bscs 4: Future of Cluster Management

2012 – 10 -16

Rafa Grimán

HPC Architect

Architect of an Open World™

Bull

Bull: Numbers

Three PetaFLOP systems

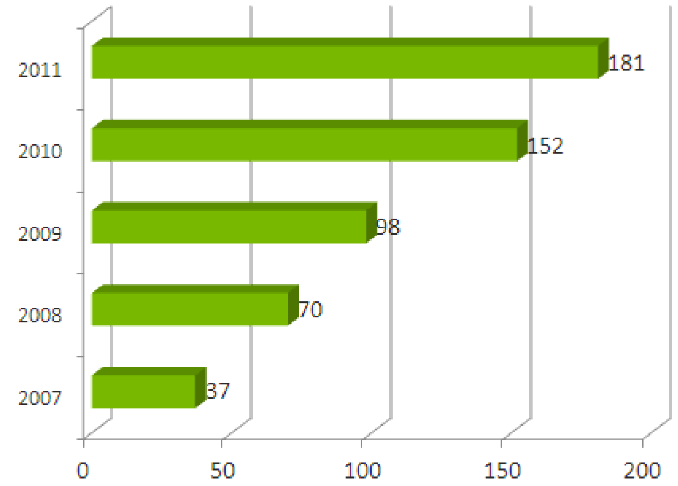
- 2010: Tera 100, the first in Europe
- 2010-2011: Genci / Curie (France) - 2 PFLOPs
- 2011-2012: IFERC – 1.5 PFLOPs

Other key projects

- BSC (Spain): 186 TFLOPs (hybrid)
- Société Générale (France) : 350 TFLOPs
- Dassault Aviation (France) : 100 TFLOPs
- KNMI (Netherlands): meteo
- AWE (UK) : 250 TFLOPs

Extreme Factory & Mobull:

