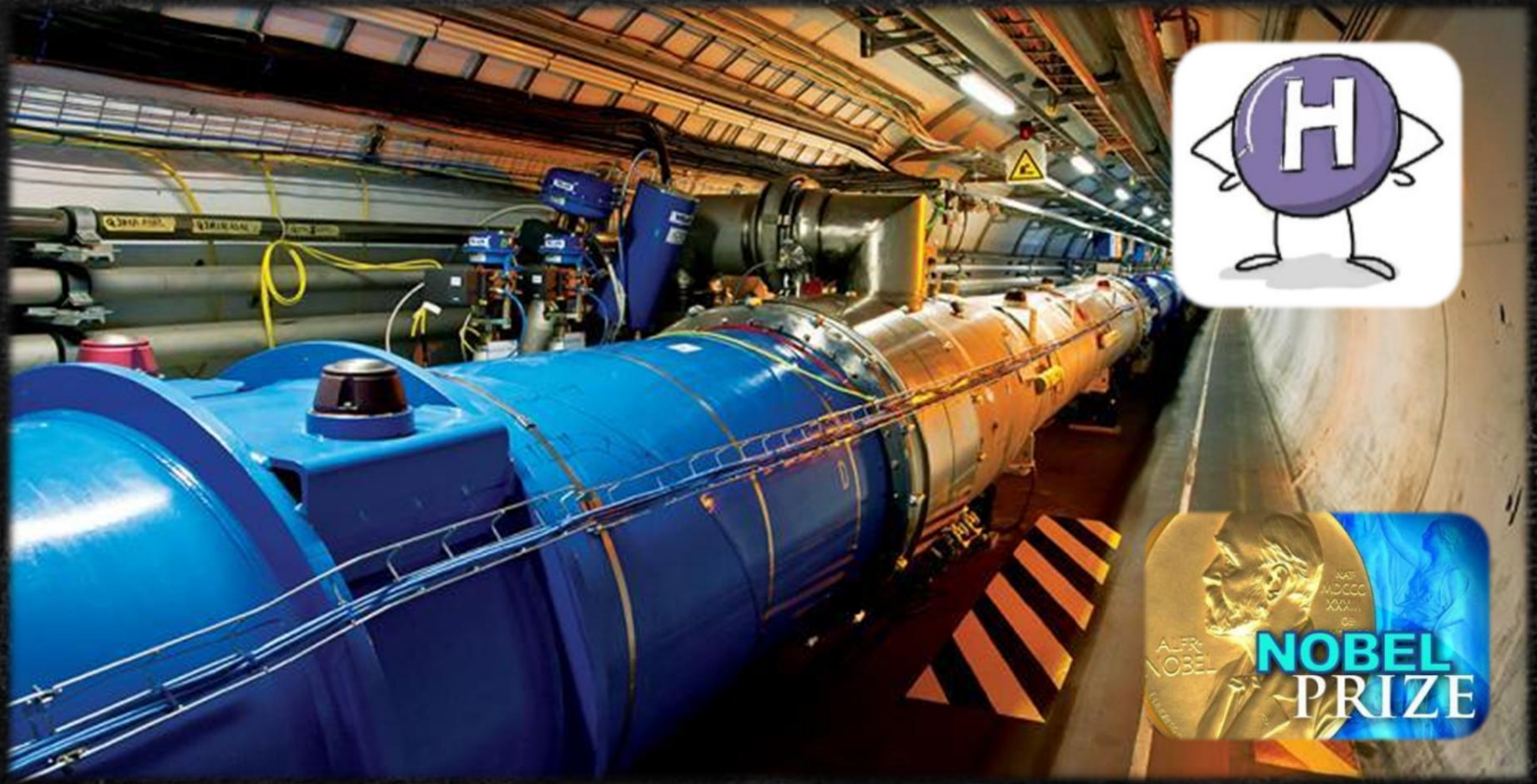
An Integration Framework Tool for ATCA Chassis in the ATLAS Detector

