GridSim: A Toolkit for Modelling and Simulating Grid Computing Environments

Staff: Rajkumar Buyya
Students: Anthony Sulistio, Marcos Dias de Assuncao, Chee Shin Yeo
Grid Computing and Distributed Systems (GRIDS) Laboratory
ARC Discovery Project, DEST International Science Linkage Project
Web: http://www.gridbus.org/gridsim

GridSim is a software platform that enables users to model and simulate the characteristics of Grid resources and networks with different configurations. GridSim is of great value to both students and experienced researchers who want to study Grids, or test new algorithms and strategies in a controlled environment. By using GridSim, they are able to perform repeatable experiments and studies that are not possible in a real dynamic Grid environment. Key features of GridSim are:

- Various allocation or scheduling policies can be made and integrated into GridSim easily, by extending them from one of the classes.
- Has the infrastructure or framework to support advance reservation, auction and Data Grid functionalities of a Grid system.
- Has the ability that reads workload traces taken from supercomputers for simulating a realistic Grid environment. This functionality is useful for testing a resource scheduling problem.
- Incorporates a background network traffic functionality based on a probabilistic distribution. This is useful for simulating over a public network where the network is congested.

Research students in the GRIDS Laboratory are themselves heavy users of GridSim and extend it whenever necessary for their own research needs. In the last 5 years, GridSim has been continuously extended in this manner to include many new capabilities and has also received contributions from external collaborators. In particular, National University of Singapore has contributed a QoS-based network module, and The University of Ljubljana has contributed a DataGrid module. Academic and industrial users of GridSim include: IBM, Unisys, HP, University of Southern California, France Telecom, Indian Institute of Technology, and Sweden's Umeˆa University. The table below lists some of the more prominent users of GridSim.

Table 1: Various users of GridSim and their targeted application domain for simulation.

Application Domain	Organisation
Scientific Workflows	The University of Southern California, USA
Business Grids	IBM Research Lab
Grid Resource and Virtual Organisation	Umeå University, Sweden
Network modelling	National University of Singapore
Grid Security Studies	France Telecom
Scheduling Studies	University of Malay
Grid economics	Technical University of Catalunya, Spain
Grid Market Studies	Indian Institute of Technology
Semantic Grid Studies	Monash University
Utility-based Resource Management	The University of Manchester, UK
DataGrid Simulation	The University of Ljubljana, Slovenia.
Data Centre Modelling	Unisys, USA
Multi-Criteria Grid Scheduling	Poznan Supercomputing Center, Poland
Hierarchical Scheduling	Universidad Complutense de Madrid, Spain
Grid Network Buffer	The University of Castilla La Mancha, Spain

International Collaborators:
1. Gokul Poduval and Chen-Khong Tham, National University of Singapore.
2. Uros Cibej and Borut Robic, The University of Ljubljana, Slovenia.
3. Agustin Caminero, Blanca Caminero, and Carmen Carrion, The University of Castilla La Mancha, Spain