

# **Technical Report: A First Experience With GT4.0**

## **Installation And Deployment Of A Grid Service**

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2005-6-9

### **Abstract**

Globus is the toolset for developing Grid applications. Since its first release, Globus has experienced the era of OGSA, and now the latest version it built upon WSRF. The main purpose of developing such a toolset has been diverted from scientific and high-performance computing to Web Services. The new GT4 is built upon such a mechanism, which is normally called service-oriented-architecture. Developing Grid applications is turned into developing Grid services.

As the first user and developer of GT4 in China Virtual-Observatory project, I have the luck to get touch to some features of GT4. I am now happy to introduce my experience to the readers of this document.

### **Introduction Of GT4**

Globus is a set of programming tools for developing Grid applications like Grid middleware or Grid-based database. It includes resource management components (GRAM etc.), data Grid components (GridFTP etc.), parallel computing component (mpich-G2), information service components and security components. These components are not independent but connected closely. Normally one needs to know other components if he wants to develop software within one component.

The latest release of Globus is GT4.0. This one is a stable release after two test releases of GT3.9.4 and GT3.9.5. GT4 is based upon Web Services, which means Grid community is merged with Web Services community (referring to Ian Forst's report on GT4).

### **Installation Of GT4 On A Linux-box Based On Fedora 3**

The installation of GT4 is relatively easy since the binary release of GT4 is tested on several Linux platforms. My machine is installed with,

- J2SE 5.0
- Ant 1.6.2

- Gcc, GNU tar, GNU sed (included in the Linux distribution CD)
- Sudo
- MySQL 4.1
- Apache Tomcat 5.5

Almost all software is the latest release.

Download GT4 binary release from

<http://www.globus.org/toolkit/downloads/4.0.0/>

The next step is to create a user “globus” with the group “globus”. Setup its home directory to be /usr/local/globus-4.0.0. Uncompress the binary release to this directory.

Next, change user to globus, on the command line, type

```
Globus->export JAVA_HOME=where you install j2se
Globus->export GLOBUS_LOCATION =/usr/local/globus-4.0.0
Globus->./configure
Globus->make
Globus->make install
```

If everything goes properly, the Globus has been successfully installed.

## Setup Security On GT4

Without security the GT4 cannot run correctly. So the first thing to do after installing GT4 is to setup security. The security of GT4 is based on X.509 certificates. The basic idea is that a Certificate Authority issues certificates to users. The Globus checks whether the certificate is valid when a user asks for a Grid service. I don't know any existing CA in China-VO's network, so I choose to use the simple-CA included with the GT4 release.

The step of setup a CA is,

```
Globus->GLOBUS_LOCATION/etc/globus-user-env.sh
Globus->GLOBUS_LOCATION/setup/globus/setup-simple-ca
```

This command will prompt several questions. Answer them in a common sense. Then,

```
Globus->GLOBUS_LOCATION/setup/globus_simple_ca_CA_Hash_setup/setup-gsi -default
```

If successfully, you will see “setup-gsi: Complete” on the prompt.

The next step is setting up host certificate.

As root, run

```
Root->grid-cert-request -host 'hostname'
```

This creates the following files:

```
/etc/grid-security/hostkey.pem
/etc/grid-security/hostcert_request.pem
/etc/grid-security/hostcert.pem(empty)
```

As globus, run

```
Globus->grid-ca-sign -in hostcert_request.pem -out hostsigned.pem
```

As root, move the signed host certificate to /etc/grid-security/hostcert.pem.

Do the same for users. Hostkey.pem and hostcert.pem will be stored in .globus directory in users'

home directory.

Using `grid-proxy-init` to test if the certificates have been installed successfully.

The next step is to make the certificates available to container (which is a must for running Grid services).

As root, run

```
Root->cd /etc/grid-security
```

```
Root->cp hostkey.pem containerkey.pem
```

```
Root->cp hostcert.pem containercert.pem
```

```
Root->chown globus.globus containerkey.pem containercert.pem
```

Add authorizations for user, referring to GT4 Admin's Tutorial.

### **An Example Of Deployment Of Grid Services**

The execution of Grid services is similar to that of a web service. The five steps of deployment of a Grid service is

1. Define the service's interface. This is done with *WSDL*
2. Implement the service. This is done with *Java*.
3. Define the deployment parameters. This is done with *WSDD* and *JNDI*
4. Compile everything and generate a GAR file. This is done with *Ant*
5. Deploy service. This is also done with a *GT4 tool*

An example is given as follows.

Refer to

<http://gdp.globus.org/gt4-tutorial/multiplehtml/ch03.html>

The source code can be downloaded from the globus site.

After the creation of the GAR file, use

```
Globus->globus-deploy-gar org_globus_examples_services_wsrf_core_first.gar
```

to deploy the service.

Run

```
Globus->globus-start-container
```

And a service with name "math" will show in the service list.

Ignore the error message showed up in the container running screen. Use a simple client to test the service. Still, refer to the web site given before.

### **Conclusion**

Grid service is a extension of Web service. The programming of Grid services is extremely similar to that of Web services. However, Grid services is excuated in Grid environment, which means it is a more closely-bounded programming way, while Web services is relatively loose-bounded. Using GT4 to run a local network is a tough job, and there is yet much to do. My job is only the

first step in this long but promising way.