- XF: Renault, Exa, LL Products
- Mobull: U_Perpignan, Cenaero



bscs 4

Architect of an Open World™

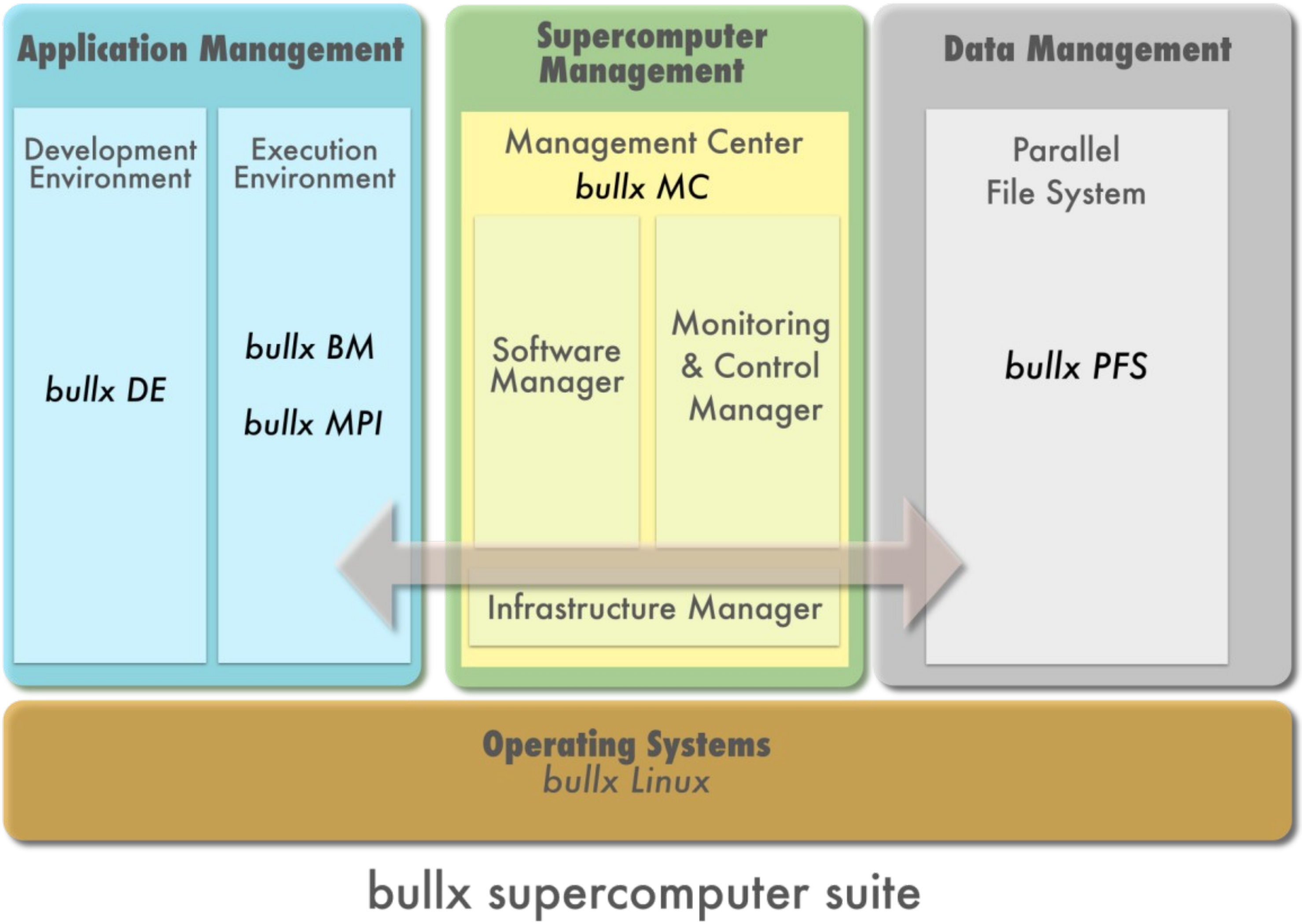
bscs 4: Rationale

- Scalability
  - 1941 – 1 FLOPs
  - ...
  - 2018 – 1 EFLOPs (10^{18})

- Complexity has increased:
  - Hardware systems
    - Accelerators: FPGAs, GPGPU
    - Several networks
    - Multicore
  - Software sophistication
    - Billions of threads, OpenMP, MPI
    - Debugging, profiling
- Storage, Visualization, ...
- Energy !!!
- Management
- Flexibility/openness

ONE SIZE DOES NOT FIT ALL

bscs 4: Basics



bscs 4: Targets

- Scalability
  - NUMA support
- Monitoring
  - Test connectivity between nodes
  - read/write/compare tests on Lustre
- bullxMPI:
  - Better integration with other modules: bullx PFS, energy management, …
  - Survive network failures
  - Better profiling tools and diagnostics
- bullxBM
  - HA improvements
  - Better resource allocation
  - Fine-grained process placement control (Cgroups)

