using the *CANopen* protocol and OPC servers. The ELMB are:

- radiation tolerant
- insensitive to the magnetic field.

The CIC has a network of 40 CAN buses / 600 ELMBs, deployed in the counting rooms and in the experimental cavern.

Connection to external systems

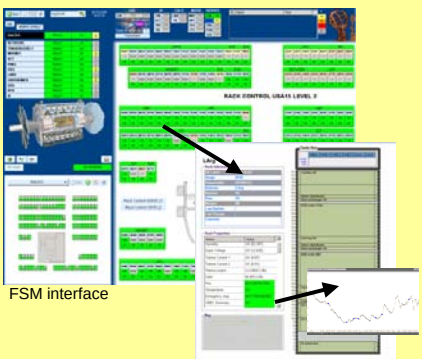
The data exchange between the DCS and the external control systems is handled via the DIP protocol. It is a communication process designed for highly reliable event-based data transfer between heterogeneous systems. The CIC has one dedicated Information Server to collect data from all external systems.



RackControl application

The Rack Control is the main application of the CIC. It supervises the 500 electronic racks in the counting rooms and in the cavern. It takes into account several parameters, such as electricity distribution information coming from a dedicated PLC, and environmental parameters (temperature, status of the fans, cooling pipes,…) measured by an ELMB placed in the Turbine Unit. It also allows sending commands via the ELMB to apply corrective actions. Information is available on the FSM at different level, from a counting room overview up to a single rack parameter.

USA15 Counting Room



FSM interface

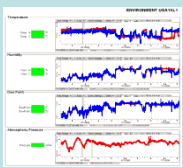
Other applications

- Environment monitoring
- Cooling and Ventilation (CaV)
- Electricity distribution
- Gas, Cryogenics, Magnets, Sniffers systems
- Radiation Monitoring
- Finding Persons Inside Atlas Area (FPIAA)
- Detector Safety System (DSS)
- LHC parameters

Conclusion

The CIC has been widely used to supervise the common infrastructure of ATLAS during the 2 last years.

- Stability of the system was proven
- Design allows evolution of the CIC control system over the lifetime of the experiment, both on the hardware and on the software.
- First experiences with beam operation in 2008



References

- "The detector control system of the ATLAS experiment", published as 2008_JINST_3_P05006
- *http://pcatdwww.cern.ch/atlas-point1/dcs/*