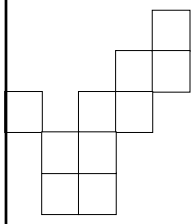


Grid Technology

B. Ramamurthy

Reference Material

- Grid Computing, Making the Global Infrastructure a Reality by F. Berman, G. Fox and A. Hey, Wiley and Sons Ltd., 2003, ISBN: 0-470-85319-0
- Publications from the site:
- http://www.globus.org/research/papers.html

Introduction

- The Grid
- The History
- Building blocks of the global grid
- Layered Grid Model
- Grid Applications
- Categories of applications
- Future of Grid

The Grid

- *The grid is a a computing and data management infrastructure that provides us ability to dynamically link together resources to support execution of large-scale, resource-intensive, and distributed applications. (paraphrased from Fran Berman et al's text)*
- Grids are intrinsically distributed, heterogeneous and dynamic.

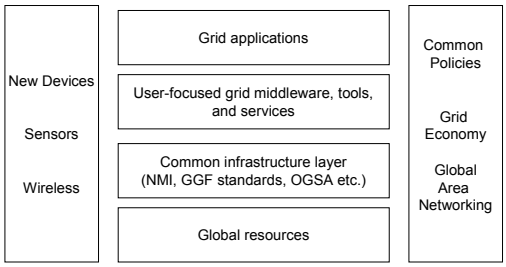
History of the Grid

- 1980s parallel computing was used as a means of achieving high performance. Examples: Parallel virtual Machine (PVM), Message Passing Interface (MPI), and High Performance Fortran (HPF).
- 1990s the focus shifted into coordination, distribution and collaboration, the fundamentals concepts of grid computing.
- I-Way, the precursor modern day grid was demonstrated in the year 1995 in SC conference.
- This lead to the development of
  - grid software in Globus, Condor, Legion, and others
  - services such as Network Weather Service (NWS), Storage Resource Broker (SRB)
  - Protocols such as Open Grid Services Architecture (OGSA), Grid Security Infrastructure (GSI)

Building Blocks

- **Networks**: grids are built on ubiquitous high-performance networks such as Internet2 Abilene, and intra-Europe GEANT network. Networks connect resources on the grid, such as the computers (nodes) and the storage.
- **Computational nodes**: Nodes are high performance parallel machines or clusters.
- **Infrastructure software**: This focuses on pulling together the network and the nodes and provides a development environment and execution platform for the applications.
- **Standards**: Development of key standards is critical for the successful management of the grid complexity. OGSA that provides the standard for the services on the grid is a fine example of such an effort.

The Layered Model



Grid Applications

- Life science Applications
- Engineering-oriented applications
- Data-oriented applications
- Physical science applications
- E-science collaboratory
- Commercial applications

Categories of applications

- Minimal communication applications: embarrassingly parallel applications. Ex; SETI@home
- Staged/linked application: access to remote instruments
- Adaptive applications: run where you find resources satisfying criteria.
- Real-time and on-demand application: do something right now.
- Coordinated applications: dynamic and brand and bound applications
- Poly-applications: choice of resources for different components of the application.

Trends

- Development of models of interaction between users and grid: Grid Computing environments and portals
- Access technologies: non-computer means of access.
- Policies: grid resources are in different domains. Developing policies is a challenge.
- Grid economies: Building a business model around it is another interesting challenge.
- Grid will serve as the enabling technology for a broad set of applications in science, business, entertainment, health and other areas.