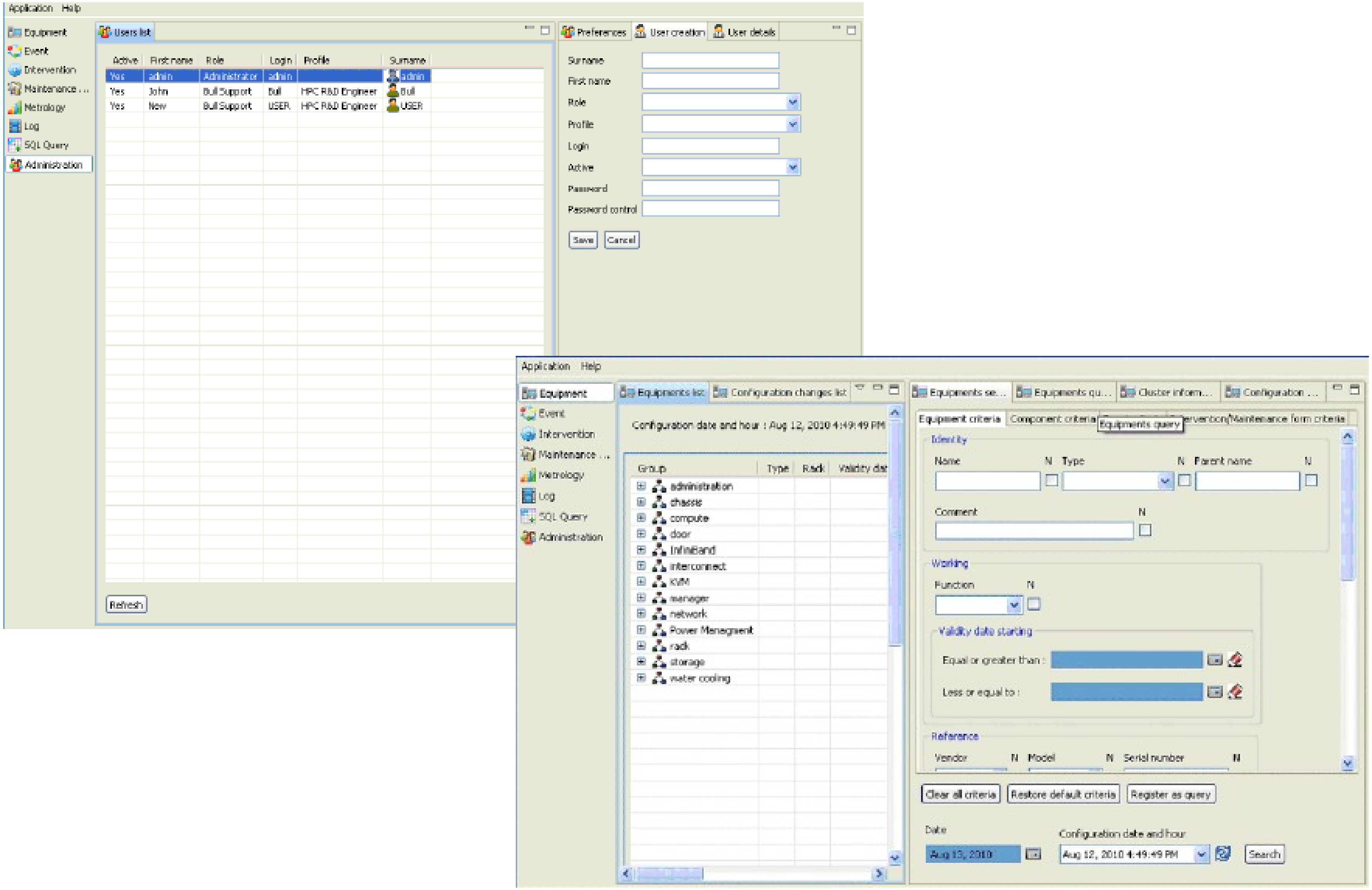
bscs 4: Main Features

- FLOSS

- Admin & Login nodes:
  - 1 – 2 (HA) admin nodes / 2000 Compute Nodes
  - Distributed Cluster Management +2000 nodes
  - LVS + Keepalive for Load Balancing on Login Nodes
  - Parallel FW updates

- Advanced features
  - ARGOS: FRU management, SLAs, ...
  - ClusterDB

bscs 4: ARGOS example



bscs 4: Main Features

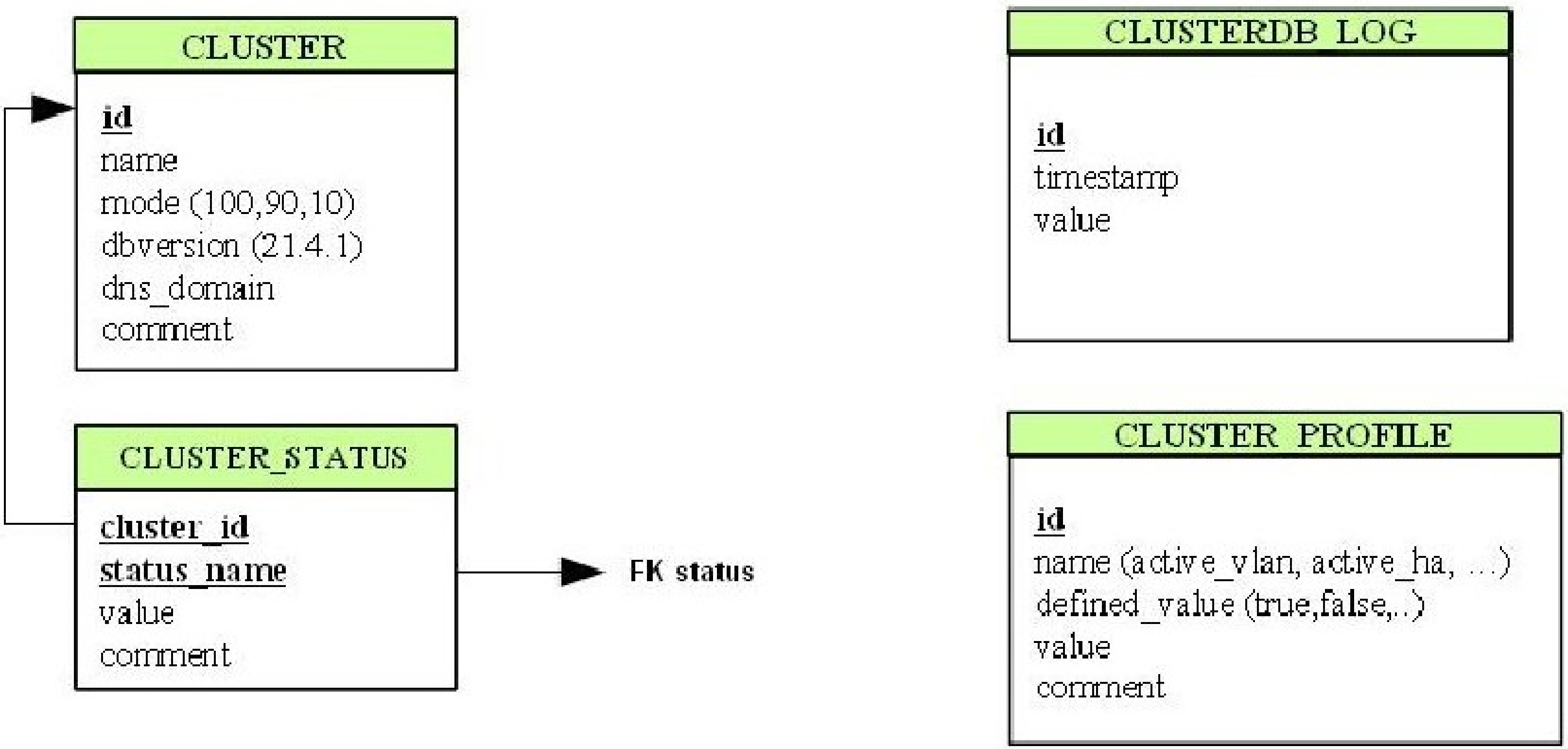
- InfiniBand
  - IBMS: IB Bull Management Suite
  - Integrated with ClusterDB
  - Diagnostic tools: bandwidth, interconnect availability, routes, ...
- Monitoring: Nagios + Ganglia
- Remote and parallel installations:
  - Node role definitions: Compute Node, Admin Node, Storage Node, ...
  - Image management

