



# Grid's future

Greg Astfalk  
Chief Scientist



# First the finale...



- The Grid has significant potential in the IT industry, from the consumer space to the enterprise
- There are challenges to be overcome before success can be declared
- Pervasive, mainstream use of Grid will take some time
- A open, community effort is essential

- There are multiple definitions for “Grid” in use in the industry today
- HP views the Grid as “implementations that support all the tasks associated with Grid services”
  - The Grid (v3) will render almost anything in IT as a “Grid service” i.e., a computer, computer cycles, storage space, an application, a data file, a database, an instrument, etc.
  - These Grid services can then be registered, discovered, provisioned, accessed, shared, removed, monitored, or billed
- Given the above the Grid then allows for secure sharing of, and collaboration with, Grid services between members of a virtual organization

# Grid's potential



- Grid **will** be an important technology in IT
- Grid is not a “technology de jour”
  - numerous mega-trends that are forcing functions on Grid
  - it is leveraging multiple existing standards
  - large industry and academic inertia behind it
- Grid will do for computing what the Web did for information

# Grid mega-trends



- Abundant bandwidth
- Global reach of the Internet
- High rate of accumulation of IT gear
- Centralization is the bane of tomorrow
- Ownership of the content of science, commerce, and consumers will be dispersed but not necessarily public
- Geographical dispersion of virtual teams
- Earth's rotation

# Scientific and commercial Grid



- Grid has its roots in scientific computing
  - it will continue to be relevant and important there
- The greater importance of Grid is in the commercial space
- OGSI, where Grid meets Web services, provides the relevance and the ability to gain benefit in commercial settings

# Grid market projections



- Gartner Group (4/03) makes no financial predictions and cautions clients against making substantial investments in Grid until clear tangible business value materializes
- A few do make projections and loosely agree that Grid spending will grow from \$250 million in 2003 to \$4 billion in 2008
- It is unclear how these numbers break down
  - hardware, software, services, etc.
- Predictions are limited to a few narrow markets
  - life sciences, energy, manufacturing, public sector, etc.

# Requirements for commercial Grid



- Grid in commercial enterprises will require
  - Grid management
  - Trust and security
  - Heterogeneity
  - Fully open standards
  - Robustness
- Without these attributes CIOs will not deploy Grid



# Social barriers



- Technical issues aside, Grid deployment in the commercial enterprise faces “social engineering” issues
  - Loss of control of resources
  - Loss of IT funding
  - Resource sharing
  - Server “hugging”
  - Change associated with new approach

# CIO demands for a new enterprise architecture



- A platform for managing change
  - linking business and IT
- Brings standardization to the entire IT environment
- Eliminates vertical islands of automation
- Embraces heterogeneity and legacy IT environments
- Uses automation to scale and reduce complexity
- Virtualizes all IT assets
- Helps convert fixed costs to variable costs

# Grid development in HP



- HP is developing technologies for use in, and on, Grids
  - interactiveGrid
  - SmartFrog
  - Utility Data Center (UDC) + Grid
  - fine-grained Grid
  - appliance aggregation
  - IPv6
  - Grid and Grid services management
  - Intra-HP Grid (~70 nodes) for testing and development
  - etc.

# Utility Data Center (UDC)



- A wire-once, programmatically reconfigurable, virtualized data center with fine-grained allocation, security and control of every resource
- Consider a request for, say, three ia-32 Linux boxes
  - static data center
    - if not present, the Grid service request fails
  - UDC
    - if not present, possible to automatically and dynamically reconfigure to honor the Grid service request
- Powerful combination
  - HP developed Globus/UDC interface

# Grid and Adaptive Enterprise



- Conceptualize HP's Adaptive Enterprise (AE) as having three layers and a adjacent tower
- Layers are
  - business practices
  - Grid services
    - “connective tissue” of applications and business practices to infrastructure
  - infrastructure
- The tower is management of
  - infrastructure
  - Grid and Web services
  - apps and business practices

