Experiences on building the ApGrid Testbed

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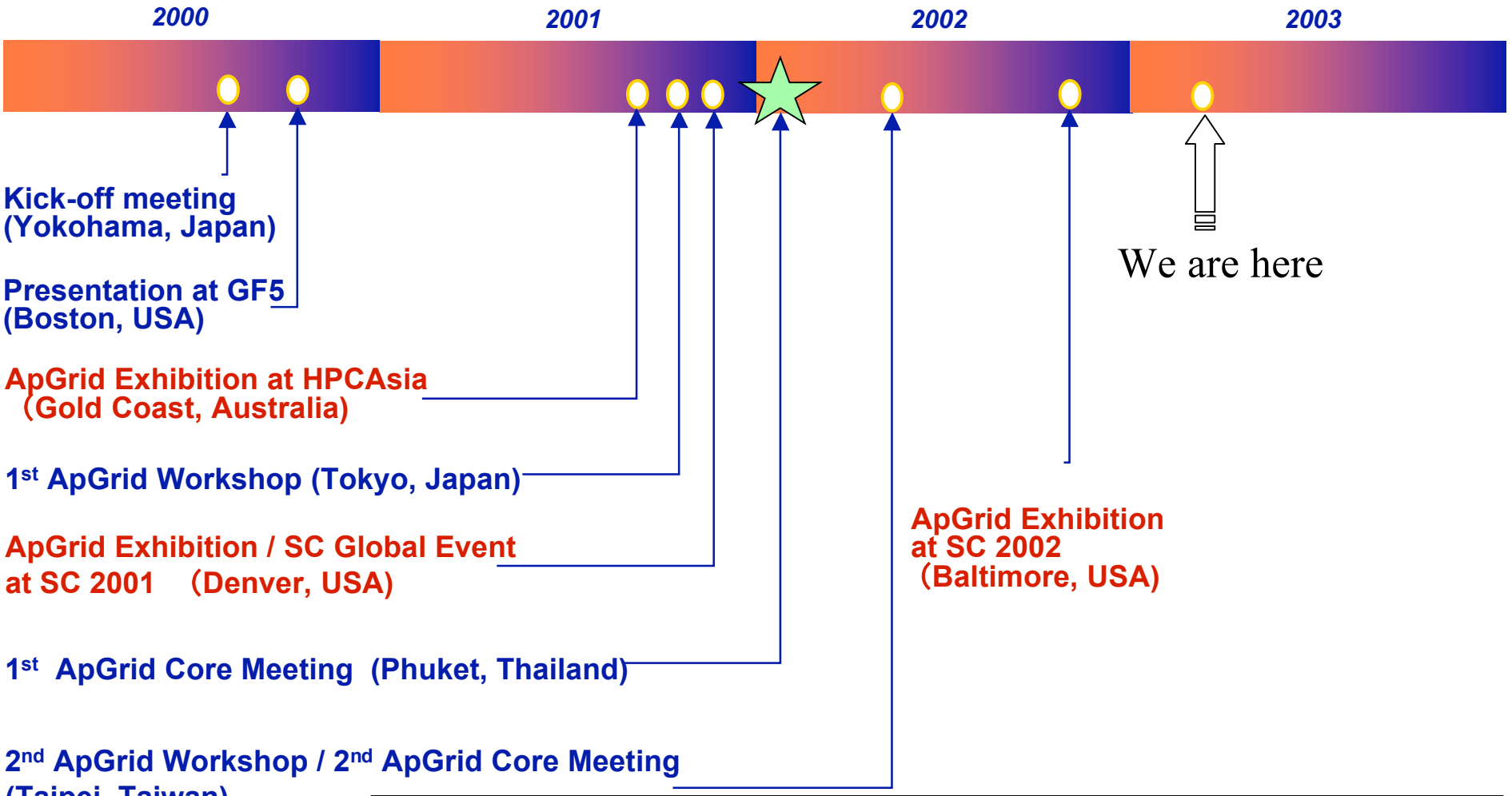
Outline

- Brief introduction of ApGrid and the ApGrid Testbed
- Software architecture of the ApGrid Testbed
- Lessons learned
- Demonstration
  - CSR Generator using Java Web Start

What is ApGrid?