bscs 4: ClusterDB

- PostgreSQL
- Nodes: hardware, profile and OS image
- InfiniBand network
- Ethernet management network
- Storage network
- Storage devices
- Lustre file-systems
- Racks
- Device status
- Monitored services (Nagios)

ClusterDB Model

- The Admin Guide has all the ClusterDB tables:
  - Relations
  - Descriptions
  - ...



ClusterDB Model: Table values/description

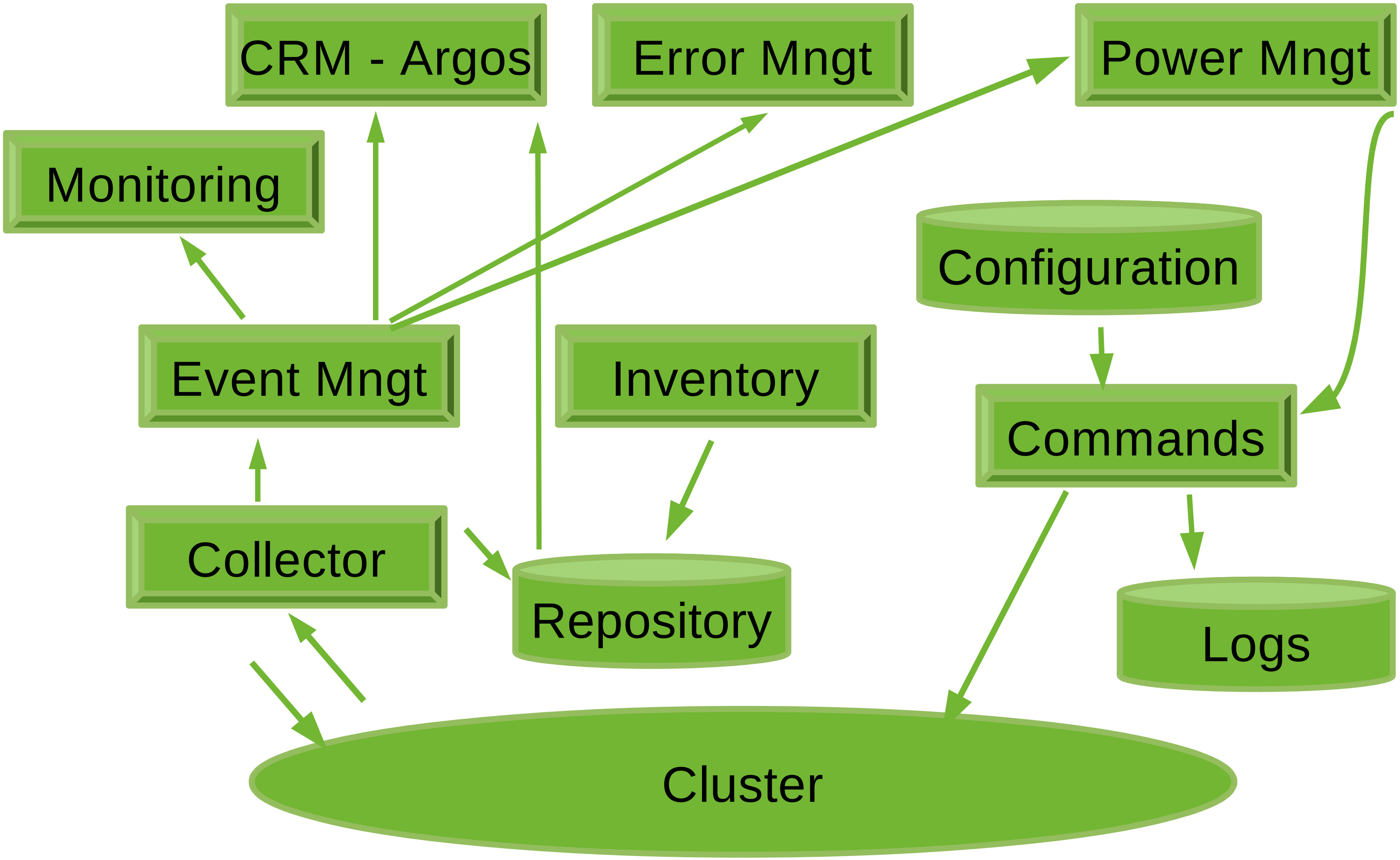
CLUSTER Table				
Column name	Type	Description	Example	Loader
id	integer	Sequence – PK	1	preload
name	varchar(32)	cluster name (unique)	demo	preload (DV)/ cmds
mode	varchar(10)	100% or 90% or 10%	100	Default value / cmds
dbversion	varchar(10)	clusterdb version	21.4.1	Default value
dns_domain	varchar(32)	DNS suffix	bullx	Default value / update
comment	varchar(128)	comment		

