Grid in Cyber Science Infrastructure

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Outline

- overview of Cyber Science Infrastructure (CSI)
- grid operation in 9 computing centers
- REsources liNKage for E-sclence (RENKEI)
- summary
Cyber-Science Infrastructure (CSI)

- new information infrastructure to boost today’s advanced scientific research
  - integrated information resources and systems
    - high-performance computing/storage resources
    - software
    - databases and digital contents
    - “human” and research processes themselves

- services
  - networking: SINET3
  - ID management: UPKI
  - grid: NAREGI
CSI (cont’d)

NII-REO (Repository of Electronic Journals and Online Publications)

GeNii (Global Environment for Networked Intellectual Information)

Virtual Labs Live Collaborations

NAREGI: National Research Grid Initiative

UPKI: National Research PKI Infrastructure

SINET3: Lambda-based Academic Networking Backbone

Industry/Societal Feedback

International Infrastructural Collaboration

NII

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Computing Systems in CSI
grid operation in 9 computing centers
Grid Operation in 9 Computer Centers

- toward production grid services in CSI
  - kickoff in Fall 2008
  - starting pilot operation in Spring 2009

- middleware
  - NAREGI middleware V.1.1.3
    - evaluation of NAREGI middleware operability on production level grids
    - collecting feedback
    - improving the software quality

- operational issues
  - discussion about grid operational issues in the computing centers
    - user administration, charge of fee, ...
VO Setting

NII
- UMS/VOMS
- IS-CDAS
- GridVM scheduler
- GridVM engine
- DG-UFT
- DG-DRMS-SV

SINET3
- IS-CDAS
- GridVM scheduler
- GridVM engine

computer center

Portal
- WF
- SS
- IS-NAS

NAREGI CA
- CA
- RA

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NAREGI CA

- operation of Grid CA for CSI participants
  - client certificate and server certificate
- CA accredited by the Asia Pacific Grid Policy Management Authority (APGrid PMA)
- cooperation with computing centers
  - Local Registration Authority (LRA) operators at computing centers in universities/laboratories
User Administration

- **How do users apply accounts?**
  - Users do not want to submit 9 application forms to the computer centers.
  - Users do not want to travel to NII for applying grid certificates.

- **How do computing centers create grid-mapfile?**
  - Computing centers have their own policies for local accounts.

- **How do computing centers collect charge?**
  - Users do not want to receive bills from 9 computer centers.
## Schedule

<table>
<thead>
<tr>
<th>09/2008</th>
<th>05/2009</th>
<th>04/2010</th>
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<tbody>
<tr>
<td>middleware development</td>
<td>improvement of middleware</td>
<td></td>
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<tr>
<td>deployment to computer centers</td>
<td></td>
<td></td>
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<tr>
<td>preparation for pilot operation ✓policy for user admin. ✓tools</td>
<td>pilot operation ✓evaluation ✓feedback ✓free of charge</td>
<td>preparation for operation ✓policy for charge ✓tools</td>
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<tr>
<td></td>
<td>operation with charge?</td>
<td></td>
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REsources liNKage for E-science (RENKEI)
REsources liNKage for E-sciense (RENEKI)

(1) computing resource federation, and application hosting

(2) file sharing, and file catalogue federation

(3) DB federation, and federation with ID management systems

(4) API for multiple grid middleware

(5) evaluation and collaboration with users

computation intensive applications users
database users
application developers

laboratory (LLS)
grid middleware (e.g. NAREGI)
computer centers (NIS)

international inter-operation

computation/data intensive application users

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Computing Resource Federation

- **workflow system**
  - job submissions to LLS/NIS

- **interoperability**
  - job submission and resource information sharing through OGF standards, e.g. BES

LLS: Laboratory Level System
NIS: National Infrastructure System
Application Hosting

- sharing applications in a research community
  - deployment and registration of applications by application developers
  - running registered application

source: Hitohide Usami, Tamagawa University
File Sharing

- distributed file system
  - high performance file access from LLS/NIS with automatic replica file allocation
  - fault tolerance with automatic file replication

source: Hideo Matsuda, Osaka University
File Catalogue Federation

- federation of file catalogues running on different grid middleware (international interoperation)
  - development of the file catalogue system with RNS (OGF standard)
  - standardization of interfaces in OGF

Source: Hideo Matsuda, Osaka University
Database Federation

(unified and easy access to multiple DB with different implementation, e.g. RDB, XML, Web, RDF, search engine,...)

- geological data
- rainfall data, e.g. AMEDAS
- hazard map
- high resolution height data from satellites
- landslip simulation by using multiple DBs and HPC systems

source: Yoshio Tanaka/Isao Kojima, AIST
Federation with ID Management Systems

- generation of grid auth. information federating with various ID management systems
  - OpenID, Shibboleth, Kerberos, Username/password, PKI (X.509 certificates)

source: Yoshio Tanaka/Isao Kojima, AIST
API for Multiple Grid Middleware

API to develop/run applications on multiple grid middleware with OGF standards, e.g. SAGA and RNS

source: Takashi Sasaki, KEK
Evaluation and Collaboration with Users

- **testbed**
  - building testbeds with LLS/NIS

- **collaboration with user communities**
  - collecting needs from application users for e-science infrastructure
  - evaluation of middleware technologies developed in the “RENKEI” project and feedback to development teams

source: Manabu Higashida, Osaka University
Summary

- NII is building CSI, a new information infrastructure to boost today’s advanced scientific research in Japan.

- 9 computer centers starts pilot grid operation with NAREGI middleware in FY 2009.

- The new middleware development project, “RENKEI”, started in Fall 2008.
Thank you.