GRID Middleware

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Advanced Grid Research Workshops through European and Asian Co-operation
Current state of Grid Middleware

● Definition
  - A mediator layer that provide a consistent and homogeneous access to resources managed locally with different syntax and access methods

● What have been achieved so far
  - Several implementation/architectures of Grid middleware
  - Well identified basic services
  - From proprietary/ad-hoc solutions to standard based solutions
    - Lot of effort is going to the development of standards
Grid Middleware initiatives

EU Unit F3 - Research Infrastructure

Specific Support Actions

EU Unit F2 - Grid Technologies

Specific targeted research project
Network of excellence
Integrated project
Specific support action

SHANGHAI GRID

China main initiatives

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Next Generation Grid Middleware
what to do to make them better?

- **Transparency and robustness**
  - Self-organizing components

- **Security and trust**
  - Need common largely accepted security framework

- **Persistency**
  - Managing states and keep track of them

- **Scalability**
  - Need to bring more P2P techniques instead of client/server approach

- **Easy to use/program**
  - Hide complexity by raising the abstraction level

- **Based on open and mature standards/protocols**
  - Stabilized the standards, make them mature!

- ...
The importance of Grid Middleware Repositories

- Several initiatives at the European and National levels
  - France: ObjectWeb - Open Source Middleware
  - UK: Open Middleware Infrastructure Institute
    - [http://www.omii.ac.uk/](http://www.omii.ac.uk/)

- Europe
  - Each FP6 Grid project is committed to participate to a repository of reference implementations and Grid middleware

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To learn more about the European Vision on Grid Middleware

Looking into the Future
From Middleware to Operating Systems…

- Is a Middleware the right approach to Grid?
  - Make the API not very stable…
  - Some behaviors that may conflict with the OS (security, scheduling, …)

- What about a Network-centric Grid operating system?
  - OS was designed to manage hardware resources
  - NGG2 recommendations
    - development of a design for a new operating system that provides a fault-tolerant, scalable, self-healing, self-managing environment upon which Grids service middleware may ‘sit’;
    - development of Grids foundations middleware suitable both for enhancing existing operating systems and for inclusion within (a);

http://www.cordis.lu/ist/grids/pub-report.htm
Approach 1 - a la Globus

Applications

Middleware Layer n

Middleware Layer n-x

Middleware Layer 1

Operating System

Approach 2 - a la GridOS

Applications

Middleware Layer n-x

Middleware Layer 1

Kernel

Operating System
Operating System

Middleware Layer

Applications

Approach 1 - a la Globus

Middleware Layer n

Middleware Layer 1

Approach 3 - a la (?)

MIDDLEWARE

Kernel

Operating System
Middleware session - Agenda

- CNGrid Software Progress
  - Prof. Zhiwei Xu, ICT, CAS, China

- AKOGRIMO - Access to knowledge through the Grid in a mobile world
  - Dr. Julian R. Gallop, CCLRC RAL, UK

- Middleware Research in the 863 High-tech Program
  - Prof. Hong Mei, Peking University, China

- NEXTGRID - The next generation Grid
  - Dr. Konstantinos Tserpes, NTUA, Greece

- The Shanghai Grid
  - Prof. Minglu Li, Shanghai Jiaotong University