CLUSTER_STATUS Table				
Column name	Type	Description	Example	Loader
cluster_id	integer	FK on CLUSTER.	1	status component owner
status_name	varchar(16)	FK on STATUS. Refers the status name	gfs_status	status component owner
value	varchar(16)	one state value among all the STATUS.defined_value	unknown	status component owner
comment	varchar(128)	comment		

ClusterDB Examples

- Backup the DB:
  - pg_dump –Fc –C -f /var/lib/pgsql/backups/clusterdball.dmp clusterdb

bscs 4: Architecture



ibview: cable monitoring

- VPDs (*Vital Product Data*) of the cables (switch side)
- Detect if your failing cables are always the same brand/model

```
(837).[vficet@bull-r423e2-2-1] ibms]$ ibview vpd --cable | head -n 30
Debug mode enabled: IBVIEW_LIBDIR = /home/vficet/X86_64//usr/lib/perl5/vendor_perl/5.12.3
IBVIEW_CONF_FILE = /home/vficet/X86_64/etc/ibms.conf
----------------------------------------------------EQUIPMENT------------------------------------------------------||-------------------------VPD-----------------------
HOSTNAME             | DESCRIPTION                       | LOCATION                       | TYPE   | SLOT    | PORT  ||      VENDOR | HW VERSION |          SERIAL NUM
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 1     ||    Mellanox |         A3 |        CD031150144
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 2     ||    Mellanox |         A3 |        CD031150164
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 3     ||    Mellanox |         A3 |        CD031150136
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 4     ||    Mellanox |         A3 |        CD031150163
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 5     ||    Mellanox |         A3 |        CD031150152
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 6     ||    Mellanox |         A3 |        CD031150147
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 7     ||    Mellanox |         A3 |        CD031150146
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 8     ||    Mellanox |         A3 |        CD031150143
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 9     ||     Luxtera |          4 |         FC322F0095
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 10    ||     Luxtera |          4 |         FC326F0006
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 11    || FINISARCORP |          4 |            DH50199
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 12    || FINISARCORP |          3 |            DHA00DS
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 13    || FINISARCORP |          4 |            DH201AU
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 14    || FINISARCORP |          4 |            DH501BX
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 15    || FINISARCORP |          4 |            DH501BN
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 16    || FINISARCORP |          4 |            DH501AT
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 17    ||    Mellanox |         A1 |        CD071140477
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 1       | 18    ||    Mellanox |         A1 |        CD071140237
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 2       | 1     ||    Mellanox |         A3 |        CD031150162
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 2       | 2     ||    Mellanox |         A3 |        CD031150168
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 2       | 3     ||    Mellanox |         A3 |        CD451E11028
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 2       | 4     ||    Mellanox |         A3 |        CD311E40531
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 2       | 5     ||    Mellanox |         A3 |        CD011130611
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 2       | 6     ||    Mellanox |         A3 |        CD311E40845
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 2       | 7     ||    Mellanox |         A1 |        CD071140440
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 2       | 8     ||    Mellanox |         A1 |        CD071140154
voltaire-4700-9      | ISR4700                           | [B,945] IB-SWITCH-3/V          | line   | 2       | 9     ||    Mellanox |         A3 |        CD031150151
(838).[vficet@bull-r423e2-2-1] ibms]$
```

