Session ID O18

Linux Clusters in non HPC Applications

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Topics in this Discussion

- A Broader Definition of Clustering
- The Value Proposition
- Some Low Hanging Fruit
- Possible Futures

A Broader Definition …

A Cluster is any collection of systems that can be logically grouped together as a single machine either by task or to simplify administration.
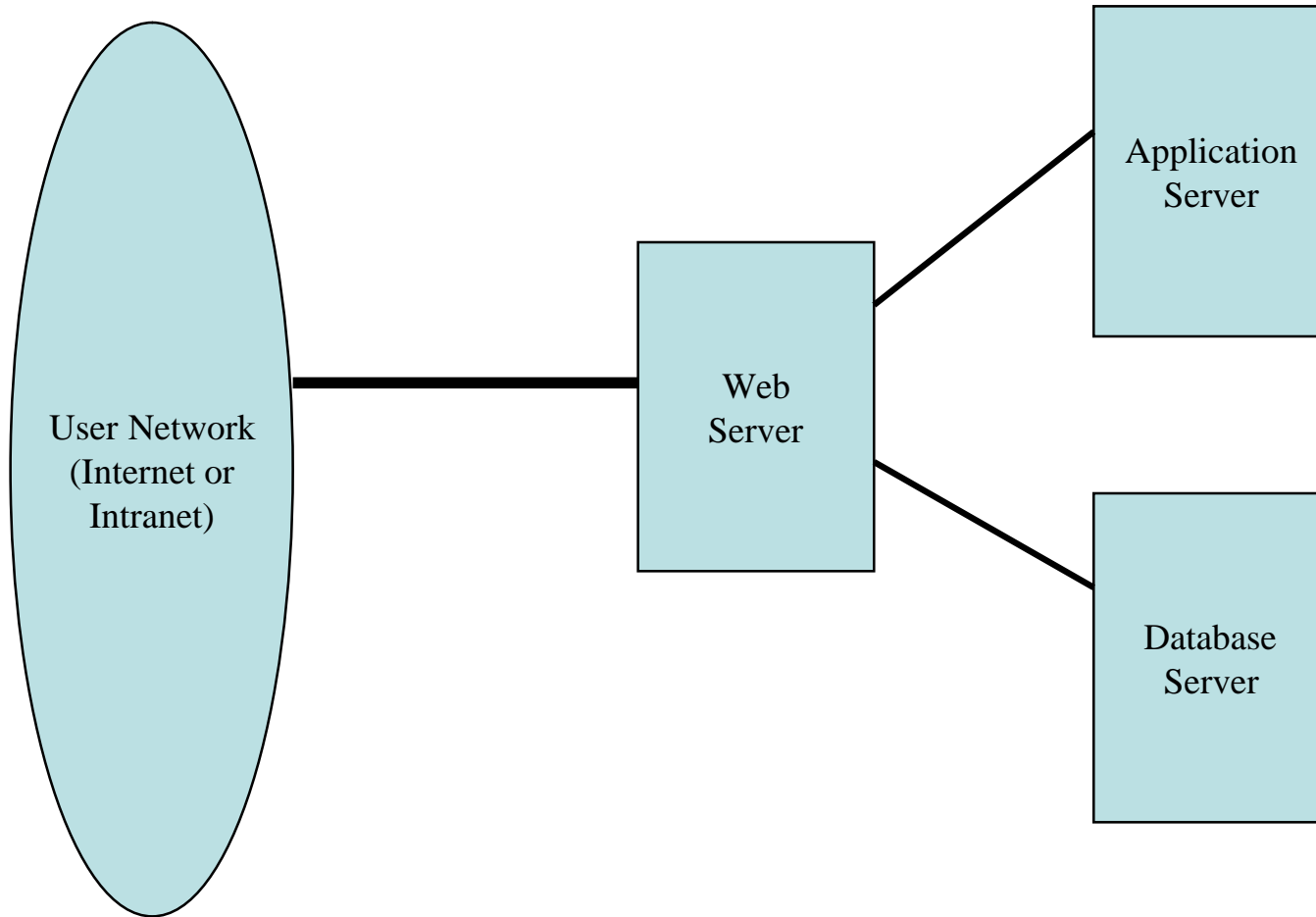
A Broader Definition …

