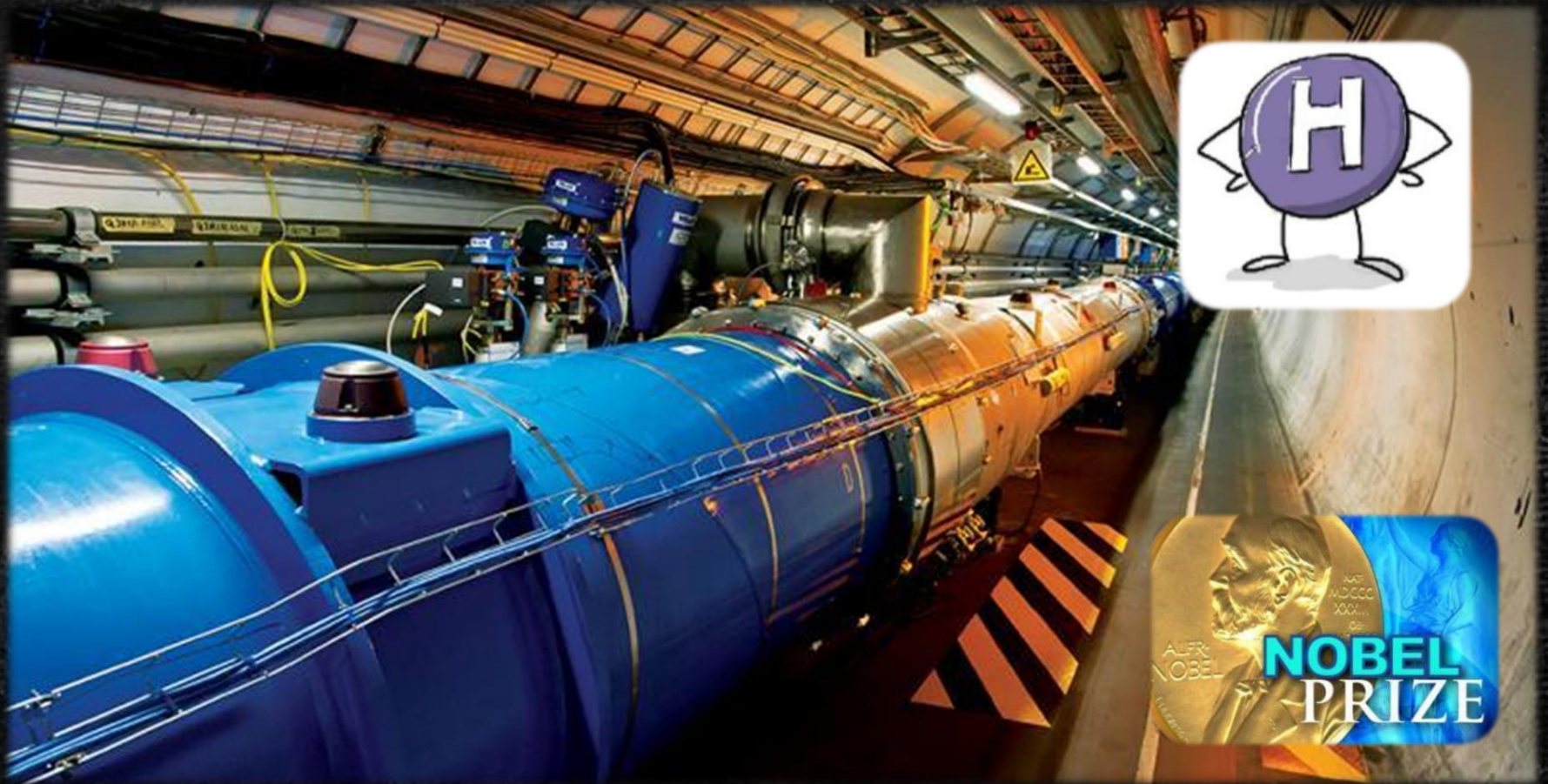


An Integration Framework Tool for ATCA Chassis in the ATLAS Detector

Robert Graham Reed
University of the Witwatersrand

Large Hadron Collider

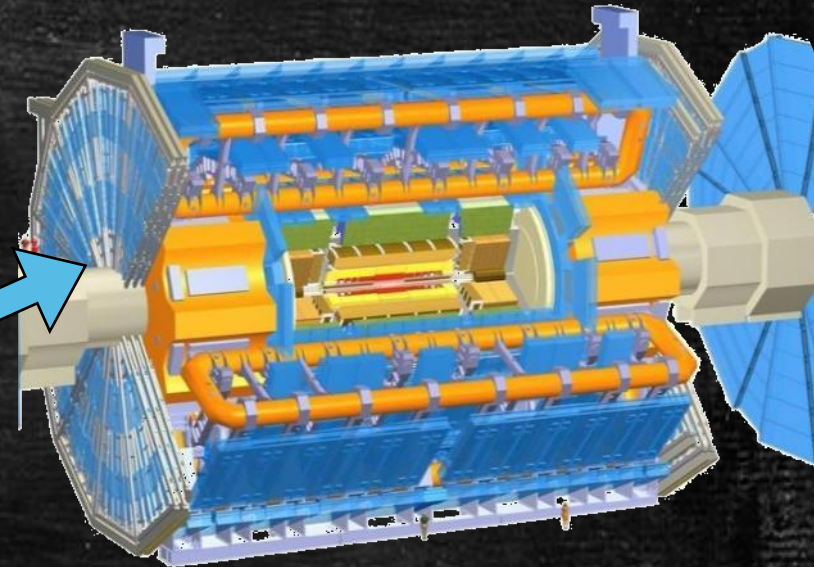