- Asia-Pacific Partnership for Grid Computing.
- ApGrid focuses on
  - Sharing resources, knowledge, technologies
  - Developing Grid technologies
  - Helping the use of our technologies in create new applications
  - Collaboration on each others work
- Not only a Testbed
- Not restricted to just a few developed countries, neither to a specific network nor its related group of researchers
- Not a single source funded project

History of ApGrid



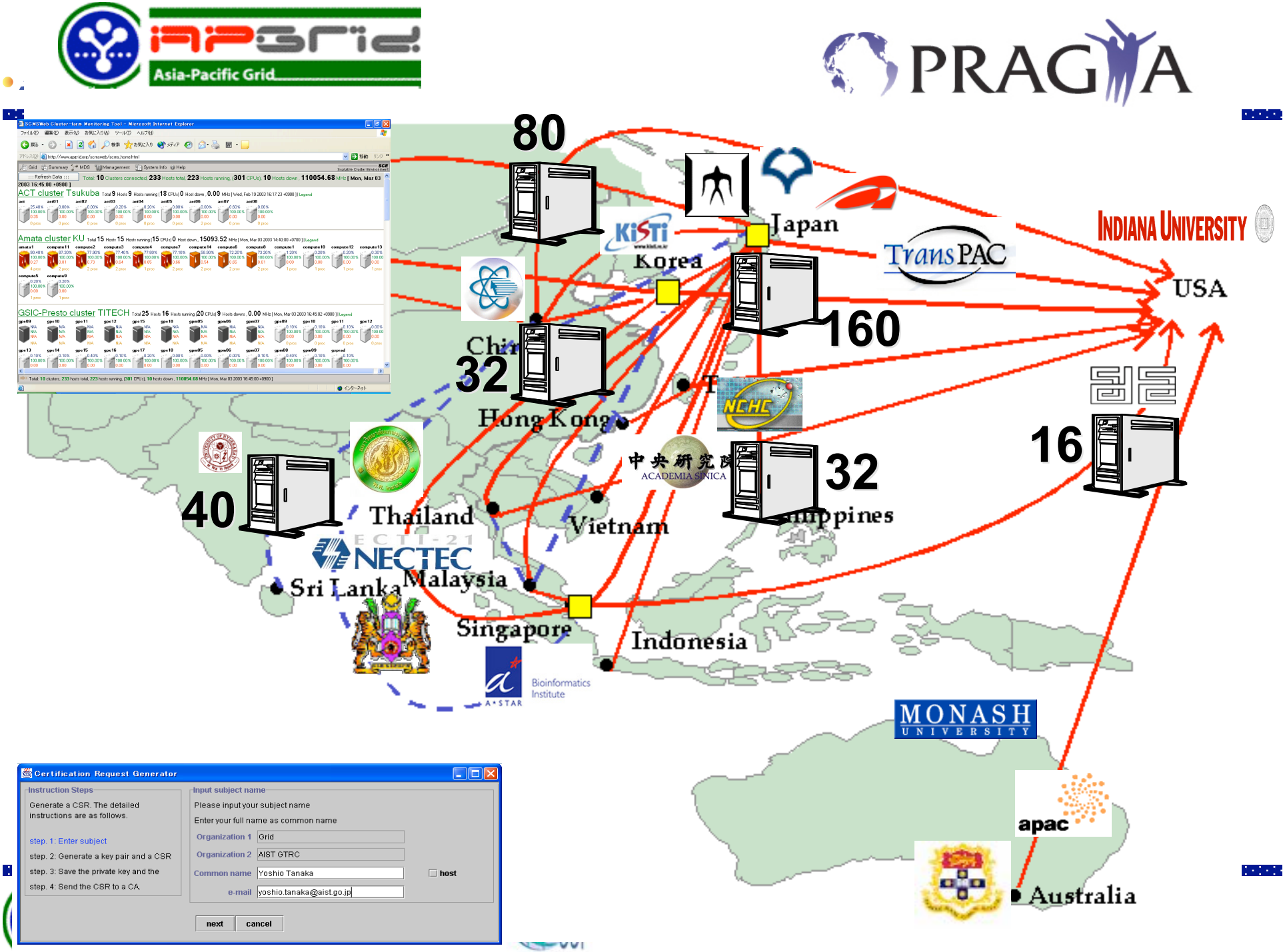
15 countries, 41 organizations (as of Feb. 28, 2003)

