eScience Projects in Singapore

Lawrence Wong
National Grid Office, Singapore

International Symposium on Grid Computing
26 – 28 July 2004
Outline

• Introduction to National Grid
• Virtual Grid Communities
  – Physical Sciences
  – Life Sciences
  – Digital Media
• Working Groups
• National Grid Phase 2
  – Industry
  – International Collaboration
National Grid Vision

to facilitate the seamless use of an integrated cyber infrastructure in a secure, effective and efficient manner to advance scientific, engineering & biomedical R&D,

with the longer term goal of transforming the Singapore economy using grid
National Grid Steering Committee

Chairman - Mr. Peter Ho

Working Groups
- Security
- Middleware & Architecture
- Governance & Policy
- Applications
- Network

SIGs
- System Administrators
- Access Grid

Virtual Grid Communities
- Physical Sciences
- Life Sciences
- Digital Media

MTI (A*STAR, EDB, RIs)
MI NDEF (DSTA, DSO)
MITA (IDA, MDA)
MOH (Hospitals)
MOE (Schools, NUS, NTU)
Industry (Lilly, Philips, SCS, StarHub)

National Grid Governance Council (NGGC)
Facilitates & coordinates activities

National Grid Office (NGO)

National Grid Operations Centre (NGOC)

National Grid Competency Centre (NGCC)
Activities

• Formulate the framework & policies
• Plan & develop a secure platform
• Adopt common open standards
• Encourage the adoption of Grid Computing
• Demonstrate the commercial viability of compute-resource-on-tap
• Lay the foundation for a vibrant Grid Computing economy
<table>
<thead>
<tr>
<th>Entity</th>
<th>OS</th>
<th>Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>IHPC</td>
<td>AIX</td>
<td>IBM Regatta</td>
</tr>
<tr>
<td>One-North (BII &amp; GIS)</td>
<td>Linux, Solaris</td>
<td>Compaq Alpha Cluster, Sun</td>
</tr>
<tr>
<td>NUS</td>
<td>Linux</td>
<td>Intel Xeon Cluster</td>
</tr>
<tr>
<td>NTU</td>
<td>Solaris, Linux</td>
<td>Sun Fire, Intel Pentium 4</td>
</tr>
<tr>
<td>SMA</td>
<td>Linux</td>
<td>Itanium 2</td>
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</tbody>
</table>
NGPP Governance Council

• Roles
  – Develop & promulgate policies for
    • Management & operation of NGPP, Sharing of resources on NGPP, Assess rights & privileges of authorized users, Preventive actions & contingency plans for risk management, Security, Service continuity, Disruptive recovery & Code of conduct for users
  – Develop a framework for service level management to ensure that NGPP service levels meet desired objectives
  – Monitor & review performance & utilization of NGPP
  – Develop a framework for economic model for next phase of NGPP
Physical Sciences VGC
Physical Sciences VGC Activities

Distributed Simulation of Flow over Dimpled Surfaces

Geo-rectification of Satellite Images

Diagnostics & Repair Scheduling

Collaborative Engineering Design & Simulation

Distributed Dissipative Particle Dynamics (DPD) Simulation

Complex Design & Modeling
Physical Sciences Virtual Grid Community Symposium 2003

Physical Sciences & Grid Computing

Friday, 4 April 2003

Organized by:

Supported by:

Sponsored by:
Life Sciences VGC
Life Sciences VGC

E-Cell & Gene Simulation

GridBlast

ENCYCLOPEDIA OF LIFE

Encyclopedia of Life
Life Sciences Data Grid

• Rationalizing Life Sciences database download, mirroring & maintenance
• Hosting of locally generated databases (ala NCBI)
• Future Enhancements
  – Allow queries across main databases
  – Support integration of Singapore data
  – Expand audience to include medical professionals
Life Sciences Virtual Grid Community Symposium 2004

Grid Research & Information Driven Bio-Medical Applications

2 - 3 April 2004

Sponsored by

Brought to you by
Inaugural Access Grid session
2nd April 2004
Presentation by Professor Carole Goble
on my Grid Project
Digital Media VGC
Distributed Computer Assisted Cel Animation

- A fully integrated 2D animation production system where many parts of 2D animation production pipeline are automated to free artists from mundane jobs to concentrate on creative tasks.
- This project performs distributed cel animation from providing auto in-betweening to auto-coloring & take advantage of a large number of clusters & nodes in a grid to greatly reduce the production time & improve the quality of animation production.