ibview: controller monitoring

- Verify controller IP addresses, FW revisions, power consumption, temperature...

```
(834):[vficet@bull-r423e2-2-i] ibms]$ ibview equipment --controller
Debug mode enabled: IBVIEW_LIBDIR = /home/vficet/X86_64//usr/lib/perl5/vendor_perl/5.12.3
IBVIEW_CONF_FILE = /home/vficet/X86_64/etc/ibms.conf
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
----
DESCRIPTION          | HOSTNAME                       | LOCATION                   | IP ADDR          |      STATE | TEMPERATURE | CONSUMPTION | SOFT VERS |  BUILD VERS | SOFT DATE
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
----
ISR4036              | voltaire-4036-1                | [G,149] SMP-S-D-3/J        | 134.130.67.34    |    primary |          29 |         110 |     3.1.2 |         721 | Oct 10 2010 11:12:12 AM
ISR4036              | voltaire-4036-10               | [B,247] SMP-S-D-6/J        | 134.130.67.43    |    primary |          38 |         108 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-11               | [B,246] SMP-S-D-5/J        | 134.130.67.44    |    primary |          38 |         107 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-12               | [B,245] SMP-S-F-2/J        | 134.130.67.45    |    primary |          37 |         110 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-13               | [B,244] SMP-S-D-4/J        | 134.130.67.46    |    primary |          33 |         110 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-14               | [B,348] SCALEMP-1/J        | 134.130.67.47    |    primary |          32 |         107 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-15               | [B,347] SCALEMP-0/J        | 134.130.67.48    |    primary |          34 |         108 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-16               | [B,346] SMP-S-D-9/J        | 134.130.67.49    |    primary |          37 |          97 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-17               | [B,345] SMP-S-F-4/J        | 134.130.67.50    |    primary |          37 |          96 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-18               | [B,344] SMP-S-D-8/J        | 134.130.67.51    |    primary |          30 |          99 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-19               | [C,454] SMP-L-C(W)-0/J     | 134.130.67.52    |    primary |          28 |          59 |     3.1.2 |         721 | Oct 10 2010 11:12:12 AM
ISR4036              | voltaire-4036-2                | [G,148] SMP-S-F-1/J        | 134.130.67.35    |    primary |          30 |          68 |     3.1.2 |         721 | Oct 10 2010 11:12:12 AM
ISR4036              | voltaire-4036-20               | [C,453] SMP-L-D(W)-0/J     | 134.130.67.53    |    primary |          26 |         112 |     3.1.2 |         721 | Oct 10 2010 11:12:12 AM
ISR4036              | voltaire-4036-21               | [C,452] SMP-L-E(W)-0/J     | 134.130.67.54    |    primary |          26 |         116 |     3.1.2 |         721 | Oct 10 2010 11:12:12 AM
ISR4036              | voltaire-4036-22               | [C,451] SMP-L-D1(W)-0/M    | 134.130.67.55    |    primary |          27 |          65 |     3.1.2 |         721 | Oct 10 2010 11:12:12 AM
ISR4036              | voltaire-4036-23               | [C,450] SMP-S-A(W)-0/J     | 134.130.67.56    |    primary |          29 |         113 |     3.1.2 |         721 | Oct 10 2010 11:12:12 AM
ISR4036              | voltaire-4036-3                | [G,147] SMP-S-D-2/J        | 134.130.67.36    |    primary |             |             |           |             |
ISR4036              | voltaire-4036-4                | [G,146] SMP-S-D-1/J        | 134.130.67.37    |    primary |          30 |         110 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-5                | [G,145] SMP-S-F-0/J        | 134.130.67.38    |    primary |          31 |         112 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-6                | [G,144] SMP-S-D-0/J        | 134.130.67.39    |    primary |          29 |         108 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-7                | [G,143] SMP-S-H-0/J        | 134.130.67.40    |    primary |          29 |         107 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-8                | [B,249] SMP-S-D-7/J        | 134.130.67.41    |    primary |          36 |         110 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036              | voltaire-4036-9                | [B,248] SMP-S-F-3/J        | 134.130.67.42    |    primary |          39 |         113 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036E             | voltaire-4036e-1               | [B,349] ADMIN-A-0/J        | 134.130.67.60    |    primary |          37 |         129 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036E             | voltaire-4036e-2               | [B,349] ADMIN-A-0/K        | 134.130.67.61    |    primary |          36 |         139 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036E             | voltaire-4036e-3               | [B,349] ADMIN-A-0/M        | 134.130.67.62    |    primary |          38 |         129 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4036E             | voltaire-4036e-4               | [B,349] ADMIN-A-0/N        | 134.130.67.63    |    primary |          37 |         139 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4700              | voltaire-4700-1                | [B,941] IB-SWITCH-0/B      | 134.130.67.64    |    primary |          28 |          15 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4700              | voltaire-4700-2                | [B,941] IB-SWITCH-0/V      | 134.130.67.65    |    primary |          30 |          15 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4700              | voltaire-4700-3                | [B,942] IB-SWITCH-1/B      | 134.130.67.66    |    primary |          29 |          15 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4700              | voltaire-4700-4                | [B,942] IB-SWITCH-1/V      | 134.130.67.67    |    primary |          35 |          15 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4700              | voltaire-4700-5                | [B,943] IB-GIGE-SW-0/B     | 134.130.67.68    |    primary |          29 |          15 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4700              | voltaire-4700-6                | [B,944] IB-SWITCH-2/B      | 134.130.67.69    |    primary |          29 |          15 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4700              | voltaire-4700-7                | [B,944] IB-SWITCH-2/V      | 134.130.67.70    |    primary |          29 |          16 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4700              | voltaire-4700-8                | [B,945] IB-SWITCH-3/B      | 134.130.67.71    |    primary |          27 |          15 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
ISR4700              | voltaire-4700-9                | [B,945] IB-SWITCH-3/V      | 134.130.67.72    |    primary |          28 |          15 |     3.5.0 |         787 | Mar 03 2011 05:35:33 PM
(835):[vficet@bull-r423e2-2-i] ibms]$
```

