Title: Gridbus Toolkit

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Audience: This tutorial should be of interest to a large number of participants from academia, government, and commercial organizations as it focuses on both theory and practice of grid computing and applications. They include: (A) students, researchers, and developers interested in creating technologies and applications for Next Generation Grids (B) participants from commercial organizations interested in creating online Grid marketplace and applications, and (C) policy makers of Grid Computing as we will be offering a live demonstration of current Grid technologies and their applications.

Course Description: Grid computing, one of the latest buzzwords in the ICT industry, is emerging as a new paradigm for Internet-based parallel and distributing computing. It enables the sharing, selection, and aggregation of geographically distributed autonomous resources, such as computers (PCs, servers, clusters, supercomputers), databases, and scientific instruments, for solving large-scale problems in science, engineering, and commerce. It leverages existing IT infrastructure to optimize compute resources and manage data and computing workloads. The developers of Grids and Grid applications need to address numerous challenges: security, heterogeneity, dynamicity, scalability, reliability, service creation and pricing, resource discovery, resource management, application decomposition and service composition, and qualify of services. A number of projects around the world are developing technologies that help address one or more of these challenges. To address some these challenges, the Gridbus Project at the University of Melbourne has developed grid middleware technologies that support rapid creation and deployment of eScience and eBusiness applications on enterprise and global Grids.

The components of Gridbus middleware are: Grid application development environment for rapid creation of distributed applications, Grid service broker and application scheduler, Grid workflow management engine, SLA (service-level agreements) based Scheduler for clusters, Web-services based Grid market directory (GMD), Grid accounting services, Gridscape for creation of dynamic and interactive resource monitoring portals, Portlets for creation of Grid portals that support web-based management of Grid applications execution, and GridSim toolkit for performance evaluation. In addition, Gridbus also includes a widely used .NET-based enterprise Grid technology and Grid web services framework to support the integration of both Windows and Unix-class resources for Grid computing.

The tutorial covers the following topics:

1. Fundamental principles of grid computing and emerging technologies that help in creation of Grid infrastructure and applications.
2. A Review of major international efforts in developing Grid software systems and applications both in academic, research and commercial settings.

3. Service-Oriented Grid Architecture for realising utility computing environment that supports resource sharing in research and commercial environments. Realization of this architecture by leveraging standard computing technologies (such as Web Services) and building new services that are essential for constructing industrial-strength Grid engines.
4. Gridbus middleware and technologies for creating enterprise and global utility Grids.
5. Issues in setting up Grids that can scale from enterprise to global and deploying applications on them.
6. Case studies on the use of Gridbus technologies in creating applications in the area of Drug Discovery, Neuroscience, High Energy Physics, Natural Language Engineering, Environmental Modelling, Medicine, Portfolio and Investment Risk Analysis.
7. Live demonstration of Gridbus technologies and their use in creating and deploying sample applications on the World Wide Grid (WWG).
8. Sociological and industrial implications of this new Internet-based distributed computing paradigm and its impact on the marketplace.

The tutorial places emphasis on concepts of Grid economy, how to design and develop Grid technologies and applications capable of dynamically leasing services of distributed resources at runtime depending on their availability, capability, performance, cost, and users' quality of service requirements.