



HPCC towards HA

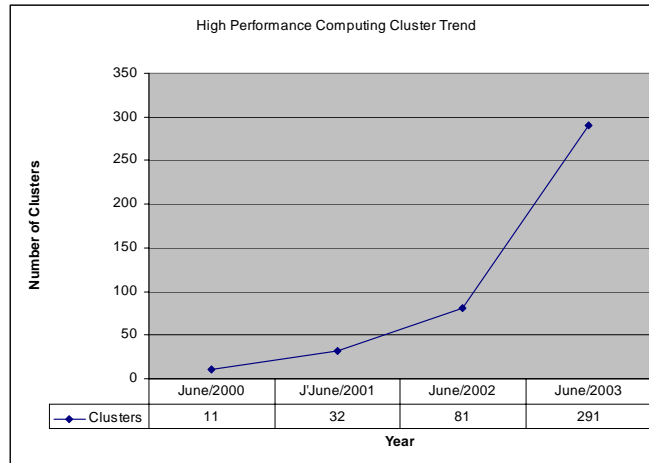
ORNL



TOC

- Introduction
- Scale Out Trend and Impact
- Levels of Fails
- Past & Current research
- Case study
- Highly Desired Items

The Fact



3

Dell Enterprise Solution Engineering

Scale Out Trend & Impact

- Trend
 - Large SMP
 - High Performance Computing Cluster
 - Grid
 - Cyberinfrastructure
- Impact to HPCC
 - Homogeneous to heterogeneous
 - One centralized location to many locations
 - Larger dataset and longer runtime
 - Shorter mean time between failure due to unpredictable failure
 - Availability become one of the overall performance factors

4

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Levels of Fails

- Hardware Level
 - Memory
 - Disk
 - Connections
 - Power
- Firmware Level
 - BIOS routine
 - NIC FW
- Software Level
 - Driver
 - OS
 - Middleware
 - Application

5

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HA for HPCC

- HA-OSCAR
 - First open source project for master node failover
 - Lead by Box Leangsuksun of LTU
 - Redundant master node and network connections
- LSF by Platform Computing
 - Master host candidate
 - Checkpointing/restart
 - Supports kernel, user and application level checkpointing/restart
- Virtual Machine Interface
 - By NCSA
 - Application running on one interconnect (Myrinet) can failover to another heterogeneous interconnect (GbE)

6

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Case Study

- SUNY BIO Cluster
 - 2000 node
 - Redhat Cluster Manager (1 hot standby master node)
 - LSF job scheduler level failover
 - Dual FC port connects to EMC FC storage
 - A rack of spare compute node
- NCSA Cluster
 - 1500 node
 - 5 computing cluster, 1 I/O cluster, and 1 development cluster
 - 1 Spare Compute node per compute cluster
 - Job scheduler level failover for master node
 - FS level failover for IO cluster
 - VMI for interconnect level failover

7

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- Q&A

8

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Highly Desired Items

- High availability standard for HPCC, Grid and Cyberinfrastructure w/ interoperable architecture
- Levels of failure prediction and detection
- Effective N+1 compute node failover for large scale deployment failover