

Bright Cluster Manager Advanced HPC cluster management made easy

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The Commonly Used "Toolkit" Approach

- Most HPC cluster management solutions use the "toolkit" approach (Linux distro + tools)
 - Examples: Rocks, PCM, OSCAR, UniCluster, CMU, etc.
 - Tools typically used: Ganglia, Cacti, Nagios, Cfuncto, System Imager, xCAT, Puppet, Cobbler, Hobbit, Big Braner, Zaloix, Groundwork, etc.
- Issues with the "toolkit" approach:
 - Tools rarely designed to work tog ther
 - Tools rarely designed to HPC
 - Tools rarely designed to sale
 - Each tool has no own command line interface and GUI
 - Each tranhas to own daemon and database
 - Roadhar appendent on developers of the tools

Making a collection of unrelated tools work together Requires a contist and scripting

Rarely leads to a really easy-to-use and scalable solution



About Bright Cluster Manager

- Bright Cluster Manager takes a much more fundamental
 & integrated approach
 - Designed and written from the ground up
 - Single cluster management daemon provides all functionality
 - Single, central database for configuration and monitoring data
 - Single CLI and GUI for ALL cluster management functionality
 - Which makes Bright Cluster Manager ...
 - Extremely easy to use Extremely scalable
 - Secur & reliable

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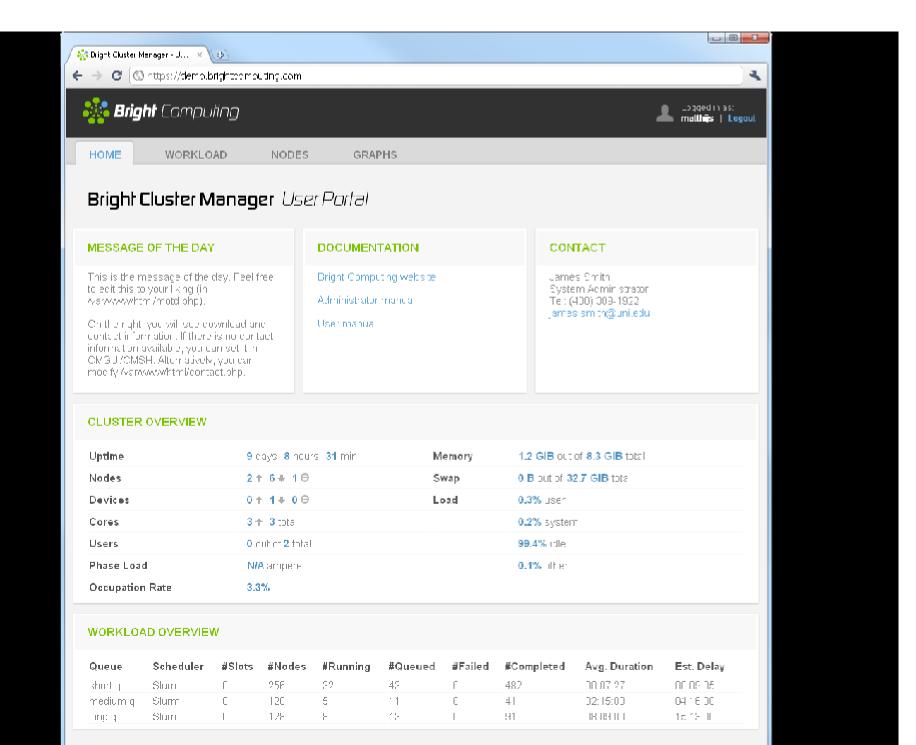
Complete





Bright Cluster Manager — Elements

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				ScaleM	P vSMP						
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Management Interface

Graphical User Interface (GUI)

- Offers administrator full cluster control
- Standalone desktop application
- Manages multiple clusters simultaneously
- Runs on Linux, Windows, MacOS X*
- Built on top of Mozilla XUL engine

Cluster Management Shall (CMSH)

 All GUI functionality also available through Cluster Management Shell

Interactive and scriptable in batch mode



Admin CLI

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Bright Cluster Manager Installer

Welcome to the Bright Cluster Manager Installer

English(US)

1 m

Welcome

- License
- Kernel Modules
- Hardware Info

O Nodes

- O Network Architecture
- Additional Networks
- O Networks
- Nameservers
- O Network Interfaces
- O Subnet Managers
- O Installation Source
- WorkLoad Management
- O Disk Layout
- O Time Configuration
- O Authentication
- O Console
- Summary

Bright Cluster Manager

License Information

Version	5.1
Edition	Advanced
Name	Bright 5.1 Cluster
Organization	Bright Computing
Unit	Development
Locality	San Jose
State	California
Country	US
Serial	2158
Valid from	15 Aug 2010
Valid until	16 Nov 2010
MAC address	77:77:77:77:77:77
Licensed nodes	512

Installation mode

- Normal (recommended)
- Express

Remote Installation

<u>C</u>ancel

Þ.

