First steps on the Grid

- An introductory tutorial -

Roman Pöschl
LAL/Orsay

EUDET Kickoff Meeting
February 2006

From Rookies to Rookies

Introductrory Remarks

- This tutorial is meant as a guidance to accomplish simple tasks using grid tools.

- It will concentrate on a few basic comments needed to manage files and run jobs

- Technical details will only be mentioned where needed

- You need to have a grid certificate in order to reproduce the steps yourself + assigned to a virtual organisation – vo

- I suppose that there are sites which support your virtual organisation in terms of
  storage capacity - i.e. disk/robot space and related (grid) infrastrastrucure
  Storage Elements SE
  CPU power (computing elements - CE)

- You need to have to run your `grid-proxy-init in` order to a calid token by which you're authorized to the grid

Contents of the tutorial

1) The grid-ui

2) Data Management

3) Job processing

4) Miscalleanous commands for those who want to know more

The grid-UI

The Grid-UI (=grid userinterface) is your hook on point to the grid

Grid Actions are performed on a Grid-UI

No magic, grid-ui is a regular computer which has the software installed to launch the grid commands discusses in this tutorial (LCG-software, EDG-software)

The essential user question to your local grid-expert:

“Do we have a grid-ui at our institute or can my local desktop become a grid-ui”

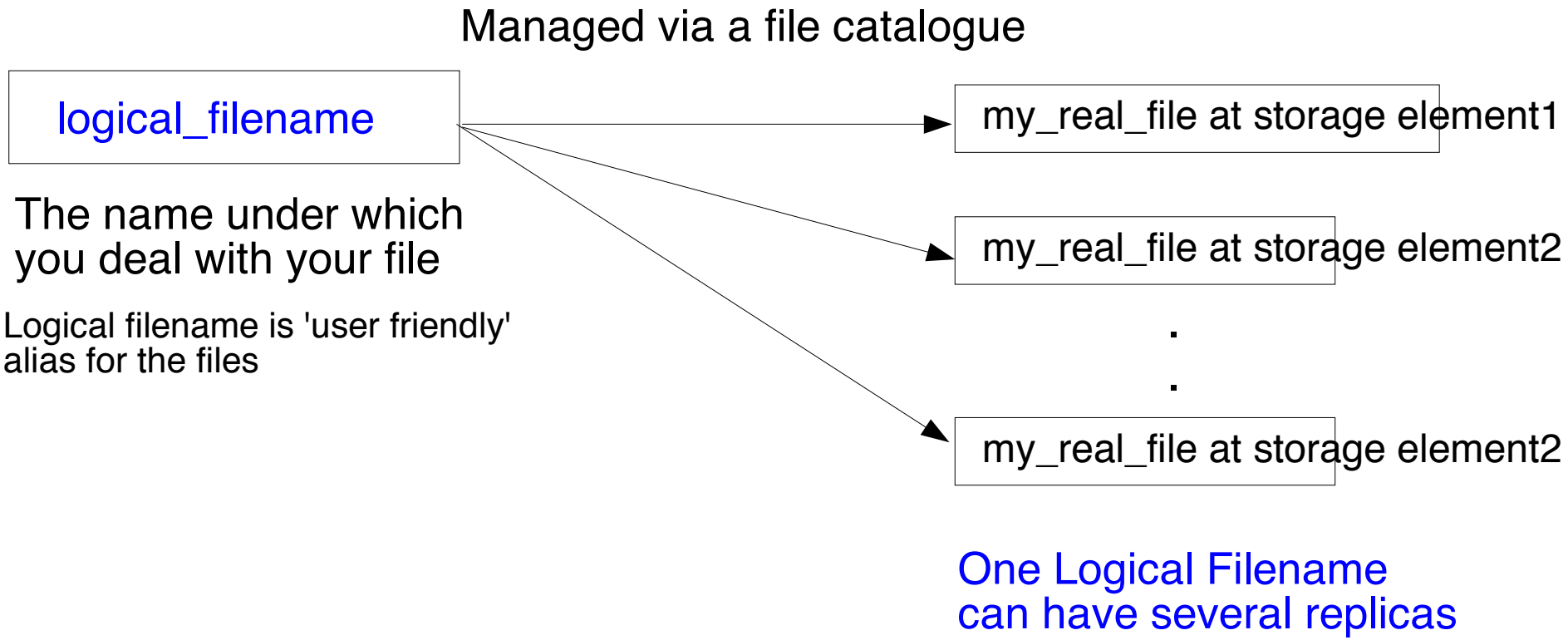
→ Setting up a grid-ui

Now we're ready to use the grid

Data Management

What is a File Catalog?