- Scalable Servers
  - Replace discrete servers with clusters using a virtual IP address mechanism
    - F5 Hardware Load Balancing
    - WebSphere Edge Server
    - Linux Virtual Server
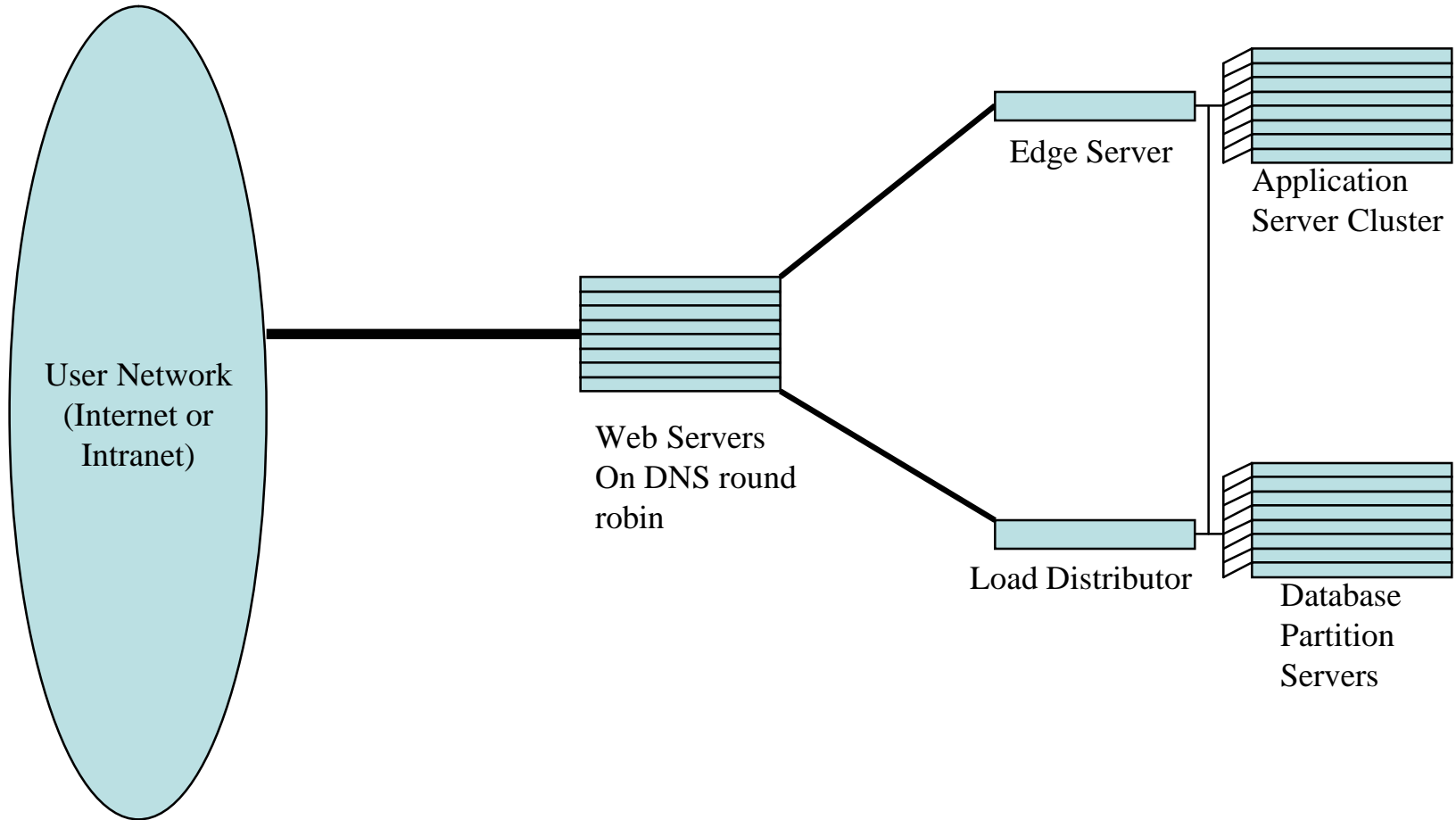   - PolyServe Matrix
    - Others…………..