ibview: node monitoring

- IB errors detected from the nodes:
  - cabling errors can lead to bad routing

```
(828):[vficet@bull-r423e2-2-i] ibms]$ ibview errors --switch
Debug mode enabled: IBVIEW_LIBDIR = /home/vficet/X86_64//usr/lib/perl5/vendor_perl/5.12.3
IBVIEW_CONF_FILE = /home/vficet/X86_64/etc/ibms.conf
---------------------------------------------------------------------------------------------------------------------
DESCRIPTION          | HOSTNAME                       | LOCATION                    | STATUS
---------------------------------------------------------------------------------------------------------------------
Bullx 36-Port QDR    | isw-CU0-1                      | [G,154] MPI-L-A-0/K         | symbol_err_crit
Bullx 36-Port QDR    | isw-CU0-3                      | [G,154] MPI-L-A-0/Y         | symbol_err_crit
Bullx 36-Port QDR    | isw-CU11-4                     | [B,353] MPI-S-A-7/ZF        | symbol_err_crit
Bullx 36-Port QDR    | isw-CU14-5                     | [B,350] MPI-S-A-9/ZM        | symbol_err_crit
Bullx 36-Port QDR    | isw-CU2-4                      | [G,152] MPI-SL-A-0/ZF       | port_phys_state
Bullx 36-Port QDR    | isw-CU6-4                      | [B,253] MPI-S-A-3/ZF        | symbol_err_crit,rcv_err,cabling_error
Bullx 36-Port QDR    | isw-CU9-4                      | [B,250] MPI-S-A-5/ZF        | symbol_err_crit
ISR4036              | voltaire-4036-1                | [G,149] SMP-S-D-3/J         | symbol_err_crit,speed_err,unsupported_fw,controller_sw,cabling_error
ISR4036              | voltaire-4036-11               | [B,246] SMP-S-D-5/J         | symbol_err_crit
ISR4036              | voltaire-4036-14               | [B,348] SCALEMP-1/J         | symbol_err_crit,cabling_error
ISR4036              | voltaire-4036-15               | [B,347] SCALEMP-0/J         | symbol_err_crit,module_dc_err,cabling_error
ISR4036              | voltaire-4036-19               | [C,454] SMP-L-C(W)-0/J      | unsupported_fw,controller_sw,cabling_error
ISR4036              | voltaire-4036-2                | [G,148] SMP-S-F-1/J         | symbol_err_crit,unsupported_fw,controller_sw
ISR4036              | voltaire-4036-20               | [C,453] SMP-L-D(W)-0/J      | unsupported_fw,controller_sw
ISR4036              | voltaire-4036-21               | [C,452] SMP-L-E(W)-0/J      | symbol_err_crit,unsupported_fw,controller_sw
ISR4036              | voltaire-4036-22               | [C,451] SMP-L-D1(W)-0/M     | symbol_err_crit,unsupported_fw,controller_sw
ISR4036              | voltaire-4036-23               | [C,450] SMP-S-A(W)-0/J      | unsupported_fw,controller_sw
ISR4036              | voltaire-4036-3                | [G,147] SMP-S-D-2/J         | symbol_err_crit,unsupported_fw
ISR4700              | voltaire-4700-8                | [B,945] IB-SWITCH-3/B       | port_phys_state
ISR4700              | voltaire-4700-9                | [B,945] IB-SWITCH-3/V       | speed_err
(829):[vficet@bull-r423e2-2-i] ibms]$
```

ibview: switch monitoring

IB errors detected:

- bad speed
- unsupported FW
- module-DC_err: dead PSU
- port phys state: not detected by OFED: cable not able to negociate the link layer or plugged but not functioning at all

```
(828):[vficet@bull-r423e2-2-i] ibms]$ ibview errors --switch
Debug mode enabled: IBVIEW_LIBDIR = /home/vficet/X86_64//usr/lib/perl5/vendor_perl/5.12.3
IBVIEW_CONF_FILE = /home/vficet/X86_64/etc/ibms.conf
----------------------------------------------------------------------------------------------------------------
DESCRIPTION          | HOSTNAME                       | LOCATION                     | STATUS
----------------------------------------------------------------------------------------------------------------
Bullx 36-Port QDR    | isw-CU0-1                      | [G,154] MPI-L-A-0/K          | symbol_err_crit
Bullx 36-Port QDR    | isw-CU0-3                      | [G,154] MPI-L-A-0/Y          | symbol_err_crit
Bullx 36-Port QDR    | isw-CU11-4                     | [B,353] MPI-S-A-7/ZF         | symbol_err_crit
Bullx 36-Port QDR    | isw-CU14-5                     | [B,350] MPI-S-A-9/ZM         | symbol_err_crit
Bullx 36-Port QDR    | isw-CU2-4                      | [G,152] MPI-SL-A-0/ZF        | port_phys_state
Bullx 36-Port QDR    | isw-CU6-4                      | [B,253] MPI-S-A-3/ZF         | symbol_err_crit,rcv_err,cabling_error
Bullx 36-Port QDR    | isw-CU9-4                      | [B,250] MPI-S-A-5/ZF         | symbol_err_crit
ISR4036              | voltaire-4036-1                | [G,149] SMP-S-D-3/J          | symbol_err_crit,speed_err,unsupported_fw,controller_sw,cabling_error
ISR4036              | voltaire-4036-11               | [B,246] SMP-S-D-5/J          | symbol_err_crit
ISR4036              | voltaire-4036-14               | [B,348] SCALEMP-1/J          | symbol_err_crit,cabling_error
ISR4036              | voltaire-4036-15               | [B,347] SCALEMP-0/J          | symbol_err_crit,module_dc_err,cabling_error
ISR4036              | voltaire-4036-19               | [C,454] SMP-L-C(W)-0/J       | unsupported_fw,controller_sw,cabling_error
ISR4036              | voltaire-4036-2                | [G,148] SMP-S-F-1/J          | symbol_err_crit,unsupported_fw,controller_sw
ISR4036              | voltaire-4036-20               | [C,453] SMP-L-D(W)-0/J       | unsupported_fw,controller_sw
ISR4036              | voltaire-4036-21               | [C,452] SMP-L-E(W)-0/J       | symbol_err_crit,unsupported_fw,controller_sw
ISR4036              | voltaire-4036-22               | [C,451] SMP-L-D1(W)-0/M      | symbol_err_crit,unsupported_fw,controller_sw
ISR4036              | voltaire-4036-23               | [C,450] SMP-S-A(W)-0/J       | unsupported_fw,controller_sw
ISR4036              | voltaire-4036-3                | [G,147] SMP-S-D-2/J          | symbol_err_crit,unsupported_fw
ISR4700              | voltaire-4700-8                | [B,945] IB-SWITCH-3/B        | port_phys_state
ISR4700              | voltaire-4700-9                | [B,945] IB-SWITCH-3/V        | speed_err
(829):[vficet@bull-r423e2-2-i] ibms]$
```

ibview: FRU monitoring

- Errors detected for PSUs, controllers and fans

```
(831):[vficet@bull-r423e2-2-i] ibms]$ ibview errors --psu
Debug mode enabled: IBVIEW_LIBDIR = /home/vficet/X86_64//usr/lib/perl5/vendor_perl/5.12.3
IBVIEW_CONF_FILE = /home/vficet/X86_64/etc/ibms.conf
-------------------------------------------------------------------------------------------------------------------------------------------
DESCRIPTION          | HOSTNAME                         | NUMBER      | LOCATION                     | STATUS
-------------------------------------------------------------------------------------------------------------------------------------------
ISR4036              | voltaire-4036-15                 | 2           | [B,347] SCALEMP-0/J          | module_dc_err
(832):[vficet@bull-r423e2-2-i] ibms]$ ibview errors --controller
Debug mode enabled: IBVIEW_LIBDIR = /home/vficet/X86_64//usr/lib/perl5/vendor_perl/5.12.3
IBVIEW_CONF_FILE = /home/vficet/X86_64/etc/ibms.conf
-------------------------------------------------------------------------------------------------------------------------------------------
----
DESCRIPTION          | HOSTNAME                         | PRIM/SEC    | IPADDR                  | LOCATION                     | STATUS
-------------------------------------------------------------------------------------------------------------------------------------------
----
ISR4036              | voltaire-4036-1                  | primary     | IPADDR                  | [G,149] SMP-S-D-3/J          | controller_sw
ISR4036              | voltaire-4036-19                 | primary     | IPADDR                  | [C,454] SMP-L-C(W)-0/J       | controller_sw
ISR4036              | voltaire-4036-2                  | primary     | IPADDR                  | [G,148] SMP-S-F-1/J          | controller_sw
ISR4036              | voltaire-4036-20                 | primary     | IPADDR                  | [C,453] SMP-L-D(W)-0/J       | controller_sw
ISR4036              | voltaire-4036-21                 | primary     | IPADDR                  | [C,452] SMP-L-E(W)-0/J       | controller_sw
ISR4036              | voltaire-4036-22                 | primary     | IPADDR                  | [C,451] SMP-L-D1(W)-0/M      | controller_sw
ISR4036              | voltaire-4036-23                 | primary     | IPADDR                  | [C,450] SMP-S-A(W)-0/J       | controller_sw
```

bscs 4: Factory Preinstallation

Architecture sketch

Compute room model

Cable length checking

Cable Labels

Compute Room map

Thermal simulation

ClusterDB preload

Logical networks definition
IP address plan

HA IO cells configuration
Node names, roles...

Architect of an Open World™