Grid Computing: A Web Services Approach

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Agenda

- Introduction to Grid Computing
- Grid Applications
- How UVic is involved
  - GridX1
- More about Grids
  - Middleware
  - Service Orientation
  - Web Services
- The CANARIE Project test Grid
Introduction to Grid Computing

- **What is Grid Computing?**
  - When the resources of many computers in a network are applied to solve a single problem

- **Types of Grids**
  - Computational
  - Data
  - Ubiquitous access to the combined computing resources of institutions across the globe

- **The Internet**
  - World-wide network for the sharing of information

- **The Grid**
  - World-wide network for the sharing of computer resources
Grid Applications

- SETI@Home  
  http://setiathome.berkeley.edu/
- fightAIDS@Home  
  http://fightaidsathome.scripps.edu/
- Earth Observational Satellite Imaging
- Climate Modeling
- Particle Physics
  - BaBar experiment (SLAC)
  - ATLAS experiment (CERN)
    - Large Hadron Collider Computing Grid being assembled
      - ~15 Petabytes of data annually
      - ~100,000 CPU's
UVic spearheaded this collaborative project between Institutions across Canada

- Currently 9 Clusters
  - 2500+ CPU's

- UVic accounts for 2 Clusters
  - 450+ CPU's

UVic maintains Data Storage for GridX1
- ~600 TB Tape
- ~160 TB Disc
More about Grids  

**Service Orientation**

**Goal:** Improving Grid Middleware
- Moving towards Service Oriented design
- Software components are represented as Services

**Service Oriented Design Principles**

**Services are:**
- Abstract, Autonomous
  - Hide logic from the outside world
- Not dependent on each other
  - Maintain a loose awareness
- Reusable
  - Commonality of service requests
More about Grids

Web Services can be used to implement a Service Oriented Architecture

- Use XML
  - Not platform specific
  - Not application specific
- Allow dissimilar applications to communicate with each other
Web Services

**Weather Web Service**
I provide weather information
Address A

**Math Web Service**
I can do Math
Address B

**Discovery Web Service**
I can find a Web Service that does what you want!

I'm looking for a Math Service

I Found one at Address B

I wonder if there's a Web Service that can do my math for me...
More about Grids

Web Services
Objective: To evaluate a Web Services based implementation of the Grid.

Funded by CANARIE
The Canadian Network for the Advancement of Research, Industry, and Education

Project Lifetime: January-December (2006)

The Grid Community awaits such research as ours before deciding to implement this new technology...or not.
Project Status

- Fully functional end to end system
- Preliminary Results are positive about the use of Web Services, in terms of:
  - Performance
  - Security
  - Scalability
- Future work on developing a monitoring system