A Broader Definition …

- For Example --- Web Farms
  - Content Server Group
  - Application Server Group
  - DB Server Group
  - Spare Nodes Group
  - Proxy Server Group

Web Farm Example

Web Farm Cluster Example

User Network (Internet or Intranet)

Web Servers On DNS round robin

Edge Server

Load Distributor

Application Server Cluster

Database Partition Servers

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Value Proposition

- Scalability

- Increased Fault Tolerance

- The System Grows with the Workload
  - Lower incremental cost for power increase

- Cluster Management Tools Reduce Complexity of this Environment

Scalability – Network Solutions

- Blocking, Bandwidth and Latency
  - Interconnect must fit application
  - Generally, less latency means more scalability
  - Generally, non-blocking is better but also more expensive
  - Bandwidth is usually not the cause of performance problems
  - Tools for Performance Analysis Exist (Oprofile, Cricket)

Scalability – Fiberchannel Solutions

- Engage the TotalStorage Experts to do this

- Infiniband has fiberchannel interfaces and scales to fairly large node counts

- Large SAN switches and "federated" SAN switch configurations are possible.

- BladeCenters make this simple and relatively inexpensive even with fairly large node counts.

Fault Tolerance

- Clusters are redundant by definition
- Few or no single points of failure
- Virtual IP Capabilities with Heartbeats
  - Linux Virtual Server -- HA Linux
  - Steeleye Lifekeeper
  - Piranha
  - PolyServe Matrix

Grow with the Workload

- Grow as the company grows
  - Low incremental cost for growth
  - No need to obsolete older equipment to add new

- Dynamically add systems for transient changes
  - "Personality Servers"
  - Custom Solutions

Cluster Management Tools

- Reduce Administrative Complexity
- Enable Custom Response to Load / Failure Events
- CSM/Director

IBM Director

- When to use Director
  - When a GUI management interface is desired
  - When both IBM and non-IBM systems are to be managed
  - When extensive self discovery, capacity planning (xSeries only) or Application Workload management (xSeries only) are desired
 - Both Windows and Linux are to be managed

CSM – Cluster Systems Manager

- When to use CSM
  - A Command Line / Scriptable interface is desired
  - Linux only environment or Linux and AIX together
  - Want to manage pSeries and xSeries together
  - Custom integration into existing customer environment is desired.
- Soon There will be CSM Extensions to Director for best of both worlds

CSM and Director

- CSM currently provides a good initial level of integration with IBM Director so that the two products can be used together

  - The Linux CSM clusters are discovered and shown in the IBM Director Console

  - The event infrastructure of both CSM and Director are tied together

    - CSM Conditions are published as Director Event Types, which can then be tied to Event Action Plans
    - When events occur in the CSM cluster, the Director actions can then be run

