The GridLab Grid Application Toolkit

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Abstract

We present a synopsis of the Grid Application Toolkit, under development in the EU GridLab project, along with some of the new application scenarios which it will enable.

1. Introduction

Increasing prevalent, Computational Grids promise to change the way in which global resources are accessed and used, however, there are very few *real* users of Grid technologies. This is partly due to the newness of Grid concepts, but also because the existing infrastructure software and services are not yet mature, varied or extensive enough to provide a fully functional environment.

Even if provided with a functioning Grid environment, many of todays applications, designed for specific single parallel machines, would be unable to exploit it. Developers are not yet aware of Grid capabilities and possibilities, nor of the conceptual and software issues they must address in their applications to be able to really use it.

Here we describe the *Grid Application Toolkit*, under development in a new EU funded project *GridLab: A Grid Application Toolkit and Testbed* (`www.gridlab.org`). GridLab aims to provide the application community with tools to start developing *scenarios* for the Grid, in such a way that they can take advantage of services as and when they become available. The accompanying Grid services co-developed in the GridLab project, will then be influenced by real application requirements.

2. Application Scenarios

The Grid will provide users with better access to distributed resources, with single logins and services such as resource scheduling, job and remote data management. High-level tools, *e.g.* Grid portals, will provide complete user environments, blurring the distinction between individual machines, with intuitive application oriented GUIs.

This is however just the start. Grid computing invites whole new classes of dynamic application scenarios. For example, a user could connect into a colleague's running simulation through a portal. Then, at the press of a virtual button, he could clone a copy running on a different machine with a different configuration. He could also downsize the cloned simulation, investigating and analyzing only the features he is interested in. When he runs a simulation, it will automatically be staged on the most appropriate machine, taking into account the resources required, the timeframe required for a solution, and the desired cost. As the simulation runs, independent tasks will be continuously farmed to different machines, the results being gathered together in a single location for the user at completion.

3. Grid Application Toolkit (GAT)

One of the central tasks of the GridLab project is to provide a *Grid Application Toolkit* (GAT) to allow developers to include grid functionality in application codes easily. The GridLab GAT will be an implementation of a programming interface (the GAT API) which can be inserted into application codes such as simulation codes, portals and scripts.

The GAT API will contain generic interfaces to services such as resource brokers, information and monitoring servers and data management systems, along with higher level interfaces providing functionality such as code migration, subtask spawning subtasks and task farming.

Through the GAT, developers can access a range of grid services, in a secure, fault tolerance and controllable manner. The GAT will allow developers and users to switch between different remote service implementations and to add easily their own implementation of any GAT API call — functionality which is seen as important for rapid prototyping and testing. The GAT will the development of grid enabled applications in a minimalistic environment, *e.g.* a non-networked laptop without special software installations, which will then run in other environments, such as a single multiprocessor supercomputer or a full grid-enabled virtual organization, exploiting as much of the grid infrastructure as the user chooses.

Proceedings of the 11 th IEEE International Symposium on High Performance Distributed Computing HPDC-11 2002 (HPDC'02)
1082-8907/02 $17.00 © 2002 **IEEE**