Towards a Comprehensive Accounting Solution in the Multi-Middleware Environment of the D-Grid Initiative

Jan Wiebelitz
Wolfgang Müller, Michael Brenner, Gabriele von Voigt

Agenda

- Introduction to the German Grid Initiative D-Grid
- Concept of Sustainability and Consequences for D-Grid
- The Distributed Grid Accounting System (DGAS)
- DGAS and HLRmon in D-Grid
- Future Developments
D-Grid Infrastructure

- D-Grid infrastructure, current stage of expansion
  - D-Grid backbone is built from several core locations
  - additional resources provided by 17 partners from D-Grid communities
  - special funding by the Federal Ministry of Education and Research in Germany
    - ~ 10,000 CPU cores with ≥ 2 GB RAM/core
    - ~ 3.3 PB disk storage
    - ~ 5.5 PB tape storage

D-Grid Reference Installation I

- Reference installation
  - provided and maintained by the D-Grid Integration Project (DGI)
  - offers the community grids easy-to-install middleware packages

- Core locations
  - have to follow the reference installation
  - have to provide compute services
  - have to provide storage services

- Further information
D-Grid Reference Installation II

- Supported Technologies
  - middleware packages
    - Globus Toolkit 4
    - LCG/gLite 3.0
    - UNICORE 5
  - data management
    - gLiteSE/dCache-SRM
    - Globus OGSA-DAI

D-Grid Concept of Sustainability

- Sustainability has to be reached by
  - self financing e-science infrastructure, independent of public funding
  - development of business models by the communities
  - foundation of the D-Grid GmbH as a public company under German law
    - development of generic services for the communities and resource providers
    - provision of the reference installation and testbed
    - coordination of activities within D-Grid

- Preconditions and consequences
  - meeting the needs of heterogeneous community infrastructures
  - implementation of a unique, all-around accepted accounting system
  - supporting the communities' business models
  - enabling the billing of resource usage
DGAS

- Distributed Grid Accounting System (DGAS)
  - accounting system developed in the EGEE project
  - based on the LCG/gLite middleware package
  - accounting information originates from the batch system
    - LSF and PBS/Torque are supported
    - are transformed into usage records
  - accounting information is stored in the Home Location Register (HLR)
    of the DGAS server
  - access to the accounting information must be authorized
    - command line interface
    - graphical user interface is provided by HLRmon

HLRmon

- HLRmon - interface for DGAS accounting information
- information from the Home Location Register (HLR)
- hierarchical authorization schema using different roles
  - ROC manager
    - access to all information
  - site manager
    - access to site-related information
  - VO manager
    - access to VO-related information
  - VO user
    - access to information regarding his usage
- condensed information on walltime, CPU-time
Advantages of DGAS for D-Grid

- Comparison of Grid accounting systems results in DGAS as the choice for D-Grid
  - allows adaptation to enable a uniform accounting of three middlewares
  - hierarchical accounting structure
    - provides high scalability
    - enables internal accounting for VO
  - benchmarks for the normalisation of CPU usage (SPECint and SPECfp)
  - necessary for heterogeneous grids
  - support of the following metrics
    - CPU-time = Vmem
    - Walltime = requested CPUs
    - Memory = used CPUs
  - support of LSF and PBS/Torque
    - support of SGE and LoadLeveler under development

Accounting Structure in D-Grid
Accounting Structure in D-Grid
DGAS Implementation in D-Grid

- Central DGAS server
  - located at the RRZN, Hannover
  - currently, 5 sites deliver accounting information
    - Leibniz Universität Hannover
    - TU Dortmund
    - FZ Jülich
    - FZ Karlsruhe
    - OFFIS Oldenburg
- HRLmon as Interface
  - role-based authorization
  - developer version in test

DGAS client packages are provided
- modifications were necessary
  - to account three middlewares
  - to remove dependencies on gLite
- modified grid-mapfile

Three constellations are supported
- LCG/gLite CE and LSF or PBS/Torque
- another middleware and LSF or PBS/Torque
- another batch system (e.g. SGE, LoadLeveler ...)

J. Wiebelitz | 15.10.1008
Future Developments

- Development for the D-Grid
  - additional metrics have to be included for comprehensive accounting
  - storage accounting (50% of the total funding for D-Grid hardware in 2006)
  - accounting of licence liable software
  - accounting of cost liable data

Thank you!

- Introduction to the German Grid Initiative D-Grid
- Concept of Sustainability and Consequences for D-Grid
- The Distributed Grid Accounting System (DGAS)
- DGAS and HLRmon in D-Grid
- Future Developments