File Catalog relates logical filenames to the actual physical location of the file



So far so good but how does it look like ...

Datamanagement using the 'LFC File Catalogue'

- LFC Catalogue allows the user to mimic a unix like file structure on the grid, e.g. Creating directories

- Suited LCG commands to register files in the gird

→ examples on creating directories and registering files

Few words to the copying command
- needs vo you're assigned to
- the storage element you're using
- The filenamee you want to copy file:...
- The logical filename of the destination -l /grid/...

All members of your vo have now worldwide access
to the file(s) by the(ir) logical filenames

LFC Catalogue allows you to assign dedicated access rights
to directories

Job Processing - Preparation

The job is described by a jdl file – job-description-language file

- contains executable and files maybe needed by your job
  note the executable can be a shell script which calls the 'real'
  executableand performs further action
  These comprise the 'sandbox'

- Arguments for the job execution can be added to the Arguments sector of the jdl file

- Defining an output sandbox containing the output of your job, e.g. Your .root or .lcio file
  (further remarks see later)

- Your virtual organisation
  Needed to assign the ressources to your job

- Your Proxy-Server for checking the validity of your token during job execution

A jdl example file

```
#Defining the executable
Executable = "run_conv";
#Defining the input sandbox
InputSandbox = {"run_conv"};
#Defining further Arguments for the job execution
Arguments = "thconv_write.steer 200045 ";
#

#Error and log files
StdOutput = "lcioconv200045.log";
StdError = "lcioconv200045.err";
#The output sandbox, might be also your root/lcio file
OutputSandbox = {"lcioconv200045.log","lcioconv200045.err"};

#Infrastructural settings
MyProxyServer = "grid-pxy.desy.de";
VirtualOrganisation = "calice";
```

In this case we submit a shell script

→ Use it to submit a job ...

Use the job id to check your job (http://... and retrieve the output

Sandbox, Input, Output

- The sandboxes: Doesn't 'swallow' files > 10 Mbyte

  Large executables (e.g. For simulations)
  can/have to be registered under
  logical filenames and can be retrieved during the job
  execution

  Therefore I would recommened to use a shell script as the
  executable assigned in the jdl file
  (after following the easy examples under (grid.desy.de)

  The same is true for the output of your job
  e.g. Large files can/have to be registered under logical filename

The 'real' executable – some words of Caution

In principle Grid computing Elements (CE) do not provide resources needed for your jobs
e.g. Libraries

Be as static as possible – static linked executables will work

Little Helper: put `ldd <myexecutable>` into your shell script
script tells you which libs are missing in case of job failure

In case your job is missing something you need to provide these Libraries or whatever is missing
a) register them as Logical Filenames
b) retrieve them during Job submission in your shell script

Practical tip: The grid-ui on which you're working is like a Computing Element.
Test your jobs such that nothing is missing before launching the real submission

List of grid commands used in this tutorial

Cover basic needs for file management and job submission

`lfc-mkdir` – creating a directory where your logical files reside
`lfc-ls` – lists contents of that directory
`lfc-rm –` removes a logical file (file has to be physically deleted before

`lcg-cr` – registers a physical to the grid
`lcg-lr` – verify the registration of your file
`lcg-del(-a)` – deletes a registered file (i.e. Deletes the physical file(s))
`lcg-rep` - Creates a local replica (since your job is executed somewhere)

`edg-job-submit` - job submission
`edg-job-status` – checking of job status
`edg-jog-get-output` – get the output of your job

With these ten commands you can do your everyday jobs

Miscalleanous Commands

Check which sides support your vo

Computing power:

```
lcg-infosites --vo calice ce --is bdii.bfg.uni-freiburg.de
```

Storage devices

```
lcg-infosites --vo calice se --is bdii.bfg.uni-freiburg.de
```

Members of your vo:

```
ldapsearch -x -H ldap://grid-vo.desy.de -b 'ou=calice,ou=vo,o=desy,c=de'
```

Conclusion

- The grid is a complex system but with a few commands one can accomplish the everyday's business

The tutorial may serve as a guiding line when reading further documentation

- However for most of us it is a new tool and we all have to get used to it

I hope this short introduction lowers the threshold a bit to start with it.