Installation Progress

English(US)

1 miles

Overview of installation

✓ Mounting CD/DVD-ROM

Y Partitioning harddrives

Installing Cent OS 5

- 📌 Installing distribution packages
- 🐓 Installing Bright Cluster Manager packages
- Y Configuring kernel and setting up bootloader
- 📌 Installing Cent OS 5 software image
- 🖋 Installing distribution packages to software image
- 🖋 Installing Bright Cluster Manager packages to software image

📌 Finalizing installation

- 📌 Initializing management daemon
- 📌 Installation Complete

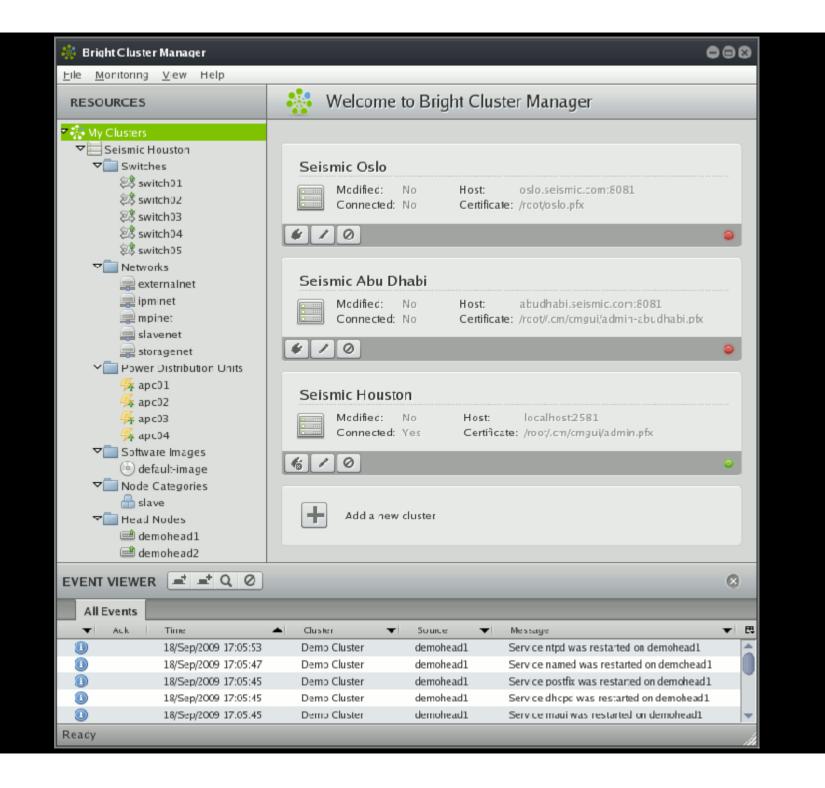
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Automatically reboot after installation is complete



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<u>R</u>eboot



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Node Provisioning

Image based

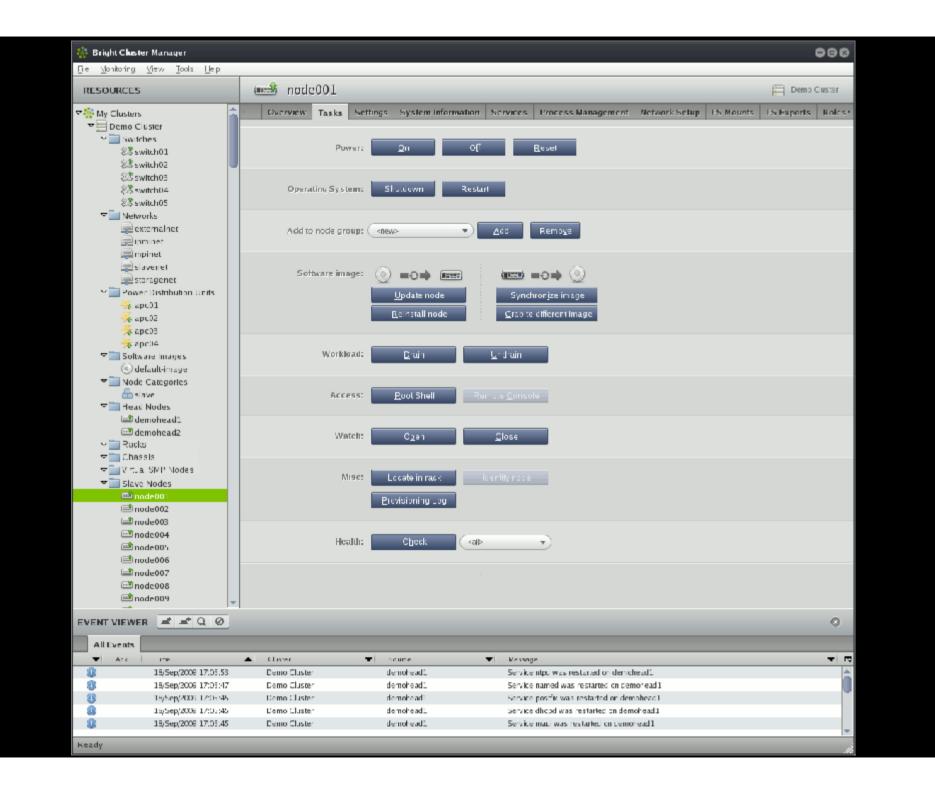
- Regular node image is a directory on the head node
- Unlimited number of images can be created
- Software changes for the regular nodes are made inside the image(s) on the head node
- Provisioning system ensures that changes are propagated to the regular nodes