ATLAS Detector

LHC Ring



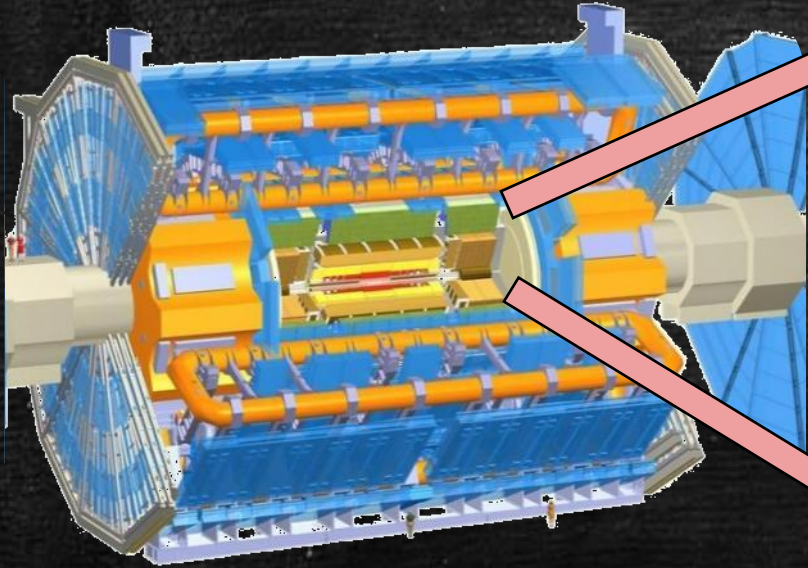
ATLAS



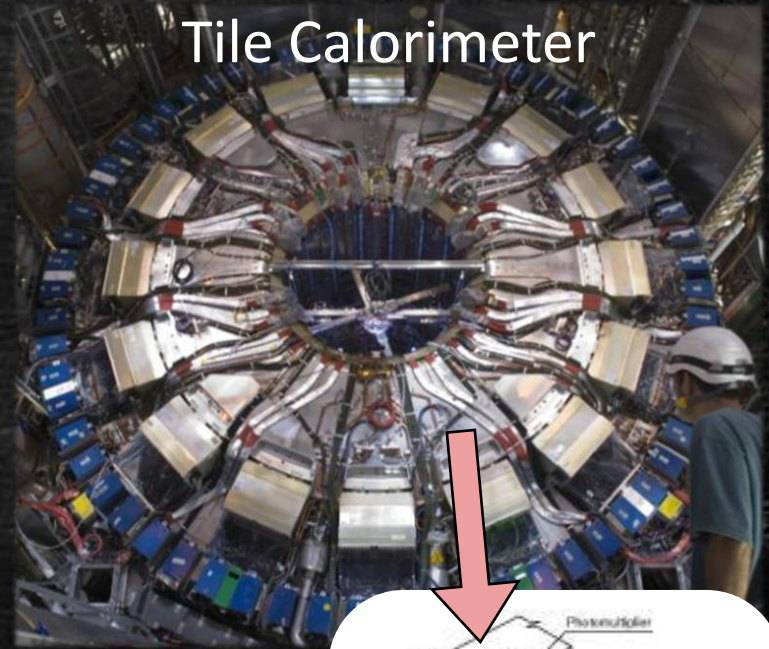
Length : 46 m
Diameter : 25 m
Weight : 7000 t
100 million channels
3km cables

