Scalable Resource Annotation in Peer-to-Peer Grids

Elizeu Santos-Neto
Network Systems Lab
University of British Columbia
CANADA

Nazareno Andrade, Francisco Brasileiro
Laboratório de Sistemas Distribuídos
Universidade Federal de Campina Grande
BRAZIL
A Peer-to-Peer Grid

Context

Site A

Site B

Site C

Peer

Resource

Admin

User

www.lsd.ufcg.edu.br
netsyslab.ece.ubc.ca
Requesting Resources – Case I

N Nodes
RAM >= 2GB
STORAGE >= 10GB
ARCH = i386
MPI = mpich
OCTAVE >= 3.0

Context

RAM = 4GB or more
STORAGE = 500GB
ARCH = i386
MATLAB = yes
MPI = mpich
OCTAVE = 3.0

P2P’2008 – Aachen, Germany
Requesting Resources – Case II
Low Resource Utilization and Low User Utility

Context

N Nodes
RAM >= 2GB
STORAGE >= 10GB
ARCH = i386
MPI = mpich
OCTAVE >= 3.0

RAM = 4GB or more
STORAGE = 500GB
ARCH = i386
MATLAB = yes
MPI = mpich
OCTAVE = ?
Resource Annotation

- User requirements and resource attributes change over time
  - Libraries and systems are constantly updated
  - System configurations change
  - Time to time users run different applications

Problem

- Centralizing the resource annotation on administrators is not scalable
- How to keep resource attributes up to date with user application requirements?
Collaborative Annotation

- From collaborative tagging to P2P Grids
  - Del.icio.us, Flickr
  - Self centered content annotation

Proposed Approach

- Shift the admin responsibility to users
  - Users annotate the resources with attributes they care about
  - Users may share their annotations
Peer-to-Peer Resource Annotation

• Scalability

• Increased Utilization

Benefits

• Increased User Utility
Challenges

- **Scale**: potentially large number of resources to annotate

- **Dynamic attributes**: annotation may expire due to the short life time of some attributes

**Discussion**

- **Incentive structure**: users ultimately compete for resources, so what about wrong annotations to divert other users?
Implementation

• **OurGrid** [CBAC+07] + **GridUnit** [DCBM06]
  - [http://www.ourgrid.org](http://www.ourgrid.org)
  - [http://sourceforge.net/projects/gridunit](http://sourceforge.net/projects/gridunit)

Discussion

• A more sophisticated information service
  - Multiple clients
  - Stronger consistency requirements
Automatic Annotation

- GridUnit
- Extension to the JUnit framework

Discussion
- Resource is annotated based on the output of test cases
Summary & Future Work

• Keep up to date resource information in P2P grids is challenging

• Collaborative resource annotation
  • Inspired on collaborative tagging systems
  • Shift of responsibilities (admins → users)

• Implementation, deployment and experimentation are on the way

• Collaborative annotation in distributed storage systems [SAAG+08]
Questions?

http://www.ece.ubc.ca/~elizeus/
http://www.ourgrid.org
References


- http://www.flickr.com
- http://del.icio.us