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Introduction to Grid Computing

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Agenda

- Grid Computing from 10,000 feet
- eScience Grids: case CERN
- eBusiness Grids: case HP
- Cool demo
- Questions

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2

Dude, what is a Grid?!

- *"...a grid is a collection of resources owned by multiple organizations that is coordinated to allow them to solve a common problem."* Gartner Group

- *"...grid computing allows you to unite pools of servers, storage systems, and networks into a single large system so you can deliver the power of multiple-systems resources to a single user point for a specific purpose. "* IBM

- *"Grid is a service for sharing computer power and data storage capacity over the Internet"* CERN

- *"a bunch of computing resources that performs some tasks"* Luc T.

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3

Dude, what is a Grid?! (cont')

- Analogy with the electric power grid

The Grid   " = "

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4
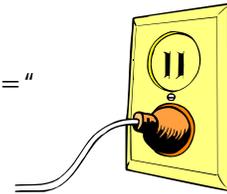
Goals

- Virtualizes resources to solve problems
  - ✓ Computing power
  - ✓ Data storage
  - ✓ Bandwidth
  - ✓ Software on-demand
- Allows to dynamically provision resources
- Leverages existing technologies
- Provides seamless access
- Spans virtual organizations (VOs)

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5

Key components

- Security
- Load Management
- Data management
- Resource management
- Scheduling
- User interface

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6

Types of grids

- Computing grids (HPC)
  - ✓ Provide access to high-performance computing resources
  - ✓ Example: CrossGrid, Unicore Plus,

- Data grids (HTC)
  - ✓ Provide access to large scale storage resources
  - ✓ Example: EU DataGrid, NASA's Information Power Grid, TeraGrid

- Utility grids
  - ✓ Provide access to applications

- "Scavenging grids"
  - ✓ Based on good will with little control over resources
  - ✓ Example: SETI@home

7

Grid versus Cluster

- Nope, a grid is not a cluster!

  - ✓ Grid resources are distributed
  - ✓ Grid resources are heterogeneous
  - ✓ Grid resources are dynamic

8

Domains of Application

- Any domain that requires computing resources
  - ✓ Financial simulation
  - ✓ Medical research
  - ✓ Environment observation
  - ✓ Engineering
  - ✓ etc...

9

Enterprise grid computing

- Resource consolidation
- Resource virtualization
- Policy-based resource management
- Provisioning or allocation
- Leverage existing computing assets
- Reducing IT cost

10

JEMS and Grid Computing

- Technical facts
  - ✓ Brand new lightweight micro-container architecture
  - ✓ Ground breaking Web Services stack
  - ✓ Clustering features out-of-the-box
    - Farming
    - Load-balancing
    - Fail-over
  - ✓ Java Management Extension API (JMX)
  - ✓ JBoss Remoting
    - http://www.jboss.org/products/remoting
  - ✓ JBoss Network
    - http://www.jboss.org/services/jbossnetwork

11

JEMS and Grid Computing

- Business facts

No license fee!

1 node = **0.00$**

10,000 nodes = **0.00$**

12

Literature

- Global Grid Forum
  www.gridforum.org
- Globus Alliance
  www.globus.org
- Enterprise Grid Alliance
  www.gridalliance.org
- Grid@CERN
  www.gridcafe.org

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13