Tile Calorimeter

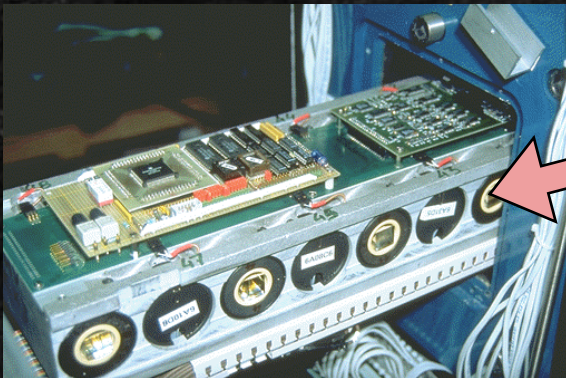
ATLAS Detector



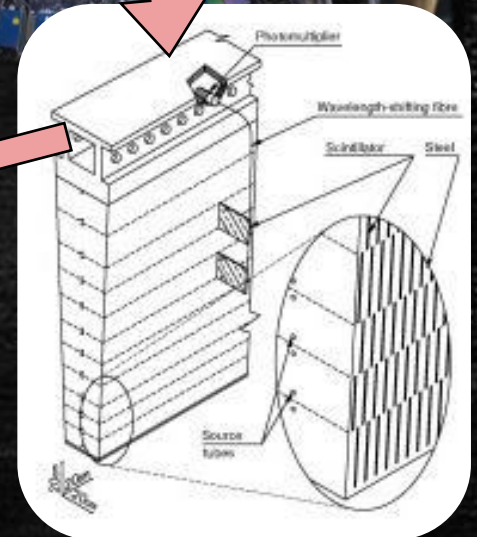
Tile Calorimeter



Front End Electronics



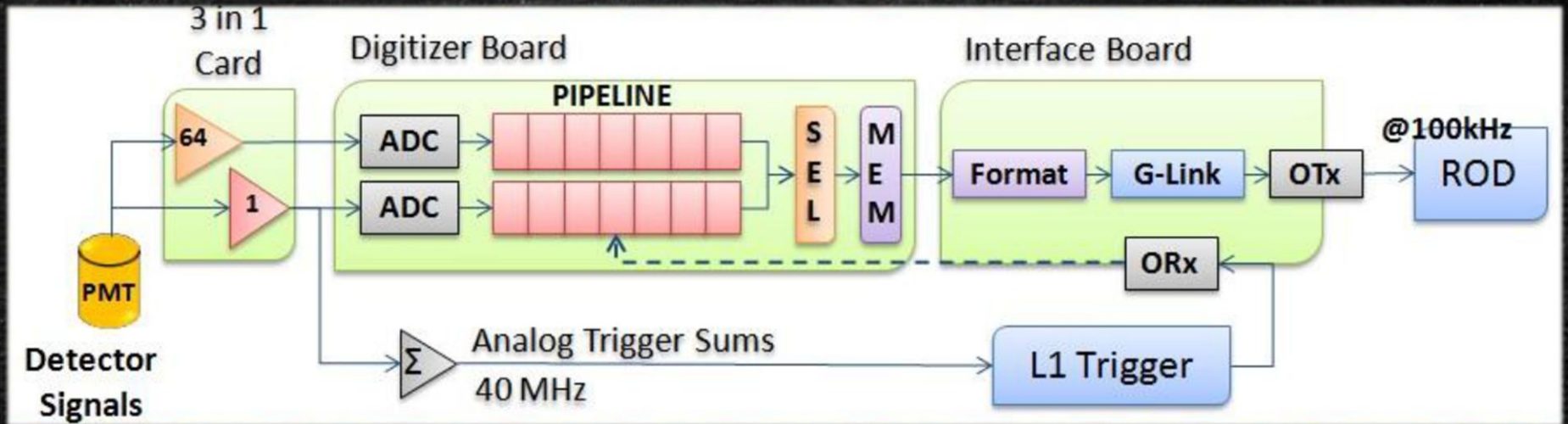
Tile Wedge



Front End Electronics - Upgrade

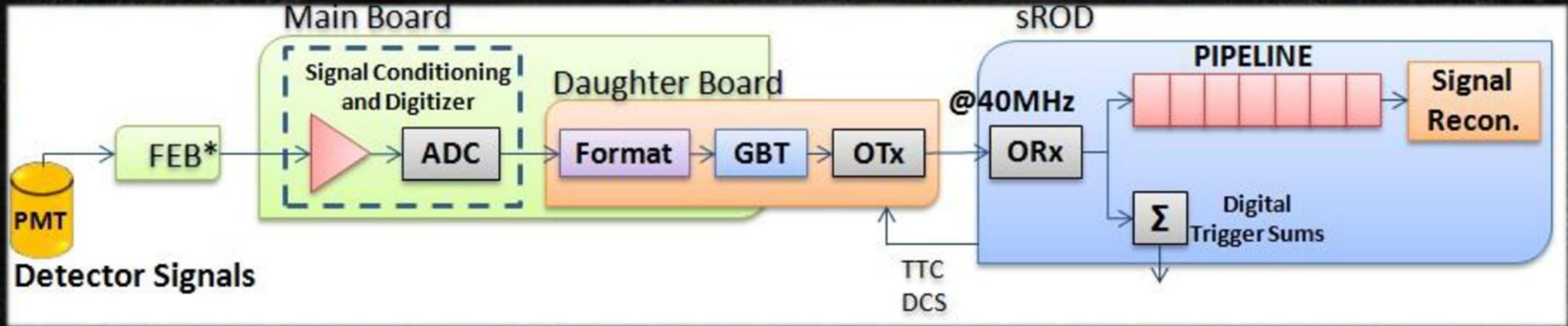
Old Architecture

On Detector ← | → Off



New Architecture

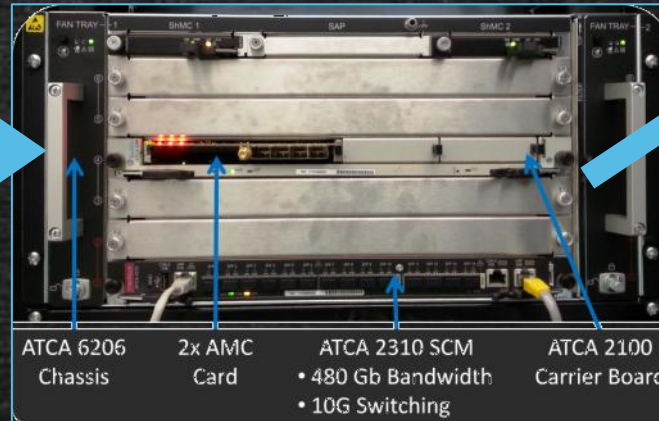
On Detector ← | → Off



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



High Availability

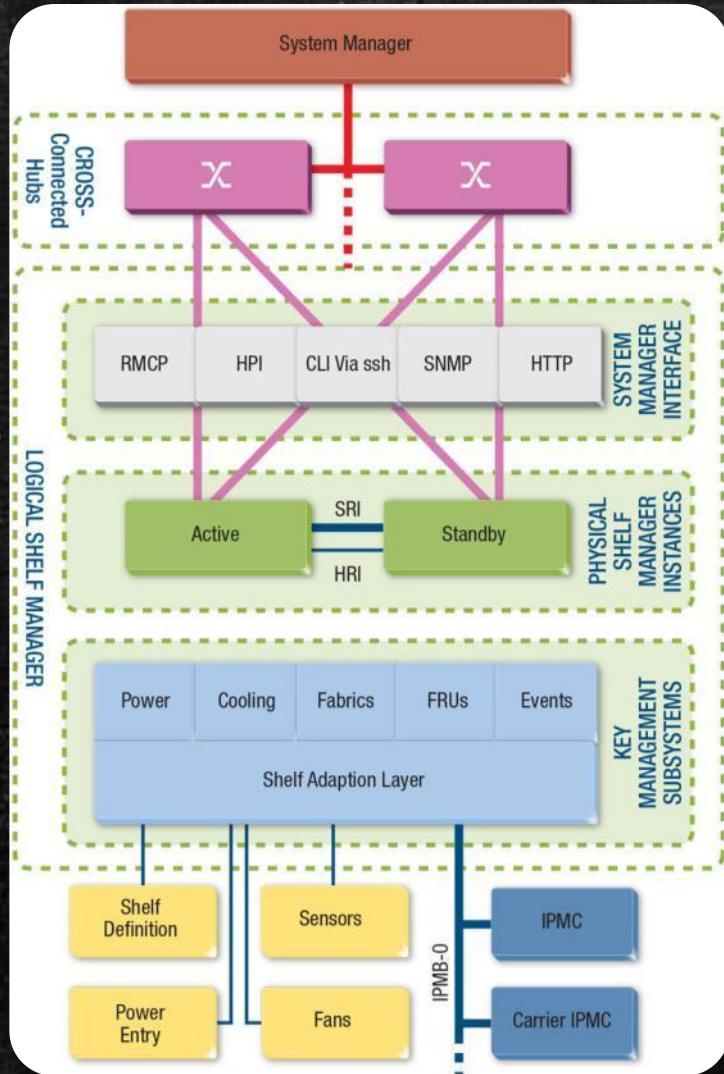
High Reliability

High Redundancy

