Facilitating access to grid resources with the use of the HPC Window

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Abstract. Grid environment developments undertaken recently have been driven by the increasing demand of the powerful computing resources. However, computing power users want to be able to run their applications not only in a fast, but also in a comfortable manner. There have been numerous computing portals deployed around the world to facilitate access to the grid. Through undertaking the PROGRESS project Poznan Supercomputing and Networking Center has also been involved in building a flexible grid-portal environment to aid users to make use of the resources a grid can offer. The HPC Window developed within the PROGRESS project facilitates access to grid resources and helps in creating a comfortable grid-workplace. The demonstrated prototype introduces the grid service provider and presents how it may be utilized by a computing portal. Our presentation is related to Topic 06: Grid Computing and Middleware Systems.

1   Introduction

Poznan Supercomputing and Networking Center (PSNC) has been involved in grid environment developments for a few years now. One of the recently undertaken projects is PROGRESS - "Access Environment to Computational Services Performed by a Cluster of SUNs". The project started in December 2001 and will continue until the end of May 2003. It aims to develop a grid-portal environment testbed. The project was undertaken within the PIONIER National Program [1] and is funded by the State Commitee for Scientific Research and Sun Microsystems Poland. The deployed prototype uses bioX applications for testing the tools and architecture. It is planned that the developed grid-portal environment system will be available as a solution from the shelf for other applications, for example electric engineering. Presenting the testbed, for which we require a post with a single computer connected to the Internet and equipped with a web browser, we would like to introduce a new item of grid-portal environment: the HPC Window and its main part: the grid service provider. These are described in Sections 2 and 3.

In Section 4 we discuss the PROGRESS system and our grid-portal research future.

2 HPC Window

The PROGRESS grid-portal environment architecture is presented in **Fig.1**. The PROGRESS project aims to develop: the security model for the system, the grid broker capable of running grid enabled bioX applications, the data management system for storing scientific data and the HPC window which is the point of access to the system, and to integrate all components of the designed architecture.
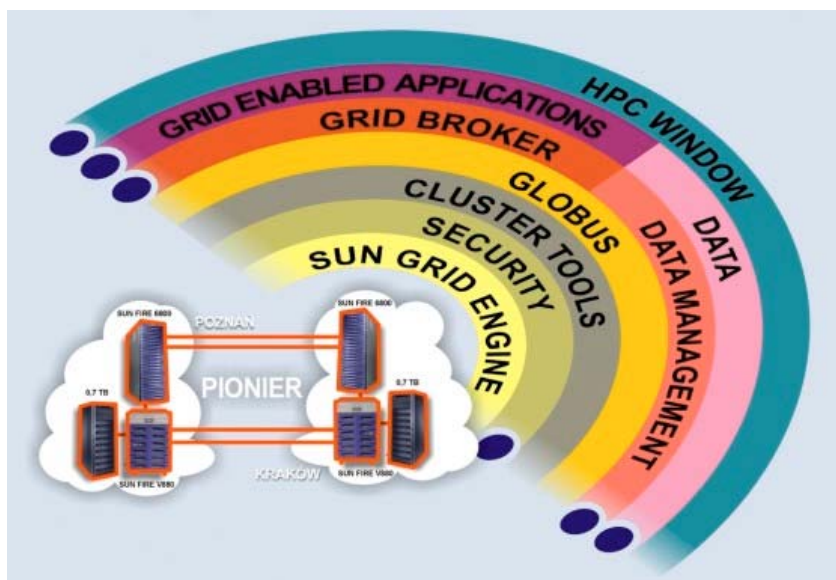
Fig. 1. PROGRESS grid-portal environment architecture.

The HPC window consists of the grid service provider and user interfaces, namely the web portal and the migrating desktop. This in our opinion makes up the complete architecture for grid access environment, which is flexible and facilitates deploying multiple user interfaces (usually web portals) utilizing the same grid resources. The introduced grid service provider layer provides a way to avoid the problem of installment and configuration of computing portals. Unlike other grid-portal environment frameworks, for example SDSC's GridPort [2] or LBNL's Grid Portal Development Kit [3], the PROGRESS HPC Window and grid service provider ease the process of deploying computing portals. We discussed the ways of improving the flexibility of grid user interfaces in a more detailed way in [4].

