

Quick Start Guide

This Start Guide summarizes the hands-on part of the course for the first 3 weeks. By the end of this tutorial you will be able to run jobs on the Grid. In order to do this you must use the course Virtual Machine. The VM has all the necessary software installed to allow you execute Grid commands.

To submit a job to the Grid you have to go through the following steps:

1. Setup the course VM
2. Install your digital certificate on the VM
3. Apply for a VO membership
4. Create a valid proxy certificate
5. Describe your job in a JDL file
6. Submit the job to the Grid

1. Setup the course VM

In order to make use of the Grid you will need access to a so-called User Interface machine (UI). For this course we have installed all the relevant UI Grid toolkits on a Virtual Machine.

- If you haven't done so, download and setup the VM. You can find instructions for the VM at the left sidebar of the MOOC portal here: <http://mooc.uva.nl/>
- If you already have a real UI account, you can of course use that one. If not, you should get the VM.

2. Install your digital certificate on the VM

The next step is to install your Grid certificate. You need a valid certificate to access the Grid resources.

- For this course we have sent your personal certificate by email. The user key is protected by a unique password for each student.
- If you already have a real Grid certificate, you can of course use that one. If not, you should use the certificate that was sent to you.
- To install your digital certificate on the VM, follow these steps:
 - a) Download your personal certificate to the VM
 - b) Install your certificate on the VM
 - c) Install your certificate in your browser

(a) Download your personal certificate to the VM



Figure 1 Locate VM Firefox

- From the Application Menu in your VM, open a Firefox session and download the *mooc-certificate* tarball that was sent to your email. Alternatively, you may start Firefox by typing in your Terminal:

```
$ firefox &
```

- Extract the contents of this tarball by typing in your Terminal:

```
$ tar zxvf mooc-certificate.tar.gz
```

(b) Install your certificate on the VM

- First open a Terminal and create a `$HOME/.globus` directory in your VM home location. Copy your extracted files in there and set the permissions. Here are the commands you need to type:

```
$ mkdir $HOME/.globus
$ cd $HOME/.globus
$ cp usercert.pem userkey.pem $HOME/.globus
$ chmod 644 usercert.pem
$ chmod 400 userkey.pem
```

(c) Install your certificate in your browser

- Convert your certificate & private key in pks#12 format and import this in your browser. Note that you may have to copy this file to a directory accessible from your browser. To do this, type:

```
$ openssl pkcs12 -export -in $HOME/.globus/usercert.pem -inkey $HOME/.globus/userkey.pem -out $HOME/browsercert.p12
```

```
Enter pass phrase for /home/mooc/.globus/userkey.pem: <enter the password sent to you>
Enter Export Password: <enter a new export password>
Verifying - Enter Export Password: <enter the export password once more>
```

- Then open a Firefox and apply the following steps to install the .p12 file in your browser:

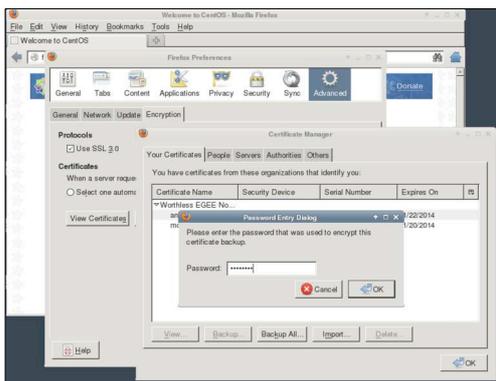


Figure 2 Firefox certificate installation

- From the Firefox Menu bar select:
Edit -> Preferences -> Encryption -> View Certificates -> Import
-> Select the browsercert.p12
-> Open: <enter the export password you set in previous step>

- To check that your certificate is valid and properly installed try to access this website: <https://voms.grid.sara.nl:8443/vomses/>
If you receive an SSL authentication error then try repeating the steps carefully as they come. If you managed to access the page above, your certificate is successfully installed!

For detailed instructions on Grid certificate installation, check out Lectures 10 & 11.

3. Apply for a VO membership

The final step to start using the Grid is to apply for a VO membership. For this course, you should register for the **tutor** VO here: <https://voms.grid.sara.nl:8443/vomses/>

- Note that you *must* have the certificate successfully installed in your browser to get access to this page. If you don't have that, go back to step 2 (Install your digital certificate on the VM).
- Select the **tutor VO** from the front page listing all the available VOs.