Robert Graham Reed
University of the Witwatersrand

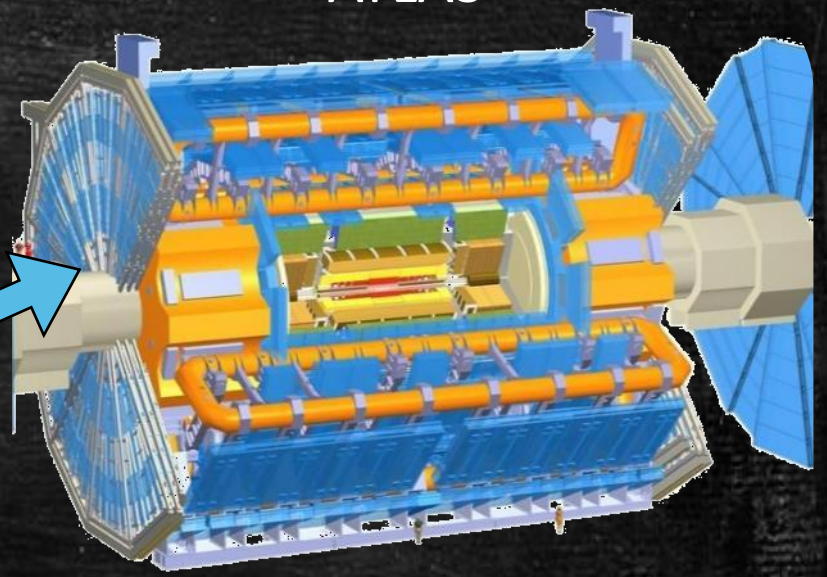
Large Hadron Collider



ATLAS Detector

LHC Ring

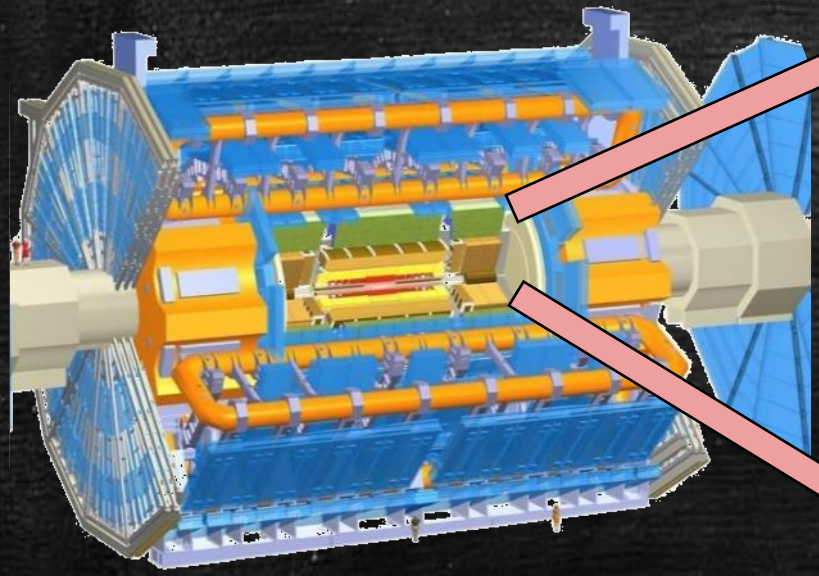
ATLAS



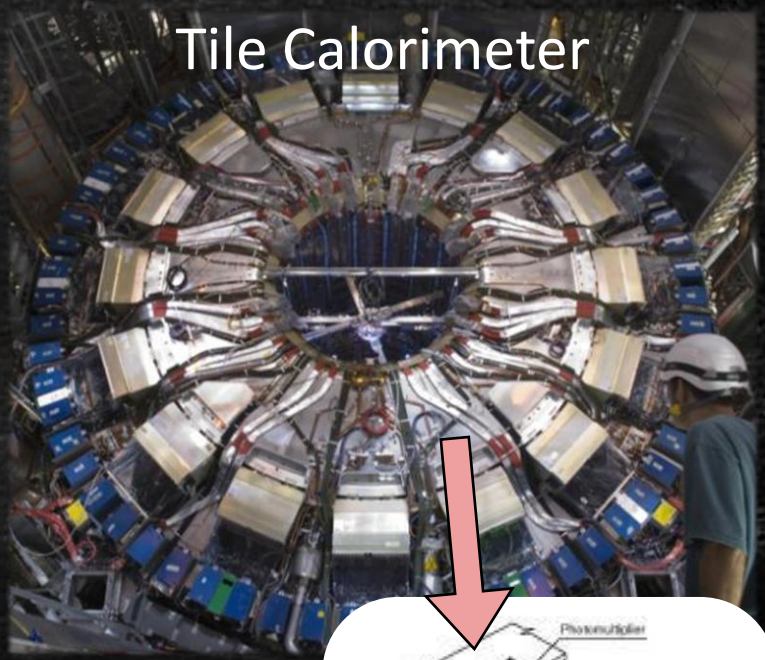
Length : 46 m
Diameter : 25 m
Weight : 7000 t
100 million channels
3km cables

