

## Grid and MetaComputing



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## Overview

- What was MetaComputing, what is Grid Computing
  - discussion.....
- MetaComputing Requirements and Purpose
  - Distributed Computing needs?
  - Parallel Computing needs?
  - Super Computing needs?
  - Dealing with Heterogeneity of everything?

## Overview

- Subtopics (I.e. all the parts that make Grid/Meta computing work)
  - Communications and Networking
  - Naming
  - Interfaces
    - RPC
      - Component based
        - ONC/DCE, Corba, JavaBeans
  - Problem Solving Environments
  - Cluster Management
  - Resource Managers
  - Scheduling MPI jobs

## Overview

- Subtopics
  - Do we have all it takes to make a MetaComputing system?
- Homework
  - Making previous MPI applications work in a distributed world

## Lecture 10

- What we will cover on March 26th
  - Grid Computing (now that we know meta-computing)
  - Globus 1, 2, 3
  - Legion
  - APPLES and NWS
  - SNIPE
  - HARNESS

## What is Meta/Grid Computing

- Is it distributed computing?
- Is it distributed Parallel ?
- Is it SuperComputing ?
- Is it High Performance Computing (HPC)
- Is Grid computing just MetaComputing.. Spread out or better evolved?
- Is it all of the above?

## MetaComputing Requirements and Purpose

- “MetaComputing is used to support the solving of problems by the integration of multiple applications, computational resources, data stores (and maybe real-time sensors)”
  - Air Traffic control, weather/climate forecasting and modeling, particle track analysis..
  - In lecture 10 compare this to grid computing..

## MetaComputing Requirements and Purpose

- Requirements
  - To handle heterogeneous computers
    - I.e. interfaces, standards, communications, portable data exchange...
    - multiple run-times systems
    - synchronization (or compute resources)
  - To handle wide area distribution
    - networks, fault tolerance (temporary and long term), replicated resources, scheduling (synchronization!)

## MetaComputing Requirements and Purpose

- Requirements
  - To handle heterogeneous data
    - real time, static, network mounted, archive formats, SDDF, ... contexts, views, schemas (from DB systems)
    - Ownership, non-symmetric access rights
  - To handle multiple user identities
    - different user ids on each system, co-operating users
  - To handle multiple security systems and methods

## MetaComputing Requirements and Purpose

- Solutions
  - Systems that support specific systems
    - e.g. Problem Solving Environments (PSEs)
  - Tool kits
    - use collections of common Distributed Computing (DC) tools and utilities to build environments/frameworks
  - Provide one massive complete system
    - Object orientated systems / Distributed OSs

## MetaComputing Requirements and Purpose

- How are these systems built and what is needed to build them?
  - Most of the problems they have to handle are already *known* problems.
  - Solutions exist in the form of the many Distributed Computing (DC) systems that currently exist..
    - Although MetaComputing is less narrow in scope than most DC systems.