- Fill in some of your personal details (name, email, etc.), then read and accept the AUP.
- Check that you have received a verification email titled “Your membership request for VO tutor” and confirm with the URL, as described in the email.
- You will receive an approval email titled “Your vo membership request for VO tutor has been approved” when the VO administrator finally signs your request.

voms admin	
List of VOs configured on this server:	
omegac	
saradmins	
vliemed	
lofar	
esr	
astron	
bbmri.nl	
appsportal.nl	
niesc.nl	
tutor	
test_vo	
ops.biggrid.nl	
flysafe	
xenon.biggrid.nl	
euclid-ec.org	
pvlcr	
astrop	
chem.biggrid.nl	
lsgrid	
dans	
projects.nl	
ncf	

Welcome to the registration page for the tutor VO.

To access the VO resources, you must agree to the VO's Acceptable Usage Policy (AUP) rules. Please fill out all fields in the form below and click on the submit button at the bottom of the page.

IMPORTANT:

By submitting this information you agree that it may be distributed to and stored by VO and site administrators. You also agree that action may be taken to confirm the information you provide is correct, that it may be used for the purpose of controlling access to VO resources and that it may be used to contact you in relation to this activity.

After you submit this request, you will receive an email with instructions on how to proceed. Your request will not be forwarded to the VO managers until you confirm that you have a valid email address by following those instructions.

Your certificate subject (DN):
/DC=nl/DC=e-infra/O=Training Services/OU=users/OU=Training Services/CN=Mooc Zero User

The CA that issued your certificate:
/DC=nl/DC=e-infra/OU=Certification Authorities/CN=Worthless NL e-Infra Zero Tutorial CA 1

The VO AUP:

By registering with the Virtual Organization (the "VO") as a GRID user you shall be deemed to accept these conditions of use:

1. You shall only use the GRID to perform work, or transmit or store data consistent with the stated goals and policies of the VO of which you are a member and in compliance with these conditions of use.
2. You shall not use the GRID for any unlawful purpose and not (attempt to) breach or circumvent any GRID administrative or security controls. You shall respect copyright and confidentiality agreements and protect your GRID credentials (e.g. private keys, passwords), sensitive data and files.
3. You shall immediately report any known or suspected security breach or misuse of the GRID or GRID credentials to the incident reporting locations specified by the VO and to the relevant credential issuing authorities.
4. Use of the GRID is at your own risk. There is no guarantee that the GRID will be available at any time or that it will suit any purpose.
5. Logged information, including information provided by you for registration purposes, shall be used for administrative, operational, accounting, monitoring and security purposes only. This information

I confirm I have read and agree with the terms expressed in the VO Acceptable Usage Policy document displayed above.

Submit

Figure 3 Request for tutor VO

Now you are eligible to use the various Grid resources!

For detailed instructions on how to apply for the tutor VO, check out Lecture 11.

4. Create a valid proxy certificate

Before proceeding to the Grid job submission you need to create a proxy from your certificate. This has a short lifetime and prevents you from passing along your personal certificate to the Grid.

- To create this proxy file, type in your VM Terminal the following command:

```
$ StartGridSession.sh tutor
```

Now starting...

Please enter your GRID password: <enter the password sent to you>

What does the *StartGridSession.sh* script actually do?

- It generates a local proxy in your /tmp directory
 - It uploads this proxy to Myproxy server
 - It delegates the proxy to the WMS with your user name (mooc) as the delegation ID
- Instead of the *StartGridSession.sh*, you can run separately the script commands like this:

```
$ voms-proxy-init --voms tutor
Enter GRID pass phrase: <enter the password sent to you>

$ myproxy-init -d -n
Your identity:/DC=org/DC=egee-ne/O=Training Services/OU=users/CN=MOOC student
Enter GRID pass phrase for this identity: <enter the password sent to you>

$ glite-wms-job-delegate-proxy -d $USER
```

You are ready now to create your first Grid job!

For detailed instructions on how to create your proxies, check out Lecture 13.

5. Describe your job in a JDL file

To submit a Grid job you must describe this in a plain text file, called JDL. Optionally, you can check the Computing Elements (CEs) that this job may run on. The JDL will pass the details of your job to the WMS.

- Create the JDL file: open a Terminal in your User Interface, in your case the VM. Start an editor eg. *nano*, copy in the following job requirements and save with Ctrl+O. To do this, type:

```
$ nano simple.jdl
Type = "Job";
JobType = "Normal";
Executable = "/bin/hostname";
Arguments = "-f";
StdOutput = "simple.out";
StdError = "simple.err";
OutputSandbox = {"simple.out", "simple.err"};
ShallowRetryCount = 3;
```

This job involves no large input or output files. It will return to the user the *hostname* of the Worker Node that the job will land on. This is specified as the *StdOutput* file "*simple.out*" declared in the *OutputSandbox*.