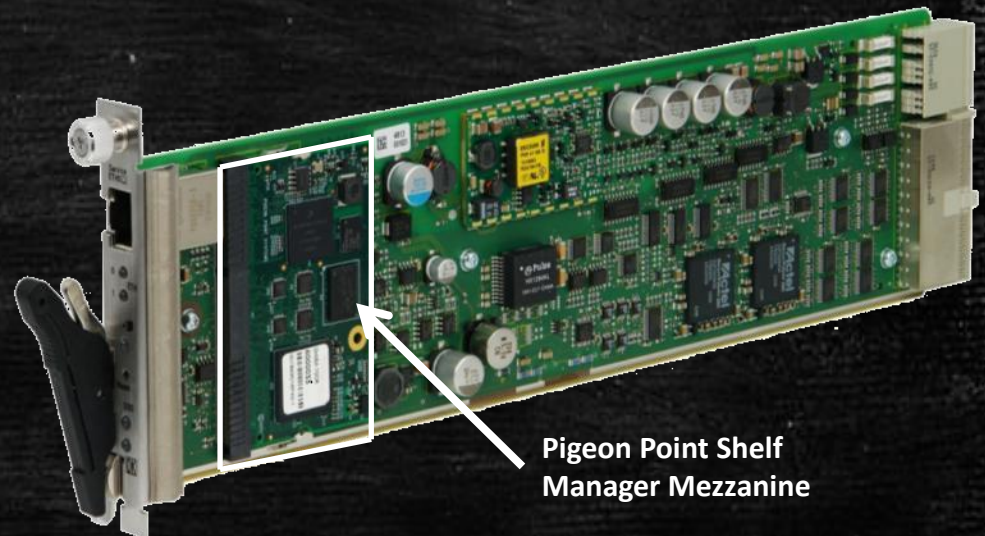
- Modular (Extremely)
- Hot swapping
- Rear Transition Module
- High Speed Backplane - 10G 40G
- Redundancy
- Monitoring and Control



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

QuickTest : fwATCA/snmpDpCreate.pnl (System1 - ATLTILATCA; #1)

Module Panel Scale Help

Host Name: localhost Agent: System1: 2_SNMPAgent_1 Poll Delay: 10 Datapoint Address: Activate on Creation Discover...

Atca Content	Name	Name	Value	Thresh	Type	OID
		setPowered	1	-	INT	1.3.6.1
		ipmbAddress	136	-	INT	1.3.6.1
		present	1	-	INT	1.3.6.1
		getPowered	1	-	INT	1.3.6.1
		manufacturer	RadSys Corp.	-	STRING	1.3.6.1
		healthy	1	-	INT	1.3.6.1
		slot	4	-	INT	1.3.6.1
		reset	0	-	INT	1.3.6.1
		name	ATCA-1200	-	STRING	1.3.6.1

Standard data points

Create standard data points

Create Standard DataPoints Create Selected DataPoints

Delete All DataPoints Delete Selected DataPoints

Key Data Points Not Found

QuickTest : fwATCA/snmpDpCreate.pnl (System1 - ATLTILATCA; #1)

Module Panel Scale Help

Host Name: localhost Agent: System1: 2_SNMPAgent_1 Poll Delay: 10 Datapoint Address: Activate on Creation Discover...

