ICT Projects at Institute of Computer Science and ACC Cyfronet AGH

AGH University of Science and Technology Krakow, Poland
Mission: “To **deploy and operate a production-quality Grid-empowered eInfrastructure oriented to service research communities supporting demanding interactive applications.**”

- **Deployment of e-Infrastructure**
  - oriented to interactive use
  - site integration support
  - grid operations service

- **Middleware for interactivity and MPI**
  - adapt/integrate existing middleware
  - guarantee interoperability with EGEE

- **Provide a complete interactivity suite**
  - desktop
  - roaming access
  - scheduler with prioritization services
  - complex visualization

- **Support for interactive applications:**
  - setup of collaborative environment and VO
  - consideration of performance
  - interactivity and visualization requirements
  - identification and selection of research oriented interactive applications

- **Support remote collaboration activities:**
  - research, management, integration, training

- **Approach target research communities**

- **Provide security measures for interactivity**
Researchers demand resources int.eu.grid VISION

Example: **Ultrasound Computer Tomography**
A new method of medical imaging based on the reconstruction by numerical techniques of an image, using as input the data measured by a scanner of ultrasounds which surrounds the object of interest.

- Distributed Parallel (MPI) Interactive Computing & Storage at the Tera level
- User Friendly Access

The application requires analyzing about 20 Gb of data, which would take order of one month in a workstation...

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Web site: http://dissemination.interactive-grid.eu/
Virolab

Virtual Laboratory for Collaborative HIV Study
Virolab

Various Experts and Different Infrastructures on Same Platform

Users
- Experiment developer
- Scientist
- Clinical Virologist

Interfaces
- Experiment Planning Environment
- Experiment scenario
- ViroLab Portal
- Patient Treatment Support

Runtime
- Virtual Laboratory runtime components
  (Required to select resources and execute experiment scenarios)

Services
- Computational services
  (services (WS, WTS, WS-RF), components (MOCCA), jobs (EGEE, AHE))
- Data services
  (DAS data sources, standalone databases)

Infrastructure
- Grids, Clusters, Computers, Network

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Web site: Virtual Laboratory: virolab.cyfronet.pl
GridSpace Technology: gs.cyfronet.pl
CoreGrid

Systems, Tools and Environments (1)

**Component Methodology on Grids**
- MOCCA component framework combining CCA and H2O
- High-level scripting approach to composition – GridSpace
- Interoperability between CCA and GCM component models
- Security issues in component-based Grid platforms (Shibboleth, GSI)
- Cooperation: UIBK, Austria and INRIA, France

**HLA Component Model**
- Component-based model with support specific for multiscale simulations
- No remote procedure call (RPC), communication by HLA mechanisms
- Grid environment to share components across administrative domains
- Cooperation: UvA, The Netherlands and UoW, UK
Performance Monitoring on Grids

- Capturing and interpreting monitoring data on a large number of short life-time workers
- Application and GRID superscalar (GS) runtime optimization
- On-line search for performance bottlenecks
- Cooperation: UPC, Spain

Adaptation of Legacy Software on Grids

- Universal architecture enabling to integrate legacy software into Grid services
- Novel design enabling efficiency, security, scalability, fault tolerance, versatility
- Loose coupling of legacy backends and service frontends enables transparent migration of computation
- Cooperation: UoW, UK and UWC, UK

DAG Scheduling on Grids

- A strategy of maximization eligible jobs in DAG scheduling seems fit well to grids.
- Known algorithms take into account a structure of DAGs only and not bring satisfactory results comparing to well known techniques.
- The research focused on possible improvements
- Cooperation: UIBK, Austria

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GREDIA

Application Development and VO Management

- Provides Application Scenario Developers with means to express business functionality as **Application Scenarios** using a simple **scripting notation**
- Capable of executing Application Scenarios
- Capable of interfacing a wide array of **computational technologies** and **data sources**
- Integrated security system with **single sign-on** functionality and **Virtual Organization management** tools
- Integrated scenario repository and **Grid Service registry**
- Fully functional development IDE
GREDIA

Appea and FiVO Architecture

Contact person: Jacek Kitowski, kito@agh.edu.pl
Aim:
SLA based Resource Allocation

„Grid are [...] to deliver nontrivial QoS” Ian Foster

On every field carefully defined SLAs are needed to provide customized solutions
EGEE

Operation Tools Architecture

VO Registry (inc. VO managers data)

Resources Registry (inc. resource managers data)

Authorization & Roles Management

SLA Negotiation Module

SLA Monitoring Module

SLA Execution Module

Resource Configuration

Infrastructure Information System

Accounting

Service Functional and Quality Monitoring

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PL-Grid

Polish Infrastructure for Supporting Computational Science in the European Research Space

Response to the needs of Polish scientists and ongoing Grid activities in Poland, other European countries and all over the world

- **Motivation**
  - E-Science approach to research
  - EGI initiative ongoing in collaboration with NGIs

- **Creation of Polish Grid (PL-Grid) Consortium** – the agreement signed in January 2007

- **PL-Grid Project (2009-2011)**, executed in the framework of the Operational Programme Innovative Economy, funded via European Structural Funds

- **Consortium made up of five largest Polish supercomputing and networking centres**
  - ACK CYFRONET AGH (Krakow) – **Coordinator**
  - Poznań Supercomputing and Networking Center (PCSS)
  - Wrocław Centre for Networking and Supercomputing (WCSS)
  - Academic Computer Center in Gdańsk (TASK)
  - Interdisciplinary Center for Math. and Computat. Modelling, Warsaw University (ICM)
PL-Grid

Assumptions

- Polish Grid is going to have a common base infrastructure – similar to solutions adopted in other countries.
- Specialized, domain Grid systems – including services and tools focused on specific types of applications – will be built upon this infrastructure. These domain Grid systems can be further developed and maintained in the framework of separate projects.
- Such an approach should enable efficient use of available financial resources.
- Creation of a Grid infrastructure fully compatible and interoperable with European and World Grids thanks to cooperation with teams involved in the development of European Grid systems (EGEE, DEISA, OMII, C-OMEGA, ESFRI).

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