  - CSM information is displayed on the Director Console Inventory section

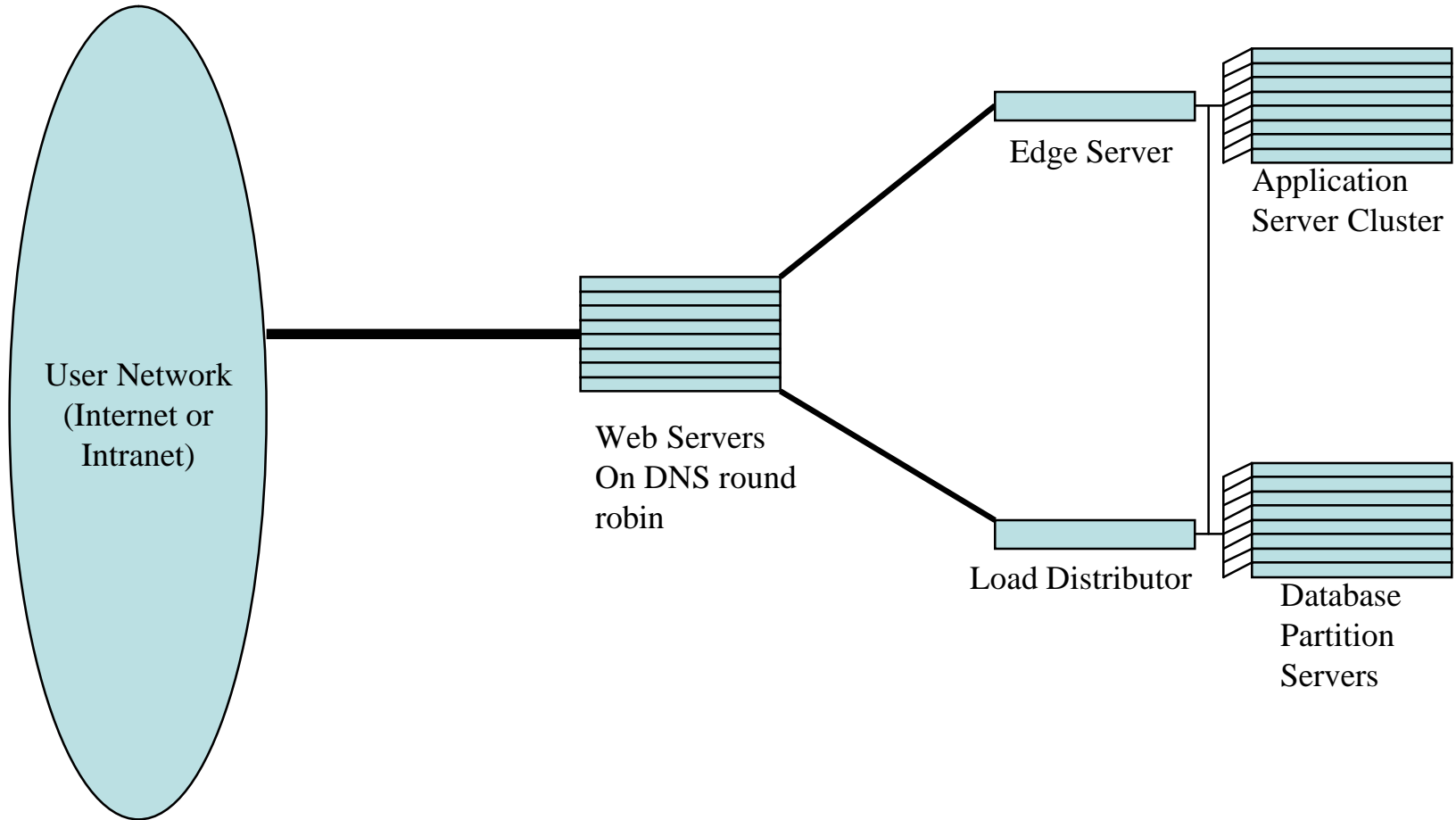- Additional integration between CSM and Director is being designed for follow-on releases