Nodes always boot over the network

- Regular nodes PXE boot into Node Installer, which
- Identifies node (switch por or MAC based)
- Configures BMC

Partition disks (if any) and creates file systems (if needed) Installs or operates software mage (if needed)

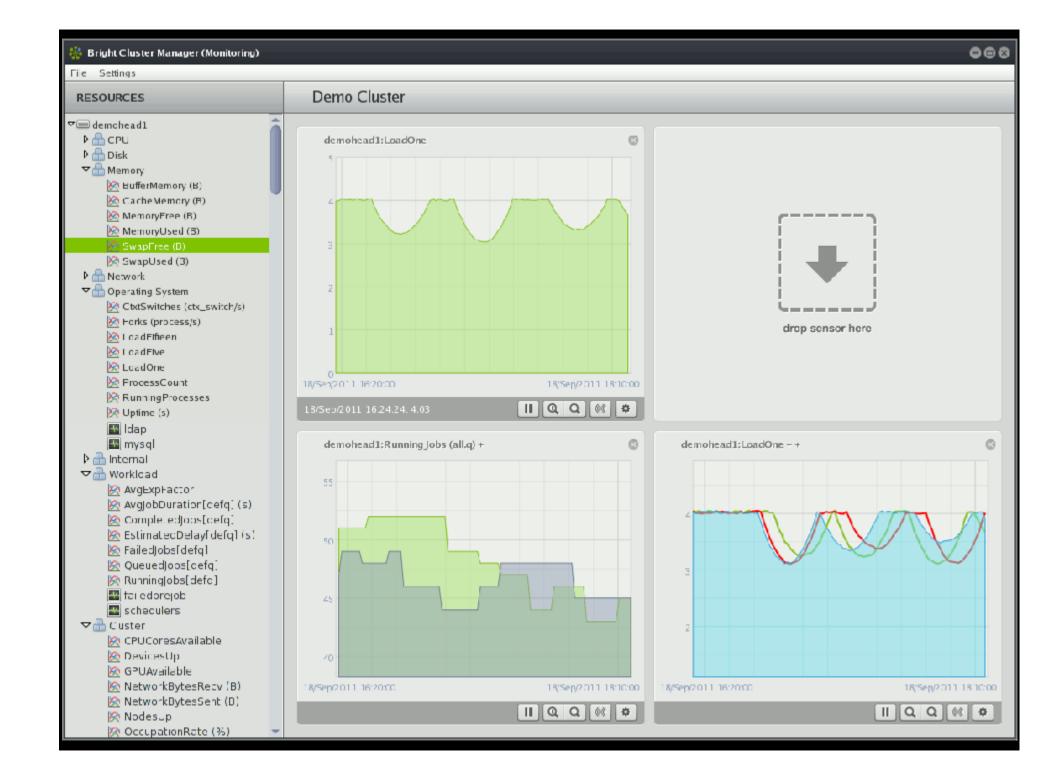
Pivot the root from NFS to the local file system



Architecture — Monitoring



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👬 Bright Cluster Manager

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Workload Manager Integration

- Automatic installation
- Automatic configuration
- Sampling, analysis and visualization of workload manager statistics
- Consistent GUI, User Portal and CLI front-end to workload manager

 Bright cluster SOAP AP provides consistent access to whole cluster, including workload manager

Failover of workload manager

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18/Sep/2009 17:05 53 Demo Cluster demohead1 Service ntod was restarted on demohead1	
18/5ep/2009 17:05 47 Demo Cluster demohead1 Service named was restarted on demohead1	
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(1) 18/Sep/2009 17.05 45 Demo Cluster demohead1 Service maximum restanced on demohead1	
Kezdy	