3   Access to Grid Service Provider with the use of an HPC web portal

The idea of introducing a new layer in grid-portal environment architecture arose from the need to separate the presentation and logical functions of a computing portal. The possibility of hiring web services technology to serve as the media between the presentation and logical modules of a computing portal empowered our vision of building multiple thematic computing portals utilizing the same grid resources. Thus, we implemented the division of grid access environment functions into presentation functions of a computing portal (or any other user interface) and logical functions of the grid service provider. The idea of this division is presented in **Fig. 2.**
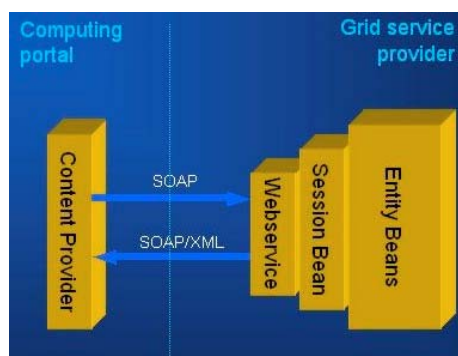

Fig. 2. Division between presentation and logical functions of the grid access environment.

The PROGRESS grid service provider includes three main services enabling access to grid resources. These are: the job submission service, the application management service and the provider management service. They altogether allow not only to submit simple computing tasks to the grid, but also add new applications to the application factory, create and use virtual applications consisting of sequences and parallels of simple applications executions, submit and execute workflowed jobs, and monitor the execution of the jobs in the grid. Additionally, basic informational services, like short news, link directory or discussion forum have been added to the service factory of the grid service provider. The service provider is also equipped with authentication and authorization modules, allowing to serve resources according to the user's identity and rights.

All the above-mentioned services allow to create multiple user interfaces. Users may switch between interfaces and, for example, submit their job using the migrating desktop interface and then monitor the execution and view the results of their experiment using the web portal. There is also a possibility of building numerous thematic HPC portals all utilizing the same

grid service provider and the same grid resources underlying beneath. The PROGRESS project aims to build a bioX computing portal [5]. Users of the PROGRESS bioX portal may run scientific experiments using applications of their interest (like DNA assembly or prediction of protein secondary structure) and read news about the newest bioX discoveries.

4 Summary

The functionality of the grid service provider is the key to success of the PROGRESS grid-portal environment. However, it is worth mentioning that HPC Window users have also the possibility of managing data stored in the data management system [6]. The data management system is used as the place to store input and output data for the computing experiments being performed in the grid. Users have the possibility of managing their data with the use of a special content provider within the PROGRESS HPC portal. However, the data management system also serves as a proxy to scientific data banks, like those provided by the SRS system [7].

The presented HPC Window is an example of a grid access environment. It facilitates the work of bioX researchers in Poland and other parts of the world. Tools developed within the PROGRESS project will be used as a solution from the shelf to aid experts in other science areas with the grid computing power.

References

1. Rychlewski, J., Weglarz, J., Starzak, S., Stroinski, M., Nakonieczny, M.: PIONIER: Polish Optical Internet. Proceedings of ISThmus 2000 Research and Development for the Information Society conference Poznan Poland (2000) 19-28.
2. Thomas, M., Mock, S., Boisseau, J., Dahan, M., Mueller, K., Sutton, D.: The GridPort Toolkit Architecture for Building Grid Portals. Proceedings of the Tenth IEEE International Symposium On High Performance Distributed Computing (2001).
3. Novotny, J.: The Grid Portal Development Kit. Accessed from http://www.cogkits.org/.
4. Bogdanski, M., Kosiedowski, M., Mazurek, C., Wolniewicz, M,.: GRID SERVICE PROVIDER: How to improve flexibility of grid user interfaces?. Accepted for publication at the International Conference on Computational Science 2003, St. Petersburg, Russia. Accessed from http://progress.psnc.pl/.
5. PROGRESS HPC Portal. Accessed from http://progress.psnc.pl/portal/.
6. Grzybowski, P., Mazurek, C., Spychala, P., Wolski, M.: Data Management System for grid and portal services. Submitted to Grid Computing: Infrastructure and Applications special issue of The International Journal of High Performance Computing Applications (IJHPCA), Cardiff University, UK. Accessed from http://progress.psnc.pl/.
7. SRS System. Accessed from http://srs.man.poznan.pl/.