Tile Calorimeter

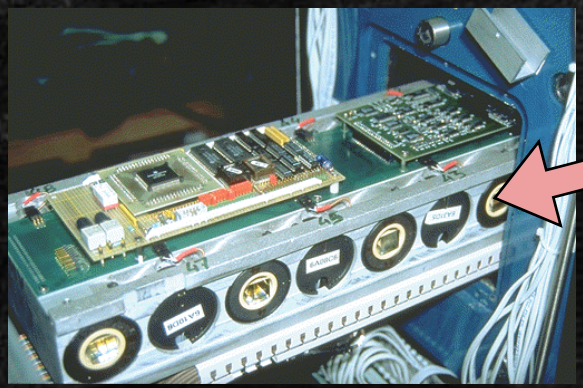
ATLAS Detector



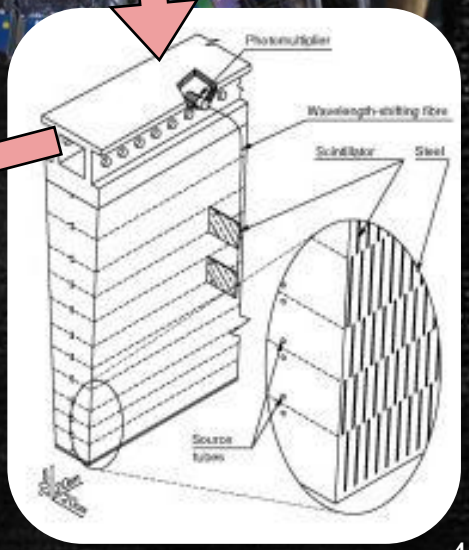
Tile Calorimeter



Front End Electronics



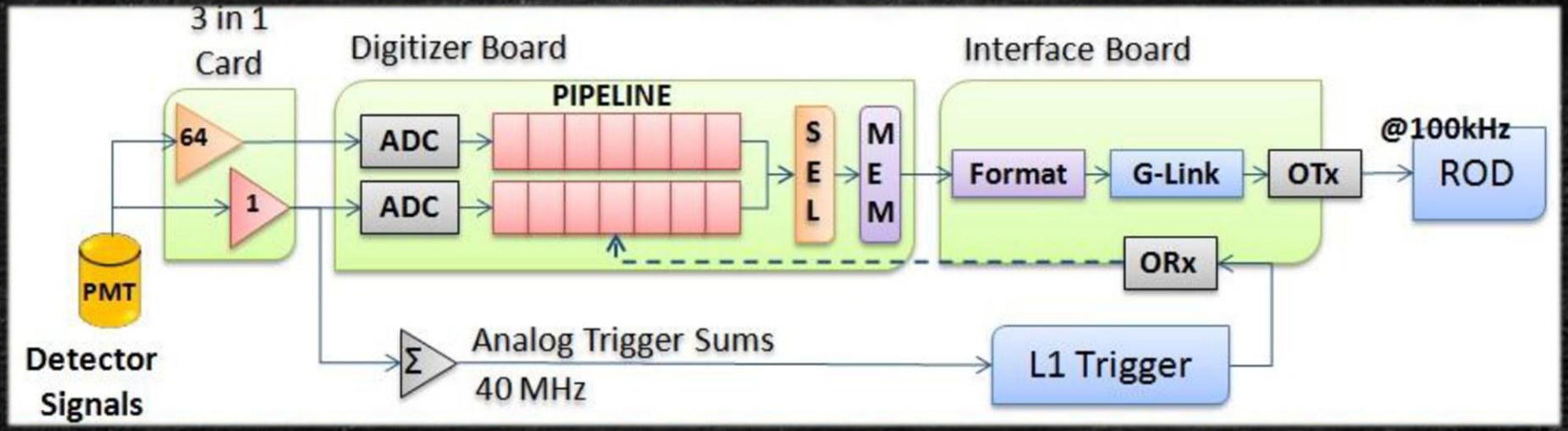
Tile Wedge



Front End Electronics - Upgrade

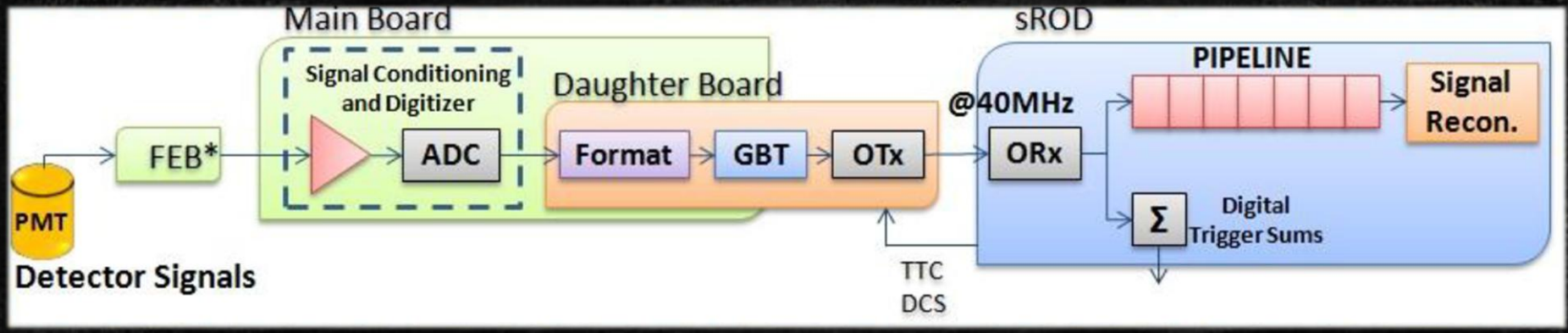
Old Architecture

On Detector ⟵ ⟶ Off



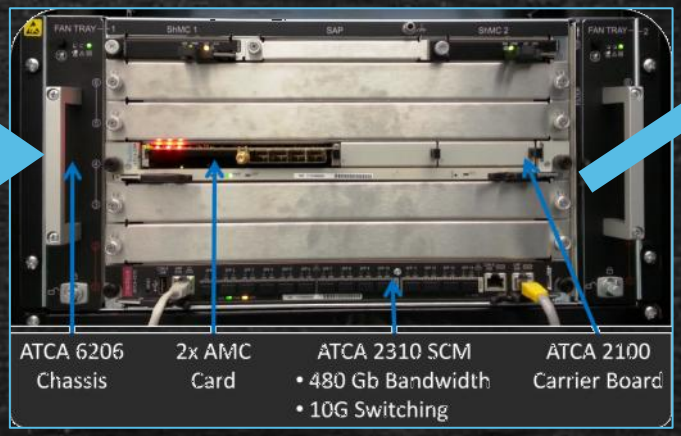
New Architecture

On Detector ⟵ ⟶ Off



Infrastructure Upgrade

sROD



ATCA Chassis

- ATCA replacement for VME Crates
- ATCA will house sROD and interface into the Detector Control System
- No software tools for this integration effort

	Present	Phase II
Total BW	~165 Gbps	~40 Tbps (+40 Tbps)
N. fibers	256	4096 (+4096)
BW/drawer	640 Mbps	160 Gbps (+160 Gbps)

Advantages of ATCA

Large Telecom Industry

kontron ELMA Schroff radisys asis ARTESYN EMBEDDED TECHNOLOGIES EMERSON Network Power

