

Grid Computing & Semantic Web

Grid Computing

- Proposed with the idea of electric power grid;
- Aims at integrating large-scale (global scale) computing resources;



Grid Computing

Then what computing resources?

- Computer processors or clusters;
- Networks;
- Data storage devices;
- Scientific instruments;
- Most importantly, they should be reached via Internet.

Why Grid Computing



Good things:

- The increasing availability of computing resources;
- Yet not fully used;
- Internet is everywhere.

Why Grid Computing



Challenges

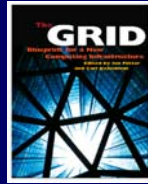
- Too much data;
- Scalable?
- Multi-disciplinary collaboration;
- Security issues.

A Definition

“ The Grid is a software infrastructure that enables *flexible, secure, coordinated* resource sharing among dynamic collection of individuals, institutions and resources” (Foster, Kesselman and Tuecke 2001)

The Development

- From mid 1990s;
- Maturing in the 2000s;
- The tools, projects, and discussions.



Major Challenges

Design widely accepted protocols for

- Job status monitoring and execution management;
- Data management;
- Resource coordination and discovery;
- Security (authentication and authorization).

Define application programming interfaces (APIs) and Software Development Kits (SDKs)

Grid Application Examples



- <http://www.globus.org/alliance/projects.php>
- Faster, more secure and more flexible;
- Facilitate collaboration,

GIS Grids

- Grid for GIS applications;
- A few related projects (GEON, GISolve, LEAD);



(<http://www.geogrid.org/>)

Semantic Web

- Proposed to facilitate web-based information sharing;
- Aims at automated machine-based information processing;

Why Semantic Web



Current web

- HTML dominates the web;
- Designed for human to digest;
- No semantics embedded;



Why Semantics Matter ?

- Semantics: the meaning of data?
- Semantic heterogeneity (e.g. naming);
- Need formal description?

Again, Why Semantic Web ?

- New generation of WWW;
- New representation of www data;
- As a global-scale intelligent database;
- How? (Enhance HTML by adding semantics)

How to Build A Semantic Web

- Use URI (Uniform Resource Identifier);
- Similar to URL;
- Also with RDF (Resource Description Framework): Three URIs.

An RDF Example

```
<?xml:lang="en" >
<http://purl.org/dc/elements/1.1/creator> _:x0 .
this <http://purl.org/dc/elements/1.1/title> "The Semantic Web: An Introduction" .
_:x0 <http://xmlns.com/foaf/name> "Sean B. Palmer" .
```

Source: <http://infomesh.net/2001/swintro/>

- The triples: Creator, title, name;
- Formatted so can be processed easily.

More...

- Can use RDF schema to model data;
- May need to conduct reasoning tasks;
- Web Ontology Language (OWL).

GIS Semantic Web

- GIS has similar semantic problems;
- The problem of interoperability;
- Geospatial ontologies.

The End

Thanks!