CSM and Director
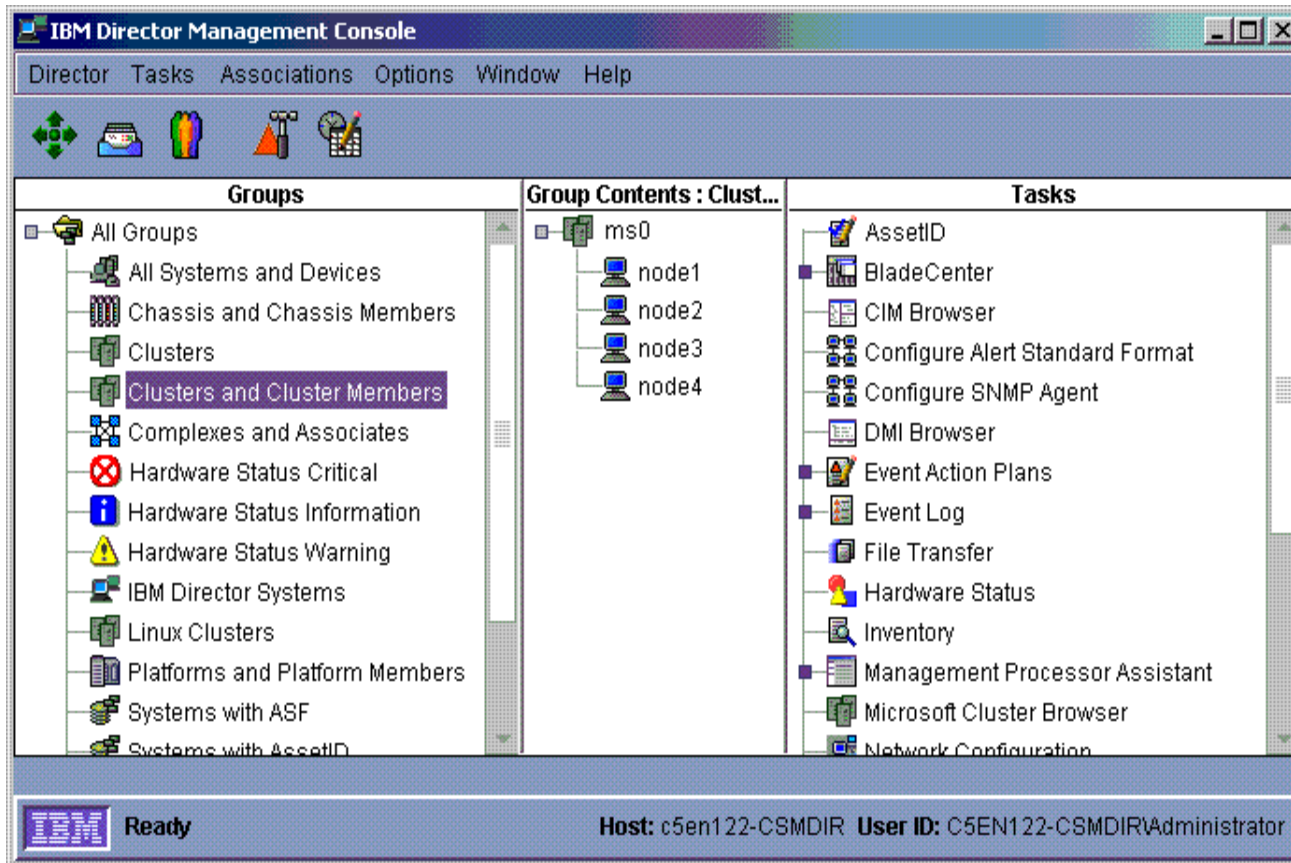
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On DNS round
robin

Edge Server

Application
Server Cluster

Load Distributor

Database
Partition
Servers

Web Servers

- Can use DNS Round Robin for simple load balancing

- Since disk access is read-only sharing of disk farm is straight forward

- Smooth growth curve from very small to large and complex as growth / application require

Database Clusters

- Two ways to do DB Clusters
  - Parallel databases
  - HA with failover
- Commercial Products Support This
 - DB2/EEE
  - Oracle 9i RAC

Application Server Clusters

- Can be done with Open Source
  - Apache / Tomcat
  - JBOSS
  - Linux Virtual Server
- Can be done with Commercial Tools
  - WebSphere & WebSphere Edge Server
  - Weblogic

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Do this with monolithic servers