Auto In-betweening
Working Groups
Working Groups

- Security
- Middleware & Architecture
- Network
- Applications
- Governance & Policy
**ALICE** (A**daptive and sc**a**lable**

**Internet-based Computing Engine**)

- **Collaborators**
  - Centre for Remote Imaging, Sensing & Processing (CRIISP), BII, Nanyang Polytechnic (School of Life Sciences), Atsuma Technology

- **Java-based Lightweight Grid**

- **Middleware**
  - lightweight – ease of setup, use & maintenance
  - portability – platform independence
  - generic infrastructure & communication support
  - maximizes **throughput** via job-parallelism
  - maximizes **performance** via (Java) object-parallelism
  - anonymity, security & accountability
  - performance (QoS) & scalability

- **Grid Programming**
  - ease of grid application development
  - template-based programming – hides complexities of parallel programming

**ALICE Brokered Grid Model**
Computational Science & Engineering (CSE) Problem Solving Environment (PSE)

- PSE portal
- Middleware components
  - Information service management
  - Agent-based workflow management
  - Distributed scheduler
30 June - 1 July 2004

Hotel Grand Copthorne Waterfront, Singapore

Topics
- Problem solving environments, workflow & development tools
- Grid programming models, languages, debugging & compilation techniques
- Grid Tools, Middleware & Fabrics
- Scheduling & resource management
- Grid applications & system solutions in science & engineering
- Novel uses of grid computing concepts & technologies
- Grid Security
Future Events

- NTU & NGO presented Singapore’s bid
  - Awarded right to host in 2006
  - Beat proposal from Brazil

- PRAGMA 2005 (with BII)

- LSGrid (with BII)

- APAN 2006 (with SingAREN)
## WG, VGC & SIG Leaders

### Working Groups

<table>
<thead>
<tr>
<th>Working Groups</th>
<th>WG Leaders</th>
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</thead>
<tbody>
<tr>
<td>Network</td>
<td>A/P Francis Lee (NTU)</td>
</tr>
<tr>
<td>Security</td>
<td>A/P Daniel Tan (NTU)</td>
</tr>
<tr>
<td>Middleware &amp; Architecture</td>
<td>A/P B C Khoo (NUS)</td>
</tr>
<tr>
<td>Governance &amp; Policy</td>
<td>A/P Teo Yong Meng (NUS)</td>
</tr>
<tr>
<td>Applications</td>
<td>A/P Kenneth Ong (NUS)</td>
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### Virtual Grid Communities

<table>
<thead>
<tr>
<th>Virtual Grid Communities</th>
<th>VGC Leaders</th>
</tr>
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<tbody>
<tr>
<td>Life Sciences</td>
<td>Dr Vineta Balla (MOH)</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>Dr Terence Hung (IHPC)</td>
</tr>
<tr>
<td>Digital Media</td>
<td>A/P Seah Hock Soon (NTU)</td>
</tr>
</tbody>
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### Special Interest Groups

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<th>SIG Leaders</th>
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<tr>
<td>Access Grid</td>
<td>Jon Lau Khee Erng (NGO)</td>
</tr>
<tr>
<td>System Administrators</td>
<td>Ong Guan Sin (SCS)</td>
</tr>
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Phase 2
Phase 2 - Emphasis on Industry

• Working with
  – Infocomm Development Authority
  – Media Development Authority
  – Economic Development Board
  – Private sector MNCs & SMEs

• Aim
  – Use the Grid infrastructure as an enhancement of the business ecosystem for corporations & businesses

• APSTC
  – Sun Microsystems’ Asia-Pacific Science & Technology Center @ Nanyang Technological University

• GI Z@NUS
  – IBM’s Grid Innovation Zone @ National University of Singapore

• AE@SG
  – Linking NGPP to CERN LCG & HP Labs
Phase 2 - International Collaboration

- The Grid extends beyond national boundaries
- Singapore National Grid wants to be plugged in to the global network through
  - Working with organizations like SingAREN, APAN & other such bodies; and
  - Advanced network infrastructure that APAN & others are building.
- Promotion of e-Science type projects
- APEC TEL Grid Workshop in Singapore (September 2004)
  - Cross-border joint project opportunity
Operational Grid with

[Courtesy of Hewlett Packard]
AI ST-NGO MOU

Framework for Cooperation (14 May 2004)

• Joint research projects
  - Developing middleware tools
  - Applying grid computing to models in science & engineering
  - Providing computing resources for science & engineering applications.

• International technology transfer program including conferences, workshops, seminars & exchange of grid researchers.

• Joint multilateral projects with academia & industries.

• Bilateral annual review on progress & development.
End