AIST Meetings

- ApGrid Workshop: On Demand
- ApGrid Core Meeting: 2-3 times a year
- Have TV-conference in flexible manner

ApGrid Testbed – features -

- Truly multi national/political/institutional VO
  - not an application-driven testbed
  - differences in languages, culture, policy, interests, …
- Donation (Contribution) based
  - Not a single source funded for the development
  - Each institution contributes his own share
  - bottom-up approach
- We can
  - have experiences on running international VO
  - verify the feasibility of this approach for the testbed development


APGrid
Asia-Pacific Grid
PRAGMA
80
Japan
KISTI
Korea
TransPAC
INDIANA UNIVERSITY
USA
160
32
Hong Kong
NCHC
16
32
ACADEMIA SINICA
40
Thailand
Vietnam
NECTEC
Malaysia
Sri Lanka
Singapore
Indonesia
Bioinformatics Institute
A*STAR
MONASH UNIVERSITY
apac
Australia
Certification Request Generator
Instruction Steps
Generate a CSR. The detailed instructions are as follows.
step. 1: Enter subject
step. 2: Generate a key pair and a CSR
step. 3: Save the private key and the
step. 4: Send the CSR to a CA.
Input subject name
Please input your subject name
Enter your full name as common name
Organization 1
Grid
Organization 2
AIST GTRC
Common name
Yoshio Tanaka
host
e-mail
yoshio.tanaka@aist.go.jp
next
cancel

AIST ApGrid Testbed – status and plans -

- **Resources**
  - 300 CPUs from 8 institution (appeared on the monitoring webpage)
    - Most resources are not dedicated to the ApGrid Testbed.
    - +100 CPUs from 5 institution (browsed through the MDS)
  - 6 AG nodes, 1 virtual venue server
  - Special devices (MEG, Ultra High Voltage Microscope, etc.)
- **An experimental Grid rather than a production Grid**
  - Most current participants are developers of Grid middleware rather than application people
  - Current ApGrid Testbed is not attractive for application developers/users.
    - small scale
    - poor network connection between Asian countries
    - most clusters are using private IP address
- **Should provide a production Grid**
  - How to motivate Asia Pacific Grid researchers to participate in ApGrid
  - How to encourage application developers/users to use Grid
    - We should show the evidence that the ApGrid Testbed is mature for running applications
  - Increase/Improve/add various resources
    - computers, networks, storages, humans resources
  - Strong requirement as PRAGMA resources