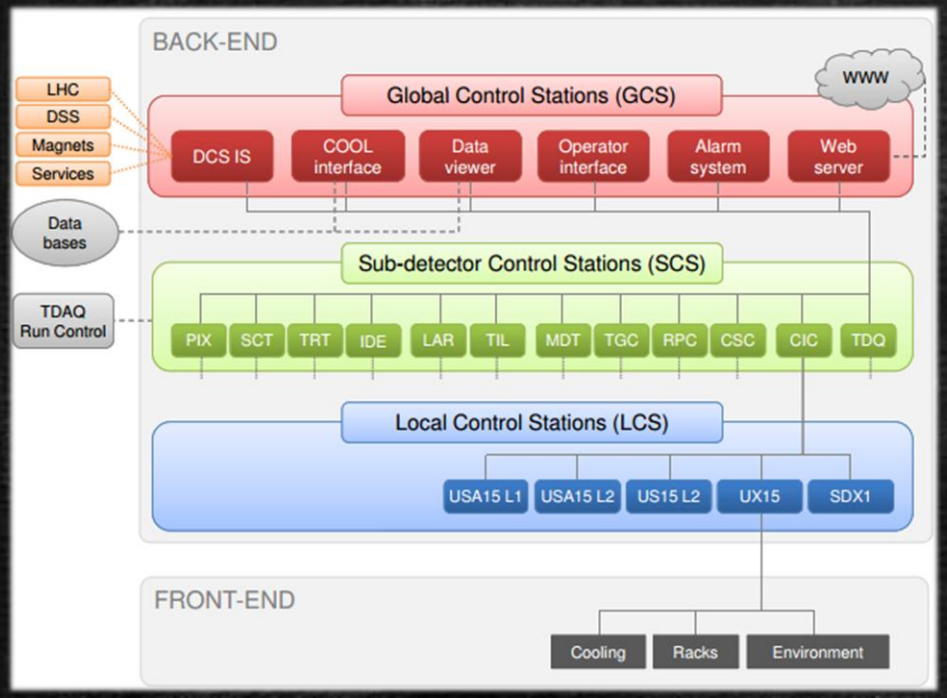
High Availability

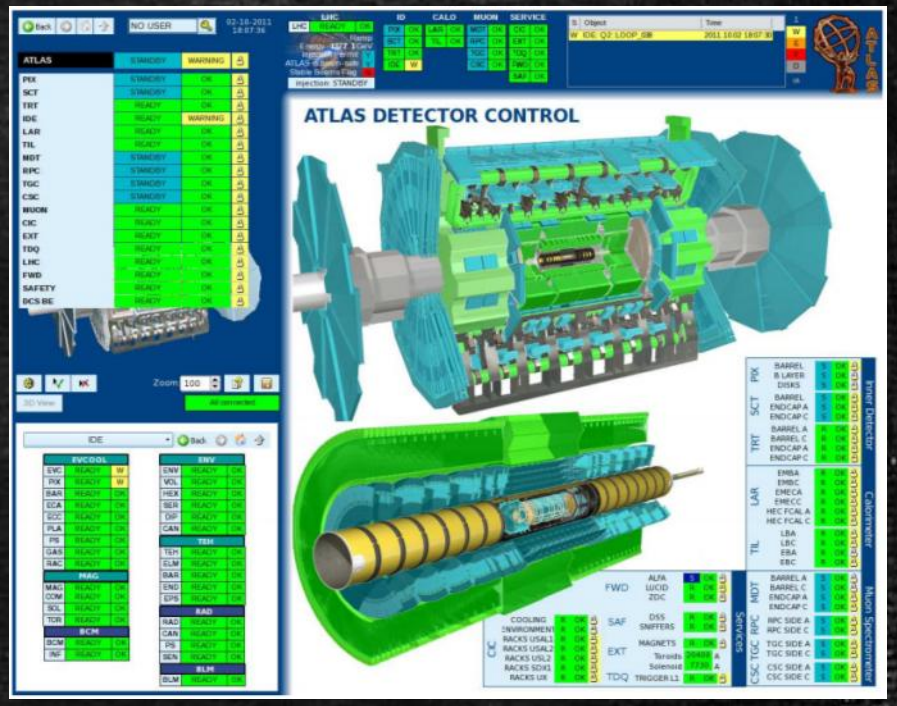
High Reliability

High Redundancy

- Modular (Extremely)
- Hot swapping
- Rear Transition Module
- High Speed Backplane - 10G 40G
- Redundancy
- Monitoring and Control

