MOBILE WORK ENVIRONMENT FOR GRID USERS. TESTBED

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The subject fits into the INTEGRATION area: distributed environments, Open Grid, web services.

Abstract

In this article we aim to describe the project developing the Migrating Desktop infrastructure for itinerants in a simple way. We also focus on the development testbed, which is prepared for the testing purposes of the runtime environment This functionality refers to the work environment of the users which change their location very often. The Roaming Access (RAS) infrastructure is the set of modules and their interconnections hidden 'behind' the user interface. The user interface called the Migrating Desktop, or grid desktop is a very useful environment that accomplishes an integrated set of services and real applications which could be run on the grid. The users can restore their environment in every place where the network access is possible. The authors are interested in the assimilation of the grid desktop with the system desktop as much as possible. The work is done under the UE CrossGrid project IST-2001-32243 [1]. The novelty of the development consists in the grid interactive application utilisation within the migrating users' environment.
What is needed for tomorrow is the proper remote and individual access to the resources, independently of the original location of the user. So far, the way of system usage has been looking in the following way: the user sits at his workstation and works with his favourite local applications. From time to time he launches a web browser and plays with it. An advanced user wants to log in to the remote host and run his, let us say, UNIX application. After computations, he somehow downloads output files and accomplishes investigation of the results. Some of the experienced users use protocols for emulating the

remote environment in the graphical manner for working with their files. The user is able to use many systems with different resources and different security policies, sharing the resources among other people. The Migrating Desktop will create a transparent user work environment, independently of the system version and hardware. The Migrating Desktop would allow the user to access grid resources and his local resources from remote computers, like i.e. laptops. It will allow to run applications, manage data files, store personal settings (configuration definitions that characterise e.g. links to the user data files, links to applications, access to application portals and/or specialised infrastructure, as well as windows settings), independently of the localisation or the terminal type.

The Roaming Access and the Migrating Desktop features will not support „remote users". It means that no special mechanisms to access the grid resources via mobile phones, PDAs (such as palmtops, organisers, etc.) will be considered within the confines of the given project.

As a bottom line of the middleware we use the Globus toolkit. These facilities give us important functionality like security policy, simple remote operations, user account mapping, etc. The CrossGrid project is not the only star on the grid firmament but one of them and it cannot exist without any influence from the surroundings. Some elements used in this work come from the DataGrid project [2] like the idea of the grid interactive job submission, the Virtual Organisation (VO) paradigm.

In the paper we present the architecture and main components of the core of developed system. It consists of: The Application Portal Server, The Desktop Portal Server, The Roaming Access Server, The Security component (Authentication and Authorisation), User Profile Manager. We use also advanced technology based on WebServices. We use them within the interfaces of the Roaming Access Server (RAS): LDAP manager, Job Submission, Session Manager, Benchmark, File operation services [4].

The graphical interface between the user and the Desktop Portal Server application will be in the form of a user desktop – similar to Windows or Linux systems desktops. The new desktop will be independent of the system desktop. It means that there will be no direct interaction between desktops, like copying files using the drag and drop mechanism. The main goal of the extra desktop is to make it possible for the grid user to work with local and grid applications without difficulty.

The developed software will be put into the practice on the CrossGrid international distributed testbed. It will share resources across 16 European sites, to run interactive applications, and is one of the challenging points of the CrossGrid project. The sites list ranges from relatively small computing facilities in universities, to large computing centers, so offering an ideal mixture to test the possibilities of the Grid framework. National academic network providers and the high-performance European network, Geant, will assure the interconnectivity of all sites. This includes usually three steps: the local step (typically inside a University or Research Center, via Fast or Gigabit Ethernet), the jump via the national network provider (at speeds that will range from 34 Mbits/s to 622 Mbits/s or even Gigabit) to the national node, and finally the link to the Geant network

(155 Mbits/s to 2.5 Gbits/s). At least 16 sites are foreseen to be included in the CrossGrid testbed, this number may be increased with the addition of more sites interested in the technologies and applications being developed by CrossGrid, and with the addition of more sites belonging to CrossGrid partners.
Much effort has been utilised in Single Sign-On feature that has been widely spoken to be the most important feature in the upcoming grid technology. There are too many resources with an additional authorisation procedure; that is why we want to simplify the user access. Delegation of the credentials is the way we want to follow. The Globus Security Infrastructure (GSI) [3] will be used as public key infrastructure for our purposes.

We also focus on the work with interactive applications. There are a lot of problems with the interaction in the grid environment. Some sort of solution have been proposed. When the user submits a Grid Interactive Job (GIJ) he needs the allocation of grid resources throughout his “interactive session”. During the whole session a bi-directional channel is opened between the user client and the application programme on remote machine. The entire job input and output streams are exchanged with the user client via this channel: the user sends input data to the job and receives output results and error messages. Details on the mechanism we foresee to manage GIJ’s are in the full paper. A very important feature in interactive environments is the ability to recovery from unexpected failures of e.g. workstation. There is no problem in case of batch jobs, but interactive applications need to be equipped with extra functionality. It would be better not to rewrite the existing application codes. However, it should be considerable to build the additional linkable library for managing grid interactive session management.
The mentioned functionality is developed in the CrossGrid project (IST-2001-32243, http://www.eu-crossgrid.org) and will be released the first time in February 2003.

References

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