# Management of Grids and Grid services

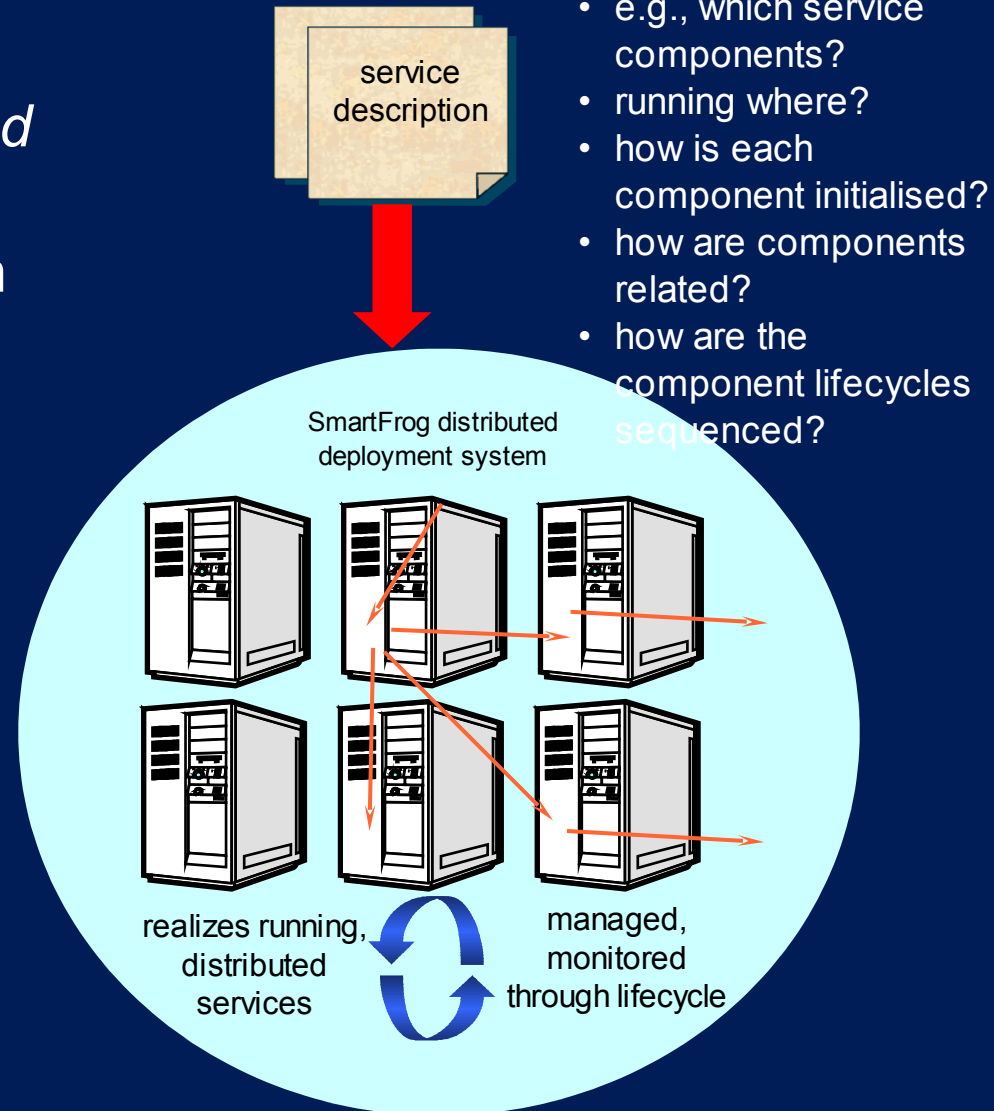


- HP has developed a Web Services Management Framework (WSMF) to manage
  - Web services
  - Resources
  - Grids
  - Grid services
  - Applications
  - business practices
- Compliant with standards efforts (OGSI, OASIS, etc.)
- Interoperable with CIM, SNMP, JMX, etc.
  
- HP will likely contribute this to GGF

# SmartFrog: Smart Framework for Object Groups



- A framework for building *configuration-driven, distributed systems*
  - Note: framework *not* solution
- Consists of:
  - Configuration description language and tools
  - Runtime deployment environment
  - Runtime components that interpret configuration data
- Decentralized, adaptive, extensible, ...



# Consumer Grid services



Individual consumers and:

- Rich Digital Media
- Home Networks
- Imaging and Printing
- Mobility





- Grid is a strategic technology for many parts of HP
- Pursuing robust Grids for returning commercial value
- Pushing and adopting fully open standards
- Developing management tools for Grids and Grid services



**i n v e n t**