Application One   Application Two

Spare Node Pool

Management
Node
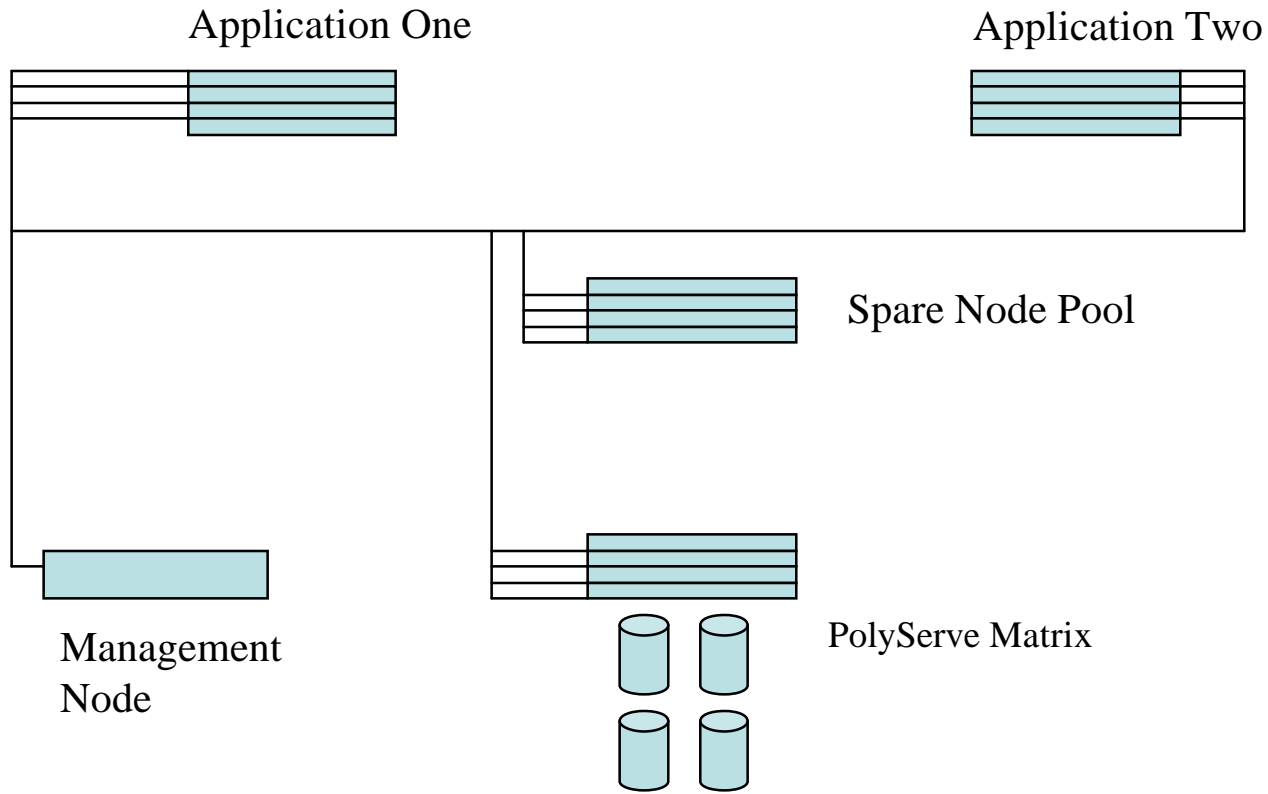
PolyServe Matrix

Possible Today

- Management Node runs CSM and Director

- Nodes run CSM, Linux, Applications

- File Service is PolyServe Matrix

- Except for PolyServe and Management node, all nodes are installed the same

- "Personality" is applied by mounts from PolyServe scalable NFS service.

- Systems dynamically applied to applications from spares in under 1 minute automatically.

Summary

- Clusters are for more than supercomputing
- Clusters solve scaling and load balancing problems
- New cluster management tools make clusters simpler to deploy and manage.
- Linux Clusters are Easy