Atca Content	Name	Sen#	Name	Value	Thresh	Type
		0	ATCA FRU Hotswap	Current State Mask 0x0010	-	MASK
		1	ATCAPhysIpmb	Current State Mask 0x0008	-	MASK
		2	ATCAPhysIpmb-L	Current State Mask 0x0002	-	MASK
		3	Ejector Closed	Current State Mask 0x0002	-	MASK
		4	-48V Absent A	Current State Mask 0x0001	-	MASK
		5	-48V Absent B	Current State Mask 0x0002	-	MASK
		6	-48V Fuse Fault	Current State Mask 0x0001	-	MASK
		7	IPMC WD Reset	Current State Mask 0x0001	-	MASK
		8	NTS Interrupt	Current State Mask 0x0001	-	MASK
		9	Power Fail	Current State Mask 0x0001	-	MASK
		10	+3.3V_IPMC	3.325000	<input checked="" type="checkbox"/>	FLOAT
		11	+12V	11.928000	<input checked="" type="checkbox"/>	FLOAT
		12	+3.3V	3.325000	<input checked="" type="checkbox"/>	FLOAT
		13	+2.5V	2.502500	<input checked="" type="checkbox"/>	FLOAT
		14	+1.8V	1.802500	<input checked="" type="checkbox"/>	FLOAT
		15	+1.5V	1.496000	<input checked="" type="checkbox"/>	FLOAT
		16	+1.25	1.232000	<input checked="" type="checkbox"/>	FLOAT
		17				
		18				
		19				
		20	+3.3V_PEX	3.264000	<input checked="" type="checkbox"/>	FLOAT
		21	ZoneA In Temp	28.000000	<input checked="" type="checkbox"/>	INT
		22	ZoneB In Te			INT
		23	ZoneC In Te			INT
		24	ZoneD In Te			INT
		25	ZoneA Out T			INT
		26	ZoneB Out T			INT
		27	ZoneC Out T			INT

Custom data points

Create selected custom data points

Create Standard DataPoints Create Selected DataPoints

Delete All DataPoints Delete Selected DataPoints

Key Data Points Not Found

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

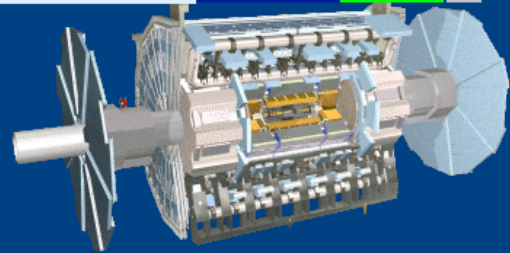
Back Home Refresh NO USER 09-02-2015 10:40:02

CSC INFRASTRUCTURE CSC ATCA

ATCA SHELF 1	READY	OK	
BLADE 1	ON	OK	✓
BLADE 2	ON	OK	✓
BLADE 3	ON	OK	✓
BLADE 4	ON	OK	✓
BLADE 5	ON	OK	✓
BLADE 6	ON	OK	✓
POWER SUPPLY 1	ON	OK	✓
POWER SUPPLY 2	ON	OK	✓
POWER SUPPLY 3	ON	OK	✓
SHELF MANAGER 1	ON	OK	✓
SHELF MANAGER 2	OFF	OK	✓

LHC UNKNOWN E
No Beam
Energy: 449.9 GeV
Injection Permit
ATLAS is beam-safe ?
Stable Beams Flag ?
Handshake

S	Object	Time	2
W	CSC: CSC COOLING::Side A	2015.02.09 10:39:42	W
W	CSC: CSC COOLING::Side C	2015.02.09 10:39:42	E
			F
			D
			U



CSC ATCA SHELF 1

BROOKHAVEN NATIONAL LABORATORY

Device: ATCA 6U Push-Pull AC/DC chass **AdvancedTCA**
 Manufacturer: **Asis Ltd.**
 Chassis ID: **ASM-CSC-PRI-01**
 Uptime: **06 day(s) 00 hour(s) 49 min(s)** Healthy

