

Constructing a Grid Portal

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Recently there has been a surge of interest in the area of grid computing, a way to enlist large numbers of heterogeneous machines to work on a multi-part problem [1]. The major aim of a Grid is to federate several distributed resources within a single entity which can be accessed transparently and efficiently by external users. Early popular systems such as SETI@home allow a user to spread a complex calculation over hundreds of machines on the Internet [4].

Although the packaging mechanism for standard Grid toolkits like Globus [2] allows software architects to develop software, services, and components that can be installed and configured by system administrators and Grid component designers, it is still quite complex because of the requirement to support sharing, persistence, and updates. To simplify the task of deployment on a client side, a wide-used approach is to develop thin clients that expose the scientific problem-solving process through convenient Web-based interfaces. A good example for such a Grid-based application is the astrophysical computing portal [3].

A portal is a community service with a single point of entry to an integrated system providing access to information, data, applications, and services. A Grid portal is a specialized portal useful for users of production Grids [5]. A Grid portal provides information about the status of the Grid resources and services. Commonly this information includes the status of batch queuing systems, load, and network performance between the resources. Grid portals provide communities another advantage: they hide much of the complex logic to drive Grid-related services with simple interaction through the portal interface.

The thin clients enable application users to easily interact with the system without updating their local software, as all communication is performed through a Web-based portal using HTML technologies. If state-of-the-art Web browsers are available on the application user clients, no additional installation task is required. Naturally, the designer of the software must put special care into fulfilling the application user needs and must provide sufficient guidance for administrators to install such a portal. Customization for users is provided by saving the state of the last interaction with the portal.

HotPage [6] is another portal that provides a collective view of a distributed set of high-performance computing resources. The portal enables researchers easily to find information about each of the resources in the computational Grid. Additionally, HotPage enables users to access and manipulate files and data and to submit, monitor, and delete jobs.

We propose a new grid portal prototype. The available facilities are presented in Figures 1-3.

Inregistrare utilizator nou

(a)

Date utilizator	
Nume:	<input type="text" value="Oprean"/>
Prenume:	<input type="text" value="Adrian"/>
Utilizator:	<input type="text" value="aoprean"/>
Parola:	<input type="password" value="*****"/>
Adresa e-mail:	<input type="text" value="opreanpetru@yahoo.co"/>
Adresa IP(ptr. FTP):	<input type="text" value="127.0.0.1"/>
<input type="button" value="Inregistreaza"/>	

Date generale
Adrian Oprean
Timpul ramas pana la
expirarea sesiunii:
12:39:22
Aplicatii trimise 0

Servicii Grid

Profil utilizator

Modifica profil pentru Adrian Oprean

Nume :
Prenume :
Utilizator :
Parola :
Adresa E-mail :
Adresa IP :

Resurse selectate Resurse disponibile

Resurse selectate	Resurse disponibile
<input type="text" value="No hosts listed"/>	<input type="text" value="adi.intranet"/>
<input type="button" value="Sterge resursa"/>	<input type="button" value="Adauga resursa"/>
<input type="button" value="Actualizeaza profil"/>	

(b)

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12:39:22
Aplicatii trimise 0

Servicii Grid

Profil utilizator

Profil pentru Adrian Oprean

Valori certificat:

- **Subiect DN:** O=Grid,OU=GlobusTest,OU=simpleCA-adi.intranet,CN=Adrian Oprean
- **Issuer DN:** O=Grid,OU=GlobusTest,OU=simpleCA-adi.intranet,CN=Globus Simple CA
- **Valabilitate:** Thu Sep 18 14:31:25 EEST 2003 - Fri Sep 17 14:31:25 EEST 2004
- **Algoritm de semnare:** MD5WithRSAEncryption

Adresa E-mail: opreanpetru@yahoo.co

Nume host Autentificat?
adi.intranet true

(c)

Fig. 1. Portal facilities: (a) login; (b) profile; (c) certificates

The Grid Portal is designed to provide access to Grid services by using Java Server Pages (JSP), Java Beans and Tomcat. The portal architecture is a standard three tier model, where a client browser securely communicates to a web server over an https connection. The web server is capable of accessing various Grid services using the Globus infrastructure.

The main entrance page (Fig.1a) offers a service to authorize users to a portal. Currently, it sets a username and password and checks a password file on the web-server to validate access, an e-mail address used to send e-mail when the application is finish and the IP for user ftp server to copy the executables. The profile of a user can be inspected (Fig. 1b). The user can modify some of the fields and save the new profile. Stored information includes preferences, credential information, submitted job history, computational resources etc. Information about the certificate of an user like subject, issuer, valability, can be also obtained if user is authenticated to a server (Fig. 1c).

The portal let a user to submit an application to a gate-keeper. The user must be authenticated to a server in order to submit an application. When the user login is created a proxy for this user and a gate-keeper is started for him. The user can start an application in three ways (Fig. 2b): by specifying the application and the parameters, by specifying the RSL string or by specifying a file with RSL string. Using RSL, the user can impose the memory requirements, name of executable, arguments, number of processors, maximum wall clock or cpu time, queue to submit to, etc. The user can also indicate if he wants to wait after the response or to receive an e-mail confirmation when the application is finished. After a job is submitted, one can see various submit information including time-stamp of job submitted, the status of the job, job output, etc.

