# WELCOME

# GRID COMPUTING

- What is Grid Computing?
- Cousins of grid  computing.
- Methods of grid computing.
- Who Needs It?
- Grid Users
- Some highly visible grids.
- Using the grid.

# What is grid computing?

- Grid computing involves  connecting geographically remote computers into a single network to create a virtual supercomputer by combining the computational power of all computers on grid.
- COMPUTATIONAL GRIDS

  - Homogeneous
  - Heterogeneous

- A network of geographically distributed resources including computers, peripherals, switches, instruments, and data.
- Each user should have a single login account to access all resources.
- Resources may be owned by diverse organizations

# Cousins of Grid Computing

- Distributed Computing
- Peer-to-Peer Computing etc.

- Distributed Computing

  Distributed computing is most often concerned with distributing the load of a program across two or more processes

# PEER2PEER Computing

- Sharing of computer resources and services by direct exchange between systems.
- Computers can act as clients or servers depending on what role is most efficient for the network.

# Methods of Grid Computing

- Distributed Supercomputing
- High-Throughput Computing
- On-Demand Computing
- Data-Intensive Computing
- Collaborative Computing
- Logistical Networking

# Distributed Supercomputing

- Combining multiple high-capacity resources on a computational grid into a single, virtual distributed supercomputer.
- Tackle problems that cannot be solved on a single system.

# High-Throughput Computing

- Uses the grid to schedule large numbers of loosely coupled or independent tasks, with the goal of putting unused processor cycles to work.

# On-Demand Computing

- Uses grid capabilities to meet short-term requirements for resources that are not locally accessible.

# Data-Intensive Computing

- The focus is on synthesizing new information from data that is maintained in geographically distributed repositories, digital libraries, and databases.
- Particularly useful for distributed data mining.

# Collaborative Computing

- Concerned primarily with enabling and enhancing human-to-human interactions.
- Applications are often structured in terms of a virtual shared space.

# Logistical Networking

- Global scheduling and optimization of data movement.
- Contrasts with traditional networking, which does not explicitly model storage resources in the network.
- Called "logistical" because of the analogy it bears with the systems of warehouses, depots, and distribution channels.

# Who Needs Grid Computing?

- A chemist may utilize hundreds of processors to screen thousands of compounds per hour.
- Teams of engineers worldwide pool resources to analyze terabytes of structural data.
- Meteorologists seek to visualize and analyze data of climate  with enormous computational demands.

# Grid Users

- Grid developers
- Tool developers
- Application developers
- End Users
- System Administrators

# Grid Developers

- Very small group.
- Implementers of a grid “protocol” who provides the basic services required to construct a grid.

# Tool Developers

- Implement the programming models used by application developers.
- Implement basic services similar to conventional computing services:
  - User authentication/authorization
  - Process management
  - Data access and communication

# Application Developers

- Construct grid-enabled applications for end-users who should be able to use these applications without concern for the underlying grid.
- Provide programming models that are appropriate for grid environments and services that programmers can rely on when developing (higher-level) applications.

# System Administrators

- Balance local and global concerns.
- Manage grid components and infrastructure.
- Some tasks still not well delineated due to the high degree of sharing required.

# Some Highly-Visible Grids

- The NASA Information Power Grid (IPG).
- The Distributed Terascale Facility (DTF) Project.

# Software infrastructure

- Globus
- Condor
- Harness
- Legion
- IBP
- Net Solve

# Globus

- started in 1996 and is gaining popularity year after year.
- A project to develop the underlying technologies needed for the construction of computational grids.
- Focuses on execution environments for integrating widely-distributed computational platforms, data resources, displays, special instruments and so forth.

# Condor

- The Condor project started in 1988 at the University of Wisconsin-Madison.
- The main goal is to develop tools to support High Throughput Computing on large collections of  computing resources.

# Legion

- An object-based  software project designed at the University of Virginia to support millions of hosts and trillions of objects linked together with high-speed links.
- Allows groups of users to construct shared virtual work spaces, to collaborate research and exchange information.

# Harness

- A Heterogeneous Adaptable Reconfigurable Networked System
- A collaboration between Oak Ridge National Lab, the University of Tennessee, and Emory University.

# IBP

- The Internet Backplane Protocol (IBP) is a middleware for managing and using remote storage.
- It was devised at the University of Tennessee to support Logistical Networking in large scale, distributed systems and applications.

# NetSolve

- A client-server-agent model.
- Designed for solving complex scientific problems in a loosely-coupled heterogeneous environment.

# CONCLUSION

- Grid Computing involves cost savings, speed of computation, and agility.
- The grid adjusts to accommodate the fluctuating data volumes that are a typical in the seasonal business.
- Grid Computing takes advantage of the fact that most of the computers in United States use their central processing units on average only 25% of the time for the work they have been assigned.

# THANK YOU….