Slot 1	<ul style="list-style-type: none"> Power Present Healthy Hot Swap Device: SLAC / Cluster On Board Basic Sensors Sensor1 Sensor2 Sensor3 Sensor4 Sensor5 Sensor6 OFF Reset
Slot 2	<ul style="list-style-type: none"> Power Present Healthy Hot Swap Device: SLAC / Cluster On Board Basic Sensors Sensor1 Sensor2 Sensor3 Sensor4 Sensor5 Sensor6 OFF Reset
Slot 3	<ul style="list-style-type: none"> Power Present Healthy Hot Swap Device: SLAC / Cluster On Board Basic Sensors Sensor1 Sensor2 Sensor3 Sensor4 Sensor5 Sensor6 OFF Reset
Slot 4	<ul style="list-style-type: none"> Power Present Healthy Hot Swap Device: SLAC / Cluster On Board Basic Sensors Sensor1 Sensor2 Sensor3 Sensor4 Sensor5 Sensor6 OFF Reset
Slot 5	<ul style="list-style-type: none"> Power Present Healthy Hot Swap Device: SLAC / Cluster On Board Basic Sensors Sensor1 Sensor2 Sensor3 Sensor4 Sensor5 Sensor6 OFF Reset
Slot 6	<ul style="list-style-type: none"> Power Present Healthy Hot Swap Device: SLAC / Cluster On Board Basic Sensors Sensor1 Sensor2 Sensor3 Sensor4 Sensor5 Sensor6 OFF Reset

Instance: 1 ON OFF Instance: 2 ON OFF
 Active Present Healthy Active Present Healthy
 Reset Reset

Power Supply: 1 Present Power Supply: 2 Present Power Supply: 3 Present

Fan tray info		PEM info	
fruID	32	fruID	3
ipmbAddress	-1	healthy	0
present	1	ipmbAddress	32
healthy	1	present	0
slot	1	slot	1
fanLevel	0		

Misc Sensors info			
BOTTOM side	32 C	3.3STBY voltage	3.36 V
TOP side	28 C	3.3MAIN voltage	3.36 V
Local Temp	23 C	+5V voltage	5.07 V
BoardTemp:RTM	31 C	VBAT	2.62 V
BoardTemp:DTM	34 C	FT 1 Tach. 1	4580 rpm
JunctionTemp:DTM	44 C	FT 1 Tach. 2	4708 rpm
BoardTemp:DPM	41 C	FT 1 Tach. 3	4708 rpm
JunctionTemp:DPM	55 C	FT 1 Tach. 4	1059 rpm
BoardTemp:RTM	29 C	FT 1 Tach. 5	1059 rpm
BoardTemp:DTM	35 C	FT 1 Tach. 6	4708 rpm
JunctionTemp:DTM	43 C	FT 1 Tach. 7	4708 rpm
BoardTemp:DPM	41 C	FT 1 Tach. 8	4842 rpm
JunctionTemp:DPM	55 C	FT 1 Tach. 9	1129 rpm
BoardTemp:RTM	29 C	FT 1 Tach. 10	1059 rpm
BoardTemp:DTM	32 C	FT 2 Tach. 1	4708 rpm
JunctionTemp:DTM	44 C	FT 2 Tach. 2	4708 rpm

Module Panel Scale Help

Generate ATCA FSM CSC

Stop FSM Create object types Generate FSM
 Remove ATCA tree Configure object types
 Remove object types Create ATCA tree Start FSM

WARNING: This script will stop and remove the current ATCA FSM tree before creating the new one!

CSC subdetector detected.

0% Close

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

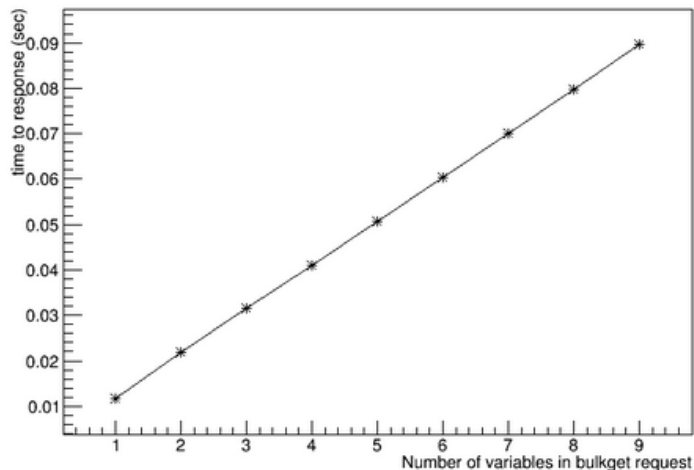
<https://svnweb.cern.ch/cern/wsvn/atlasdcs/fwATCA/>

