Gridbus: Middleware for Utility-based Grid Computing

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Web: http://www.gridbus.org/

An Inaugural *Knowledge Transfer Award* Winning Project at the University of Melbourne

The flagship project of the Grid Computing and Distributed Systems (GRIDS) Laboratory is the Gridbus Project which covers various research sub-projects that look into the management of distributed resources and scheduling of applications on global Grids. The Gridbus Project is unique in that it explores the practical application of well-known economic theories to solve resource management problems in Grids. In addition to fundamental R&D, the Gridbus Project has also partnered with various scientific, engineering, and business communities in applying Grid technologies to solve various challenging problems in e-Science and e-Business domains. The Gridbus Project/GRIDS Lab has advanced the discipline of Grid computing in the following ways:

- Carried out fundamental research in distributed resource management and application scheduling on global Grids.
- Pioneered the principles of Grid economy as well as techniques and mechanisms that enable the delivery of Grid services as utility-like services.
- Proposed several adaptive scheduling algorithms for deploying applications on global Grids based on users' quality of service (QoS) requirements.
- Co-developed fundamental Grid technologies that enable the creation of scalable Grid environments as well as support the rapid development of Grid-enabled applications.
- Applied Grid technologies to several applications in collaboration with domain scientists, and deployed them both on national and international Grid infrastructure.

The research probes include:

- Service-Oriented Grid Architecture
- Grid Economy and Resource Management.
- Grid Service Broker
- .NET based Grid Framework (Alchemi)
- Grid Workflows and Scheduling
- Service Level Agreements (SLA)-based Resource Allocation Systems (Libra).
- Grid Simulation Toolkit (GridSim).
- Resource Usage Accounting (GridBank).
- Grid Application Development Environment
- SensorGrid and Open SensorWeb Architecture.
- InterGrid for peering and internetworking between islands of Grids
- Application Targets: Drug Discovery (*WEHI*), Neuroscience (HFI & *Osaka Uni*), Kidney Modelling, Natural Language Processing, High-Energy Physics, Catchment Hydrology (eWater CRC), and Financial Investment Risk & Portfolio Analysis (*Spain*).

The software developed as part of the Gridbus Project has been released as open source which enables practitioners around the world to benefit from the products of the Grid research carried out at the University of Melbourne. The Grid software technologies developed by the Gridbus Project such as Gridbus Broker, GridSim, and Alchemi have helped a broad range of people, from research students and established academics to industrial practitioners in institutions and enterprises around the world. Other activities such as training of students on real Grid projects, and tutorials and seminars in conferences around the world have produced benefits both in Australia and around the world. Therefore, by developing, sharing and teaching fundamental Grid technologies, the project has been able to make immense impact on scientific, engineering, and business communities around the world. Recently, the project received a large International Science Linkage (ISL) grant from the Commonwealth DEST to establish strategic research linkages with international projects based in Europe, USA, and Asia.