Detector Control System

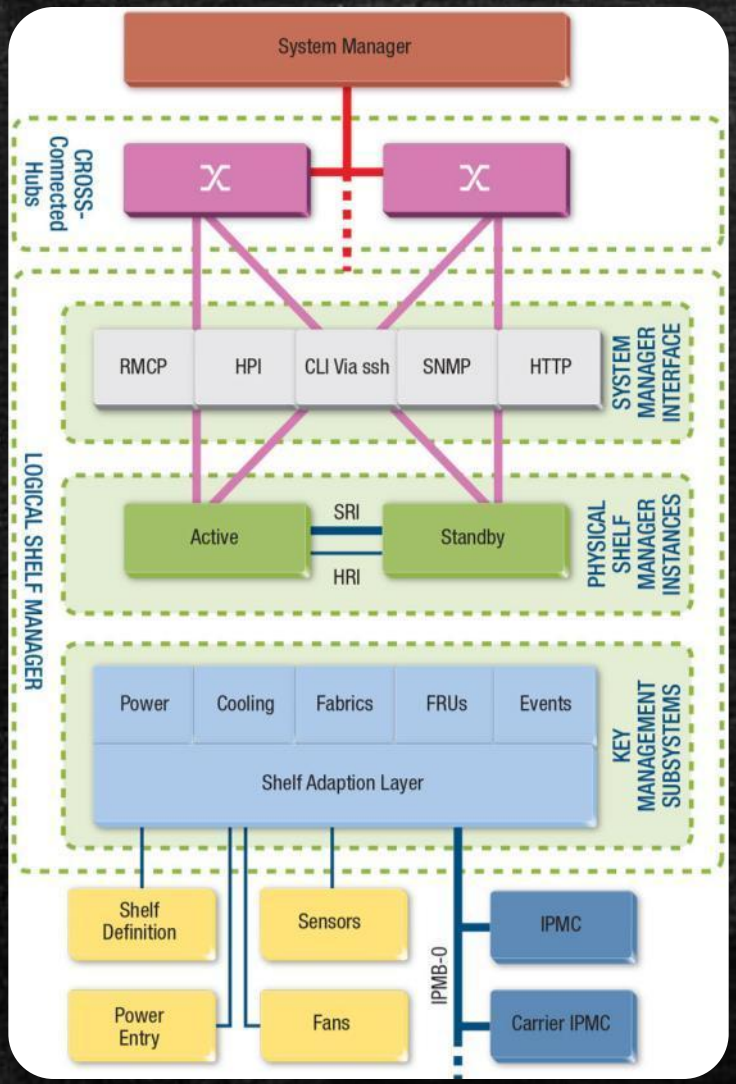




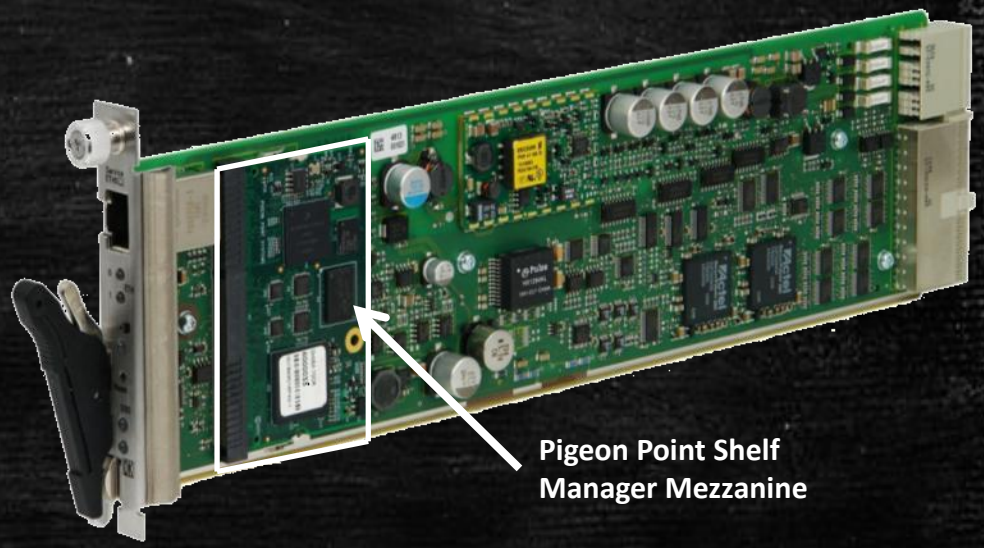
- 12 Sub-detectors and common infrastructure
- Distributed system
- Reads, processes and archives ~ 10^6 parameters

- DCS Web interface
  - Summary of information
  - Live update
  - Easy to read

Interface to ATCA - Shelf Manager



- Pigeon Point Shelf Managers
  - Ethernet connection (SNMP)
  - Passive control
  - Interface to the chassis
  - Follows specifications defined by PICMG VITA and SAForum – Open design, source code and operation
  - Suggested by ATLAS DCS