A history page (Fig. 2a) reveals the submitted applications and the results; using this page the user can stop a running application. Another frame (Fig. 2c) is used to query an LDAP server by setting and retrieving object classes and attributes such as operating system type, memory, cpu load for various resources. This information will be useful for submitting applications (RSL string). The user can also put executables on the server using ftp (Fig. 3a). The applications will be started later using the submission page. The user must have an anonymous ftp installed so the application can connect to the user computer and transfer the files. A search facility for information about the server is also available (Fig. 3b).

AMS Subject Classification: 68Q85

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References

1. I. Foster, C.Kesselman, S.Tuecke, The Anatomy of the Grid: Enabling Scalable Virtual Organizations, *Int.J. of HPC Applics.*, **15** (3), 200-222, 2001.
2. Globus Toolkit, <http://www.globus.org>.

(a)

(b)

(c)

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12:39:22

Aplicatii trimise 3

Servicii Grid

Deconectare
Profil utilizator
Trimite aplicatie
Afiseaza aplicatii

Transfer fisiere
Informatii resurse

Aplicatii trimise

Nume aplicatie	Status aplicatie	Ora si data trimiterii	Iesire aplicatie	Actiune
Show process	DONE	Sep 18, 2003 3:04:20 PM		Afiseaza iesirea
View files	Unknown	Sep 18, 2003 3:03:18 PM		Afiseaza iesirea
View files	DONE	Sep 18, 2003 3:03:03 PM		Afiseaza iesirea

Date generale
Adrian Oprean
Timpul ramas pana la
expirarea sesiunii:
12:39:22

Aplicatii trimise 3

Servicii Grid

Deconectare
Profil utilizator
Trimite aplicatie
Afiseaza aplicatii

Transfer fisiere
Informatii resurse

Trimite aplicatie

Asteapta dupa iesire aplicatie?

Trimite e-mail cand aplicatia este gata?

Nume aplicatie:

Nume host:

Manager aplicatie:

Pune direct executabil

Executabil:

Atribute:

Comanda RSL

Fisier RSL

Date generale
Adrian Oprean
Timpul ramas pana la
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12:39:22

Aplicatii trimise 0

Servicii Grid

Deconectare
Profil utilizator
Trimite aplicatie
Afiseaza aplicatii

Transfer fisiere
Informatii resurse

Servicii de informatii

Selecteaza MDS-ul pentru interogare

Selecteaza resursele

Selecteaza atributele de cautare

Fig. 2. Portal facilities: (a) history; (b) start applications (c) queries.

(a)

Date generale
 Adrian Opresan
 Timpul ramas pana la
 expirarea sesiunii:
 12:39:22

Aplicatii trimise 4

Servicii Grid

Deconectare Profil utilizator Trimite aplicatie Afiseaza aplicatii

Transfer fisiere Informatii resurse

Transfer fisiere

Host: 127.0.0.1 Host: adi.intranet

Director: not selected Director: not selected

Fisier selectat: selected file Fisier selectat: selected file

- ./JCE-unix/
- ./X0-lock
- ./X11-unix/
- ./font-unix/
- ./gdm_socket
- ./evolution-500-2638/
- ./gatekeeper.log
- ./grid-info-soft-register.pids.2890
- ./kde-aopresan/
- ./kde-root/
- ./ksocket-aopresan/
- ./mc-aopresan/
- ./mc-root/
- ./mcoop-aopresan/
- ./orbit-aopresan/
- ./orbit-root/
- ./ssh-XXPh6IU1/
- ./ssh-XXUSBSIN/
- ./ssh-XXkY8to7/
- ./ssh-XXsMRHhp/

- ./test/
- ./test.rsl

(b)

Date generale
 Adrian Opresan
 Timpul ramas pana la
 expirarea sesiunii:
 12:39:22

Aplicatii trimise 0

Servicii Grid

Deconectare Profil utilizator Trimite aplicatie Afiseaza aplicatii

Transfer fisiere Informatii resurse

Afiseaza resurse

Afiseaza informatii despre resurse pentru
 ldap://adi.intranet:2135/Mds-Vo-name=local,o=grid

Nume host	Atribute	
adi.intranet	Mds-Computer-isa	athlon
	Mds-Computer-platform	i686
	Mds-Computer-Total-nodeCount	1
	Mds-Cpu-Cache-12kB	64
	Mds-Cpu-features	fpu vme de pse tsc msr pae mce cx8 sep ntr pge mca cmov pat pse-36 mmx fxsr sse syscall mmxext 3dnowext 3dnow
	Mds-Cpu-Free-15minX100	066
	Mds-Cpu-Free-1minX100	00
	Mds-Cpu-Free-5minX100	049
	Mds-Cpu-model	AMD Duron(tm) processor

Fig. 3. Portal facilities: (a) ftp; (b) search

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4. J. Kaufman, T. Lehman, G. Deen, Autonomous Optimization of Distributed Computing on the Grid. Invited talk, PPAM'2003, 7-10 Sept. 2003, procs. in print.
5. G. von Laszewski, G.W. Pieper, P. Wagstrom, Gestalt of the Grid, 2002, <http://www.mcs.anl.gov/~laszewsk/papers/vonLaszewski-gestalt.pdf>.
6. NPACI HotPage, 2001, <https://hotpage.npaci.edu/>.