- Job list match: as a last step before actually submitting the job, it is useful to test the matching Computing Elements. It does not guarantee anything about the CE load, just matches your JDL criteria with the available VO resources. This step is optional:

```
$ glite-wms-job-list-match -a simple.jdl

Alternatively, use your delegation ID <mooc>:
$ glite-wms-job-list-match -d mooc simple.jdl
```

- The '-a' option should not be used frequently. It creates a proxy of your certificate 'on-the-fly' when the job is submitted; therefore '-a' is quite inefficient when submitting hundreds of jobs.

Your job is now ready. Continue to the next step to submit it to the Grid!

For detailed instructions on JDL file construction, check out Lectures 12 & 14.

6. Submit the job to the Grid

You should have your *simple.jdl* file ready in your VM up to this point. When you submit this simple Grid job to the WMS, a job will be created and sent to a remote Worker Node. There it will execute the command `"/bin/hostname -f"` and write its standard output and its standard error.

- To submit your first Grid job and get an understanding of the job lifecycle, follow these steps:
 - a) Job submission
 - b) Status tracking
 - c) Output retrieval

(a) Job submission

- A job can be submitted by typing in your VM Terminal this command:

```
$ glite-wms-job-submit -d $USER -o jobIds simple.jdl
```

- The option `'-o'` allows you to specify a file (in this case `'jobIds'`) to store the unique job identifier:
 - You can use this URL identifier to monitor your job from the command line or your browser and to get the job output.
 - Note that omitting the `-o` option means that the jobID is not saved in a file. When you do not save this id you will effectively loose the output of your job!
 - The jobID string looks like this:

```
$ cat jobIds
###Submitted Job Ids###
https://wms2.grid.sara.nl:9000/6swP5FEfGVZ69tVB3PwnDQ
```

(b) Status tracking

- To check the current job status from the command line, apply the following command that queries the Logging and Bookkeeping service (LB) for the status of the job. In your VM type:

```
$ glite-wms-job-status -i jobIds
```

Alternatively, you can use the jobID itself <replace with your jobID>

```
$ glite-wms-job-status https://wms2.grid.sara.nl:9000/6swP5FEfGVZ69tVB3PwnDQ
```

- To check the current job status from the web browser, copy the jobID URL to your browser. Note that this URL cannot be accessed unless you have your certificate installed in this browser.

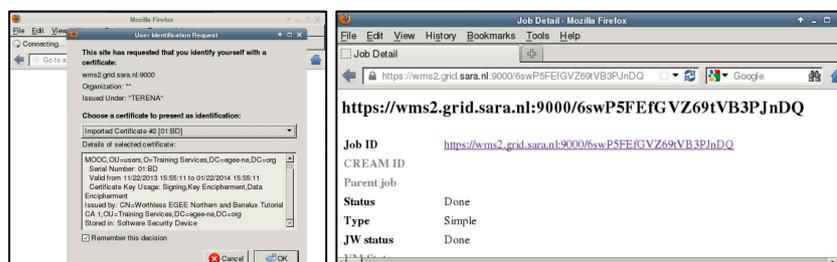


Figure 4 Job status tracking

- If you realize that you need to cancel a submitted job, use the following command:

```
$ glite-wms-job-cancel -i jobIds
```

Alternatively, you can use the jobID itself <replace with your jobID>

```
$ glite-wms-job-cancel https://wms2.grid.sara.nl:9000/6swP5FEfGVZ69tVB3PwnDQ
```

(c) Output retrieval

You can retrieve the job output once this is successfully completed, in other words the job status has changed from RUNNING to DONE.

- You don't need to specify a delegation identifier to get the output.
- You can choose the output directory with the --dir option. If you do not use this option then the output goes under the /tmp with a name based on the ID of the job.
- The output consists of the files included in the OutputSandbox. To get the output, type in your VM Terminal:

```
$ glite-wms-job-output --dir . -i jobIds

Alternatively, you can use the jobID itself <replace with your jobID>
$ glite-wms-job-output https://wms2.grid.sara.nl:9000/6swP5FEfGVZ69tVB3PwnDQ

=====
                JOB GET OUTPUT OUTCOME
Output sandbox files for the job:
https://wms2.grid.sara.nl:9000/6swP5FEfGVZ69tVB3PwnDQ
have been successfully retrieved and stored in the directory:
/home/mooc/MyFirstJob/mooc_6swP5FEfGVZ69tVB3PwnDQ
=====

$ cat /home/mooc/MyFirstJob/mooc_6swP5FEfGVZ69tVB3PwnDQ/simple.out
wn02.lsg.hubrecht.eu <this is the Worker Node hostname>
```

Congratulations! You have just executed your first job to the Grid!

For detailed instructions on Grid job submission, check out Lecture 13.