Framework Tool Desired Functionality

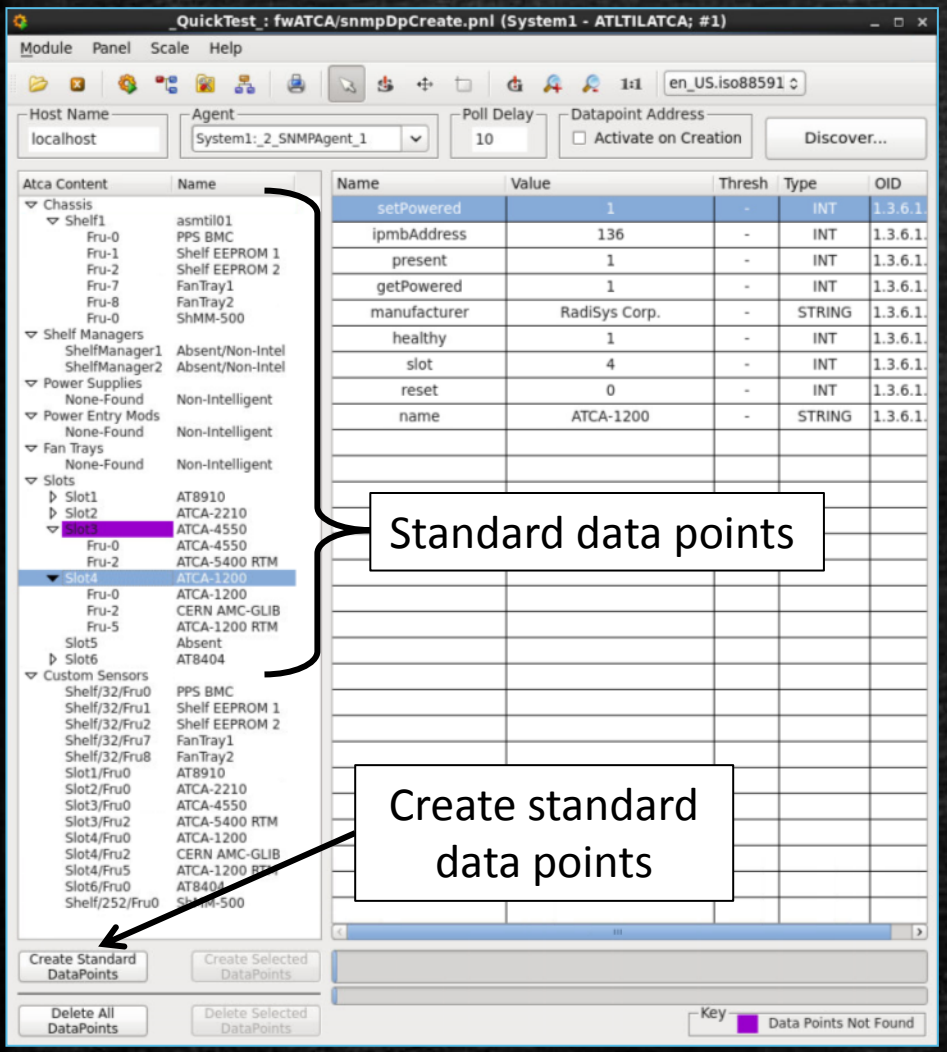
Search

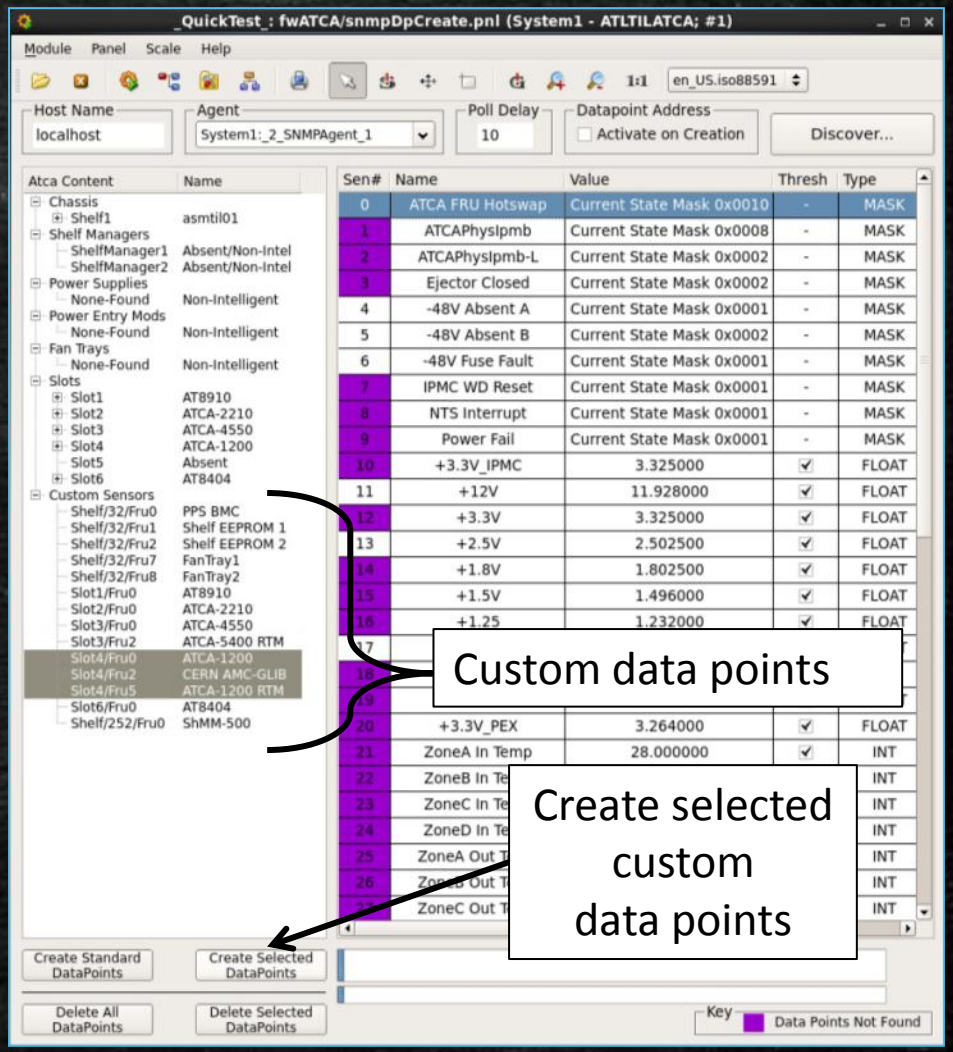
Sort

Create

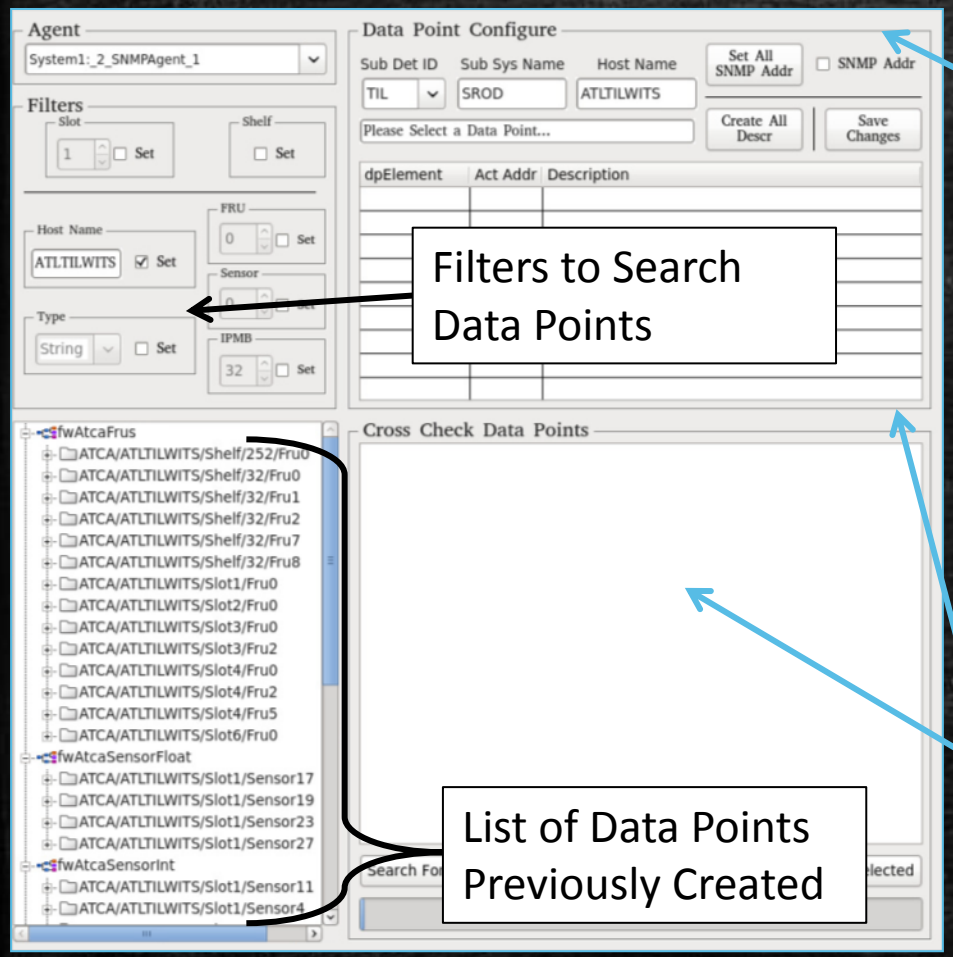
Configure

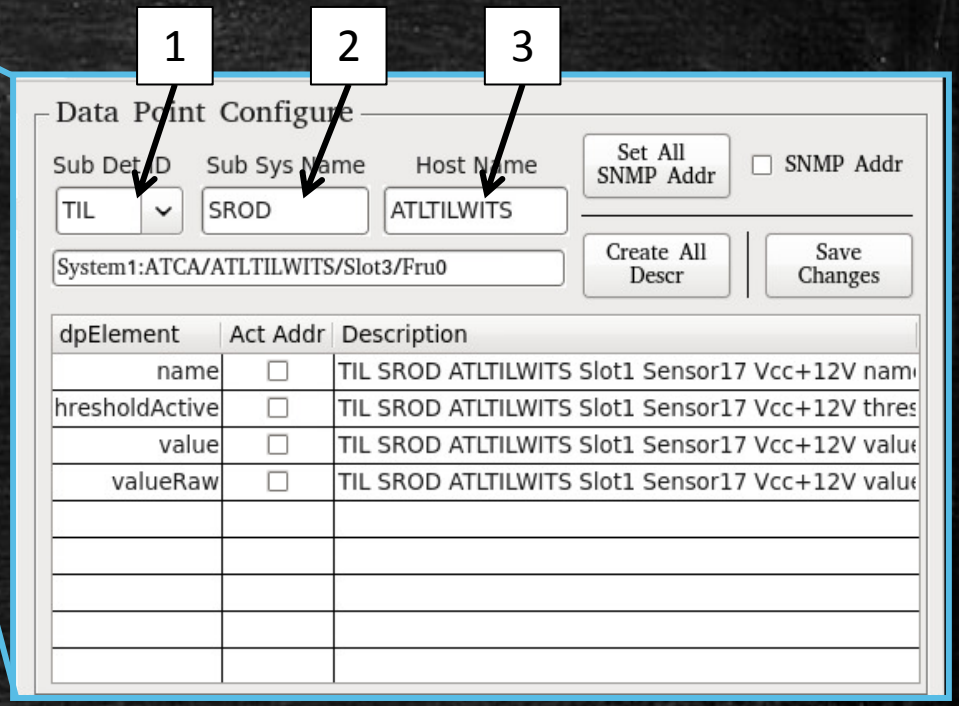
fwATCA – Search – Sort – Create





fwATCA - Configure



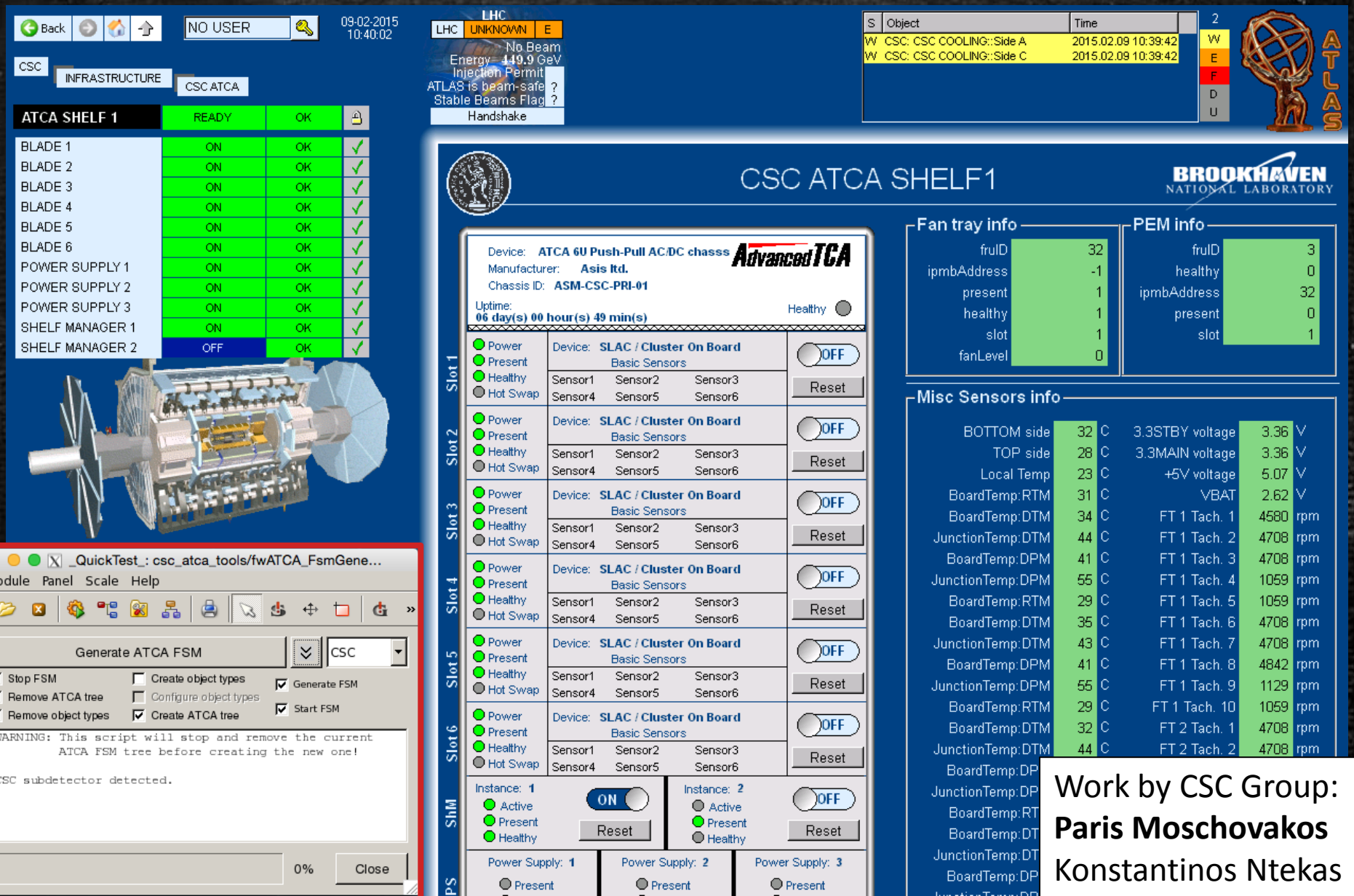


Cross Check Data Points to show data points not found in Shelf

ATLAS ATCA DCS Developers

- We started E-group after first version of fwATCA
  - atlas-dcs-atca-developers@cern.ch
- Currently have 14 members
- First kick starter meeting
  - https://indico.cern.ch/event/370695/
- Outcome:
  - Positive feedback about fwATCA with some suggestions
  - accepted by DCS and developers group
  - Using framework as the basis of integration effort
  - Adding new features:
    - Finite State Machine (Almost complete – CSC Group)
    - Generic status panels (Almost complete – CSC Group)
    - Alert configuration (Work in progress)

