JGRID: AN INTEGRATED GRAPHICAL APPLICATION
DEVELOPMENT AND GRID EXECUTION ENVIRONMENT
BASED ON JINI

Duration of the project: 2 years (January 2003 – December 2004)
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1. Introduction

The aim of this project is to develop a second-generation grid execution framework and
application development environment based on Jini technology. The recent developments in
grid computing technology gave rise to a number of national and international grid
infrastructure and research projects. Several countries, including Hungary, are deploying
national grid systems based on first-generation grid software, such as Globus and Condor.
Few projects are devoted to the research and development of future grid middleware and
application development software, which are inevitable to the widespread acceptance and use
of grid technology.

The first major goal of the project is to design and develop a distributed object computing
abstraction/middleware layer to shield grid computing details from developers. Distributed
object technology enables the creation of modular, reusable, easily configurable and
deployable software, which is a strict necessity for future, very complex, grid systems.
The second goal of the project is to create a high-level, graphical grid application development environment that enables developers to design, develop, test, debug and monitor complex grid applications executed on the grid execution environment. This work is based on the successful P-Grade parallel application development environment.

1.1. Jini Technology

Jini Technology, developed by Sun Microsystems in 1999, was designed to create dynamic distributed object systems. It is based on service-oriented philosophy, which makes it a perfect match for future service-oriented grid systems. Central to Jini is discovery that allows services and clients to dynamically find each other and establish connection in an ad-hoc manner. In addition, services are used via a service proxy that hides client-server communication (e.g. transport protocol) and service implementation details from the client. Jini has a built-in self-healing property, as disconnected or crashed services, clients are automatically removed from the system without affecting other participants. These features make Jini very much suited for creating a grid software infrastructure.

2. Project Tasks

The project tasks are centred on the two main goals, and are related to the middleware development and the implementation of the application development environment.

- Development of a wide-area service discovery framework that enables clients and services to discover and interact with millions of services in an effective way.
- Development of a Broker service network that facilitates wide-area execution control of grid applications, including sequential and parallel programs.
- Development of a point-to-point communication layer that enables processes of parallel Java programs to efficiently communicate with each other regardless of the processes’ location.
- Development of a security infrastructure that enables the safe interoperation of various services and clients over different administrative domains.
- Making the Jini grid middleware robust and fault tolerance in order to function reliably in the presence of network, computer and software errors.
- Development of the graphical application development environment that can be used to design service-oriented grid applications. This involves extending the existing P-Grade parallel application development environment with the ability to generate Java source code from graphical program designs, as well as providing interoperability with the Jini grid system.
- Finally, the Jini Grid system and application development environment will be interoperable with the emerging OGSA (Open Grid Service Architecture) Web Services technology.

We hope that the developed grid system will demonstrate our concepts and show the potential of Jini in second-generation grid systems, as well as help the exploitation of grid technology and grid computing within the Hungarian and international academic community.