AIST ApGrid Testbed – Software Infrastructure -

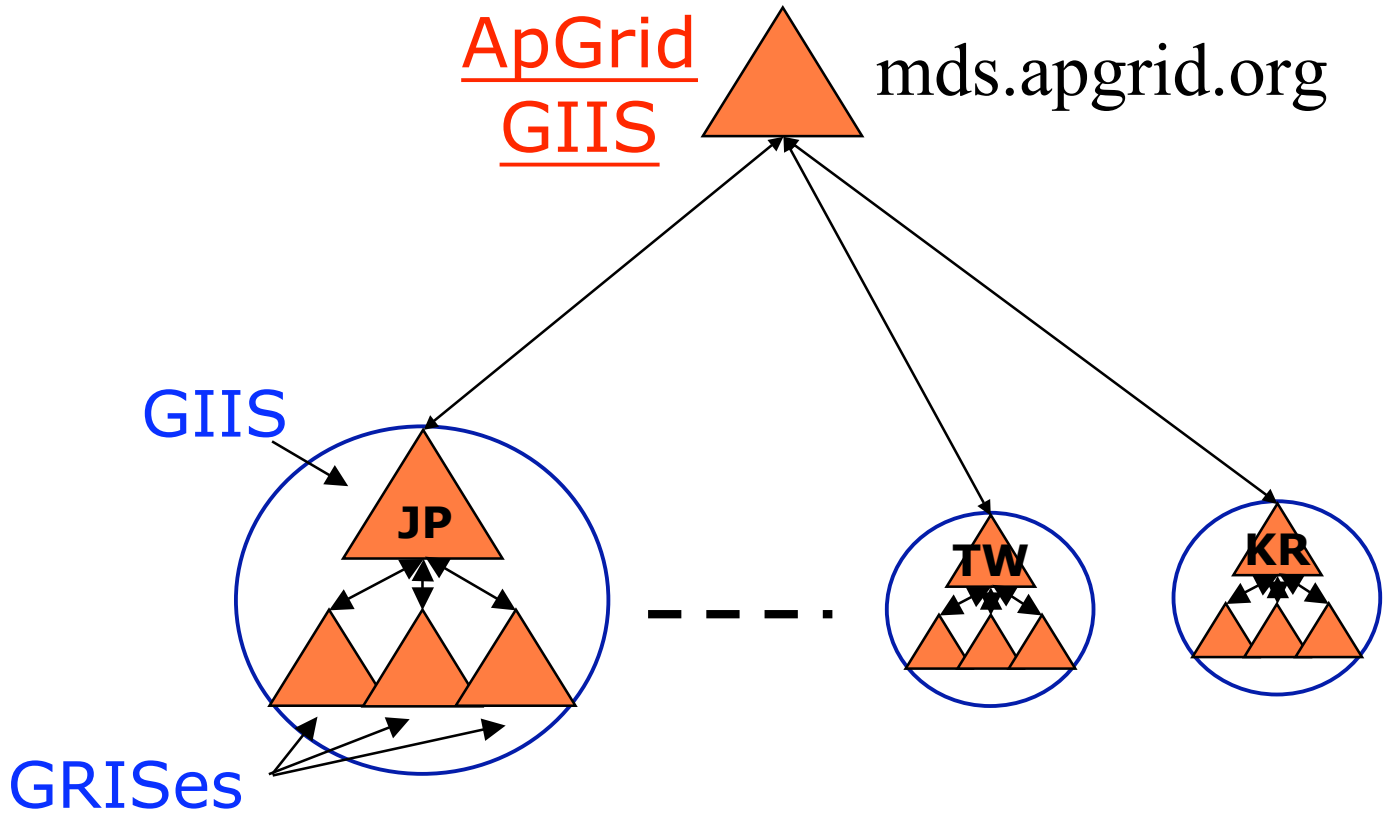
- Use Globus Toolkit 2.2 (or later) as a common software
  - Security is based on GSI
  - Information Service is based on GIS
- The ApGrid Package includes
  - GPT 2.2.5
  - Globus Toolkit 2.2.3
  - MPICH-G2 (MPICH 1.2.5.1)
  - Ninf-G 1.1
  - Iperf 1.6.5
  - SCMSWeb 2.1
  - + installation tool

Testbed Developments - Security Infrastructure -

- Certificates and CAs
  - Users and resources have to have their certificates issued by a trusted CA.
  - The ApGrid Testbed runs CAs and issues certificates for users and resources.
- ApGrid CA?
  - The ApGrid Testbed allows multiple root CAs.
  - Each country/organization/project may run its own CA and these could be root CAs on the ApGrid Testbed.
    - » currently, there are 9 CAs
  - Certificates, signing policy files of the ApGrid CAs are put on the ApGrid home page and can be downloaded via https access.
  - CP and CPS will be appeared shortly.
  - Planning to establish ApGrid PMA and collaborate with other communities.
- The ApGrid Testbed is also planning to run an ApGrid root CA which is signed by a commercial CA such as Verisign.