FSM Generation & Display



Work by CSC Group:
Paris Moschovakos
Konstantinos Ntekas

Summary & Plans

- Pioneered the integration of ATCA into the ATLAS DCS – Now used by:
  - CSC (MicroMega), L1Topo and FTK
- Common ATLAS framework which provides a platform to:
  - Search, Sort and standardize information
  - Automate data point creation and configuration
- Platform allows:
  - Custom panel development
  - Finite State Machine development
  - Expert configuration and control
- Future work
  - Alert configuration panel

Acknowledgement & Information

Stefan Schlenker

Filipe Martins

Alberto Valero and Carlos Solans

- Documentation

https://twiki.cern.ch/twiki/bin/viewauth/Atlas/AtlasDcsAtca

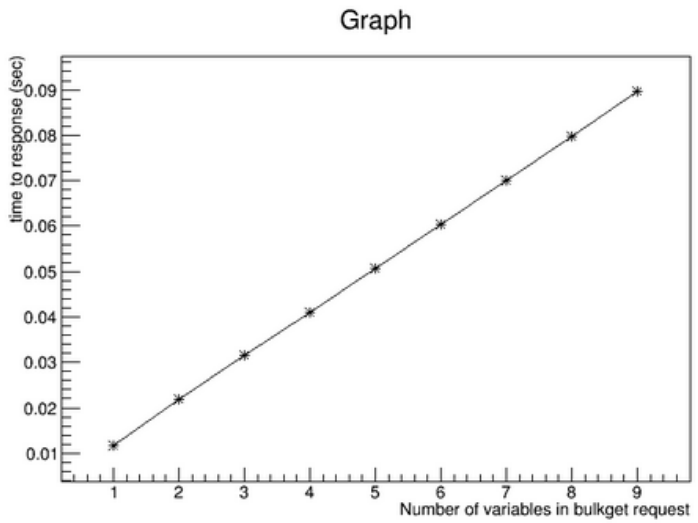
- SVN Repository

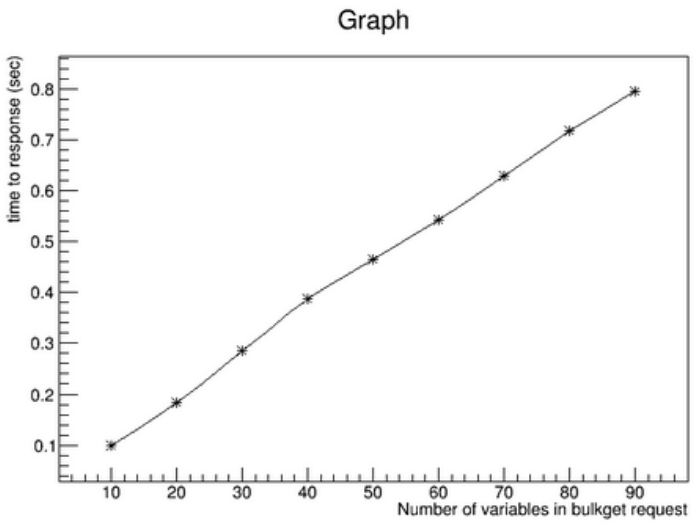
https://svnweb.cern.ch/cern/wsvn/atlasdcs/fwATCA/

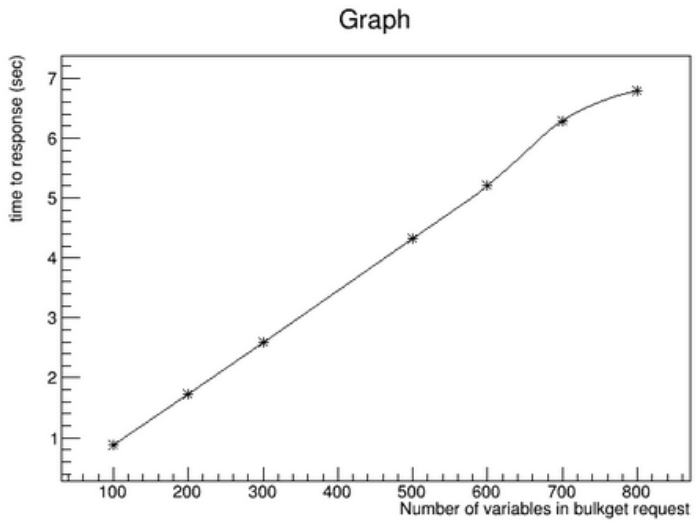
- E-Group

atlas-dcs-atca-developers@cern.ch

Back Up







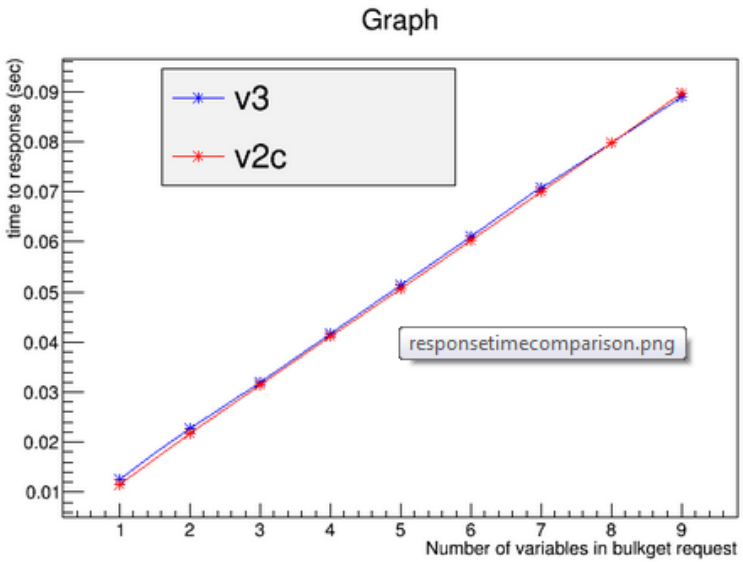
Bulk Get up to 900 Variables

~100 sensors / sec for standard time out

Taken from: https://twiki.cern.ch/twiki/bin/viewauth/Atlas/ShelfManagerInterfaceToDCS

Back Up

Timing results without load on the shelf manager, v2c v3 comparison



No major difference

Taken from:
https://twiki.cern.ch/twiki/bin/viewauth/Atlas/ShelfManagerInterfaceToDCS