SECURE APPLICATION DEPLOYMENT IN THE HIERARCHICAL LOCAL DESKTOP GRID

Attila Csaba Marosi, Gábor Gombás and Zoltán Balaton

MTA SZTAKI
Laboratory of Parallel and Distributed Systems
atisu@sztaki.hu, gombasg@sztaki.hu, balaton@sztaki.hu

Abstract The Desktop Grid model harvests the unused CPU cycles of any computer connected. In this paper we present a concept how the separated Desktop Grids can be used as building blocks for larger scale grids by organizing them in a hierarchical tree. We present a prototype implementation and show the challenges and security considerations we discovered. We describe methods and give solutions how security can be enhanced to satisfy the requirements for real-world deployment.

Keywords: Public Resource Computing, Volunteer Computing, BOINC, Hierarchy, Local Desktop Grid

1. Introduction

Contrary to traditional grid[11] systems where the maintainers of the grid infrastructure provide resources where users of the infrastructure can run their applications, desktop grids provide the applications and the users of the desktop grid provide the resources. Thus, a major advantage of desktop grids is that they are able to utilize a huge amount of resources that were not available for traditional grid computing previously.

Users of scientific applications usually are concerned only about the amount of computing power they can get and not about the details how a grid system delivers this computing power. Therefore, they want to develop a single application that in turn can run on any infrastructure that provides the most appropriate resources at a given time. Unfortunately existing applications have to be modified in order to run on desktop grid systems and this makes desktop grids less attractive for application developers than traditional grid systems.
2. Desktop Grids

The common architecture of desktop grids consists of one or more central servers and a large number of clients. The central server provides the applications and their input data. Clients join the desktop grid voluntarily, offering to download and run an application with a set of input data. When the application has finished, the client uploads the results to the server. Based on the environment where the desktop grid is deployed we must distinguish between two different concepts.

Global Desktop Grids

Global Desktop Grids (also known as Public Desktop Grids) consist of a publicly accessible server providing projects and the attached clients. There are several unique aspects of this computing model compared to traditional grid systems. First, clients may come and go at any time, and there is no guarantee that a client that started a computation will indeed finish it. Furthermore, the clients cannot be trusted to be free of either hardware or software defects, meaning the server can never be sure that an uploaded result is in fact correct. Therefore, redundancy is often used by giving the same piece of work to multiple clients and comparing the results to filter out corrupt ones.

Local Desktop Grids

To fill the gap between the traditional grids and the desktop grids SZTAKI introduced the concept of Local Desktop Grids. Local Desktop Grids are intended for institutional or industrial use. Especially for businesses it is often not acceptable to send out application code and data to untrusted third parties (sometimes this is even forbidden by law). The project and clients are shielded from the world by firewalls or any other means. This environment gives more flexibility by allowing the clients to access local resources securely and since the resources are not voluntarily offered the performance is more predictable.

SZTAKI Local Desktop Grid

As we can see there is a huge difference between traditional grids and desktop grids. We also have to make a distinction between the publicly used Global Desktop Grids and the Local Desktop Grid concept. The SZTAKI Local Desktop Grid\cite{4} (or SZTAKI LDG) implements the latter. It is based on BOINC\cite{1} technology and extends it according to the needs of institutional and business users. BOINC is originating from the SETI@Home\cite{3} project to provide an open infrastructure for utilizing the computers of people interested in the outcome of a project.