Cluster Health Management

- Goal: provide problem free environment for running jobs
- Four elements
 - 1. Cluster management automation
 - 2. Regular health checks
 - Actions that return PASS, FAIL or UNKOWN
 - Can be associated with a settable severity and a message
 - Can launch an action based on any response value
 - 3. Prejob health checks
 - Let the workload manager hold the job very briefly
 - Check the health of each reserved node
 - If unhealthy, take the node offline, inform the system administrator
 - Let the workload manager schedule the job to a different set of nodes

boverane configurable and exensible

- Hardware stability & performance tests
 - Very wide range of tests

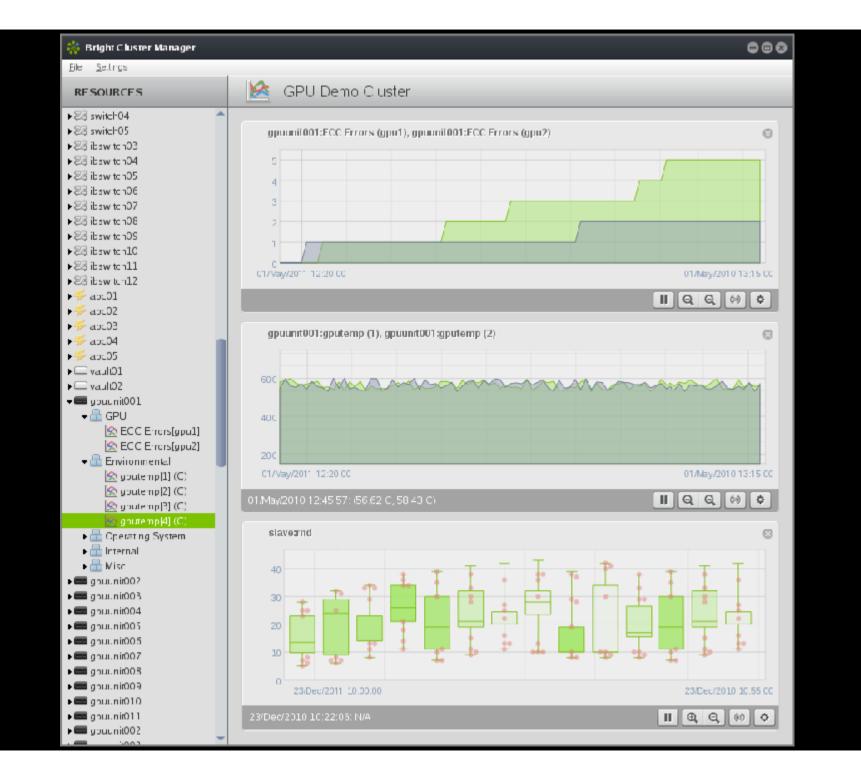
May include disk overwrite and reboot(s)



Bright Cluster Manager for GPGPU

- CUDA & OpenCL redistribution rights
- Current and previous versions of CUDA & OpenCL
- Easy switching between CUDA & OpenCL versions
- CUDA driver automatically compiled at boot time
- Support for all NVIDIA GPUs











The Bright Advantage

Productivity & Efficiency

- 1. Easy to learn and use
- 2. Installation in less than 30 minutes
- 3. Full insight in and control over the cluster
- 4. All elements of the cluster are managed (servers, switches, networks, etc.)
- 5. Flexible provisioning (incremental, live, diskfull, diskless, IB-only, node discovery)
- 6. Comprehensive monitoring (graphs & rackview)
- 7. Rowerful automation (thresholds, alerts, actions)
- 8. Vendor-independent workload manager integration
- 9. Integrated application development environment
- 10. Multi-cluster functionality

Bonnore tensine GREEPIND

11 Easy, automatic updating from Linux & Bright repositories

1/13 Rapid SMP deployment

👬 Bright Computing

The Bright Advantage

Uptime

- 1. Built-in support for unattended, reliable head node failover
- 2. Comprehensive cluster health checking framework
- 3. Powerful burn-in environment

Performance

- 1. Single light-weight daemon
- 2. Daemons are optimized and synchronized

Compliance & compatibility

- 1. Intel Cluster Ready
- 2. Audited by DICE and several customer (e.g. DoD, Pharma's)

Tried and ested for full compatibility with many ISV applications

3. Based on standard Linux distributions and kernels

Drivers included for most major hardware brands



The Bright Advantage

Scalability

- 1. Off-loadable provisioning
- 2. Efficient collection and processing of monitoring metrics
- 3. Tried & tested on largest clusters in the world

Security

- 1. Automated security and other updates from PGP signed repositories
- 2. All internal + external communication encrypted using public/private key encryption through SSH/SSL
- 3. Authentication based on X519 certificates
- 4. Role-based access control
- 5. Auditing of all administrator write actions

Firewall

SecuredDA