- E-Group

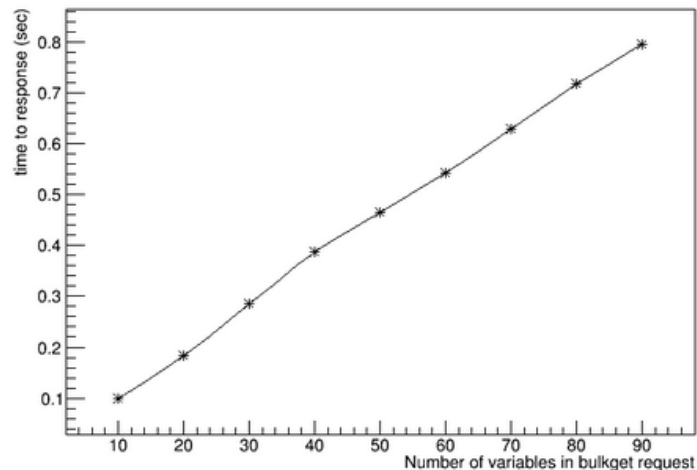
atlas-dcs-atca-developers@cern.ch

Back Up

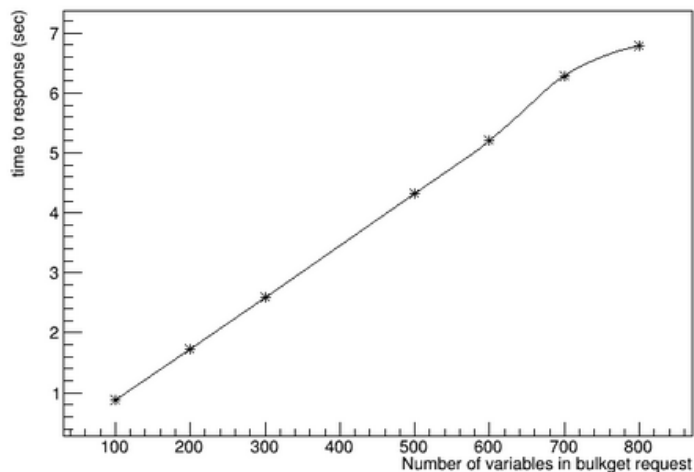
Graph



Graph



Graph



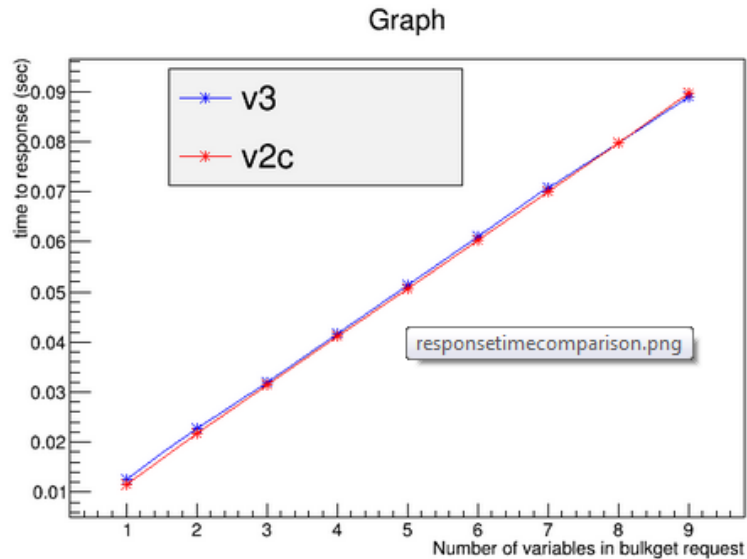
Bulk Get up to 900 Variables

~100 sensors / sec for standard time out

Taken from:
<https://twiki.cern.ch/twiki/bin/view/ath/Atlas/ShelfManagerInterfaceToD>
CS

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>