Testbed Developments - Information Services -

- **Based on MDS (GRIS/GIIS)**



How the ApGrid Testbed has been developed?

- 2001
  - tried to find possible participants in Asia Pacific countries
  - demos/exhibits at international conferences (HPCAsia, SC01)
  - 1st ApGrid workshop in Tokyo/Japan.
- Jan. 2002
  - Discussed technical issues of the testbed development at the 1st ApGrid Core meeting in Phuket/Thailand.
  - "ApGrid Testbed Development Notes" (written by myself) was used as a basis for the discussion.
- May 2002
  - Reported progress and set milestones for the development at the 2nd ApGrid Core meeting in Taipei/Taiwan.
- Nov. 2002
  - Demonstration of Ninf-G applications on the ApGrid Testbed.
  - Gained insights on both Ninf-G and Testbed developments
- Jan. - Feb. 2003
  - Deployed SCMSWeb
  - Built an ApGrid software package

AIST Lessons Learned

- **Difficulties caused by the bottom-up approach and the problems on the installation of the Globus Toolkit.**
  - Most resources are not dedicated to the ApGrid Testbed.
  - Site's policy should be respected.
  - There were some requirements on modifying software configuration, environments, etc.
    - » Version up of the Globus Toolkit (GT1.1.4 -> GT2.0 -> GT2.2)
    - » Apply patches, install additional packages
    - » Build bundles using other flavors
  - Different requirements for the Globus Toolkit between users.
    - » Middleware developers needs the newest one.
    - » Application developers satisfy with using the stable (older) one.
    - » It is not easy to catch up frequent version up of the Globus Toolkit.
  - ApGrid software package should solve some of these problems

AIST Lessons Learned (cont'd)

- Scalability problems in LDAP
  - sizelimit should be specified in grid-info-slapd.conf (default is 500)
  - GIIS lookup takes several ten seconds
- Well known problem ☺
  - Firewall, private IP addresses…
- Human interaction is very important
  - have timely meetings/workshops as well as regular VTCs.
  - understand and respect each other's culture, interests, policy, etc.

ApGrid Technologies supports the ApGrid Testbed

Social Framework

Applications and Portals and tools for the testbed managements

ActiveSheet, BioGrid, Drug Design, HEPGrid, ThaiGrid Portal, CFD, Chemical Eng., SCMSWeb, CSR generator

High Level Grid Middleware

Programming Tools: Ninf-G, Omuni-RPC, Nimrod DPL, MetaCompiler
Simulators: Bricks and GridSim
Resource Brokers: Nimrod-G

Low Level Grid Middleware

Security, Process, Storage, QoS, etc: CPM, GrACE, Grid Data farm

Grid Fabric

AP partners have Computers: PC, WS, Clusters, Supercomputers; SCE manager;
WAN: APAN, TransPAC, GrangeNet, APII, Tsukuba WAN
Instruments: MEG, Ultra High Voltage Microscope, KEK Accelerators, …

AIST CSR Generator: motivation

- How to get a user certificate:
  1. Generate a Certificate Signing Request (CSR)
     eg. grid-cert-request command, etc.
  2. Send the CSR to the Certificate Authority
  3. After the validity check, CA signs the CSR and issues a certificate.
- ssl and/or globus is required for getting certificates.
- Web interface for getting certificates are preferable.
- Placing private keys on the web server should be avoided, i.e. a key pair should be generated at the client side

CSR Generator using Java Web Start

- **Solution: Implemented CSR Generator using Java Web Start**
- When a user wish to get a certificate, the user is required to *simply click the link*.
- Java Web Start *automatically downloads all necessary files!*

demonstration

For more info

Home Page http://www.apgrid.org/

Mailing Lists

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ML for discussion (open for anyone)	discuss@apgrid.org