



Application development on EGEE with P-GRADE Portal

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Contents

- P-GRADE Portal in a nutshell
- Workflow development with the Portal
- Workflow execution with the Portal
- Scaling up to a parametric workflow



Current situation and trends in Grid computing

- Fast evolution of Grid systems and middleware:
 - **GT2, OGSA, GT3 (OGSI), GT4 (WSRF), LCG-2, gLite, ...**
- Many production Grid systems are built with them
 - EGEE (**LCG-2 → gLite**), UK NGS (**GT2**), Open Science Grid (**GT2 → GT4**), NorduGrid (**~GT2**)
- Although **the same set of core services** are available everywhere, they **are implemented in different ways**
 - Data services
 - Computation services
 - Security services (single sign-on)
 - (Brokers)



P-GRADE Portal in a nutshell

- **General purpose, workflow-oriented computational Grid portal.** Supports the development and execution of workflow-based Grid applications – **a tool for Grid orchestration**
- **Open source with GPL license:** <http://sourceforge.net/projects/pgportal/>
- Extends **GridSphere**
 - Easy to expand with new portlets (e.g. application-specific portlets)
 - Easy to tailor to end-user needs
- **Grid services** supported by the portal:

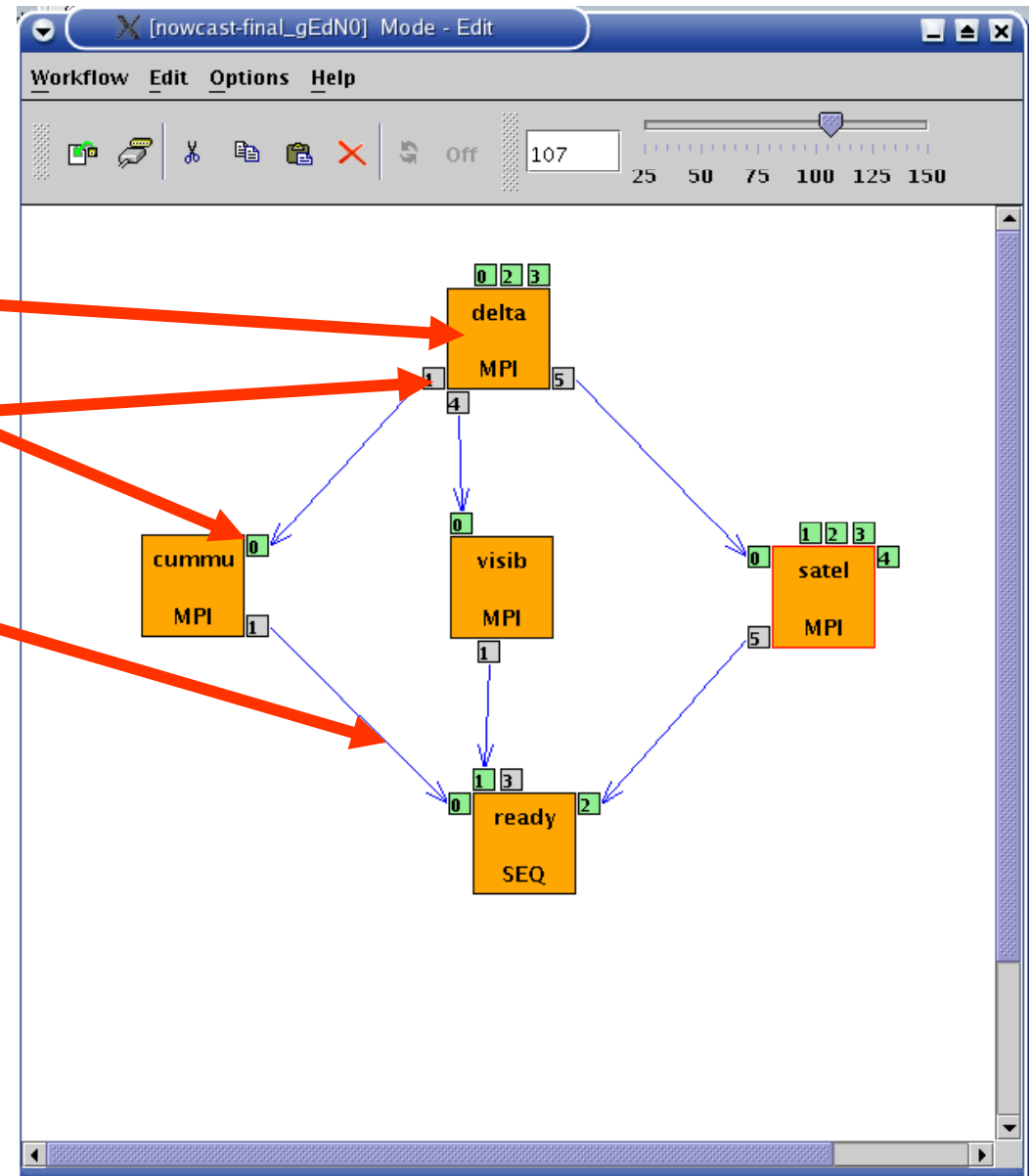
Service	EGEE grids	Globus grids
Job execution	Computing Element	GRAM
File storage	Storage Element	GridFTP server
Certificate management	MyProxy	
Information system	BDII	MDS-2, MDS-4
Brokering	Workload Management System	GTbroker
Job monitoring	Mercury	
Workflow & job visualization	PROVE	

Solves Grid interoperability problem at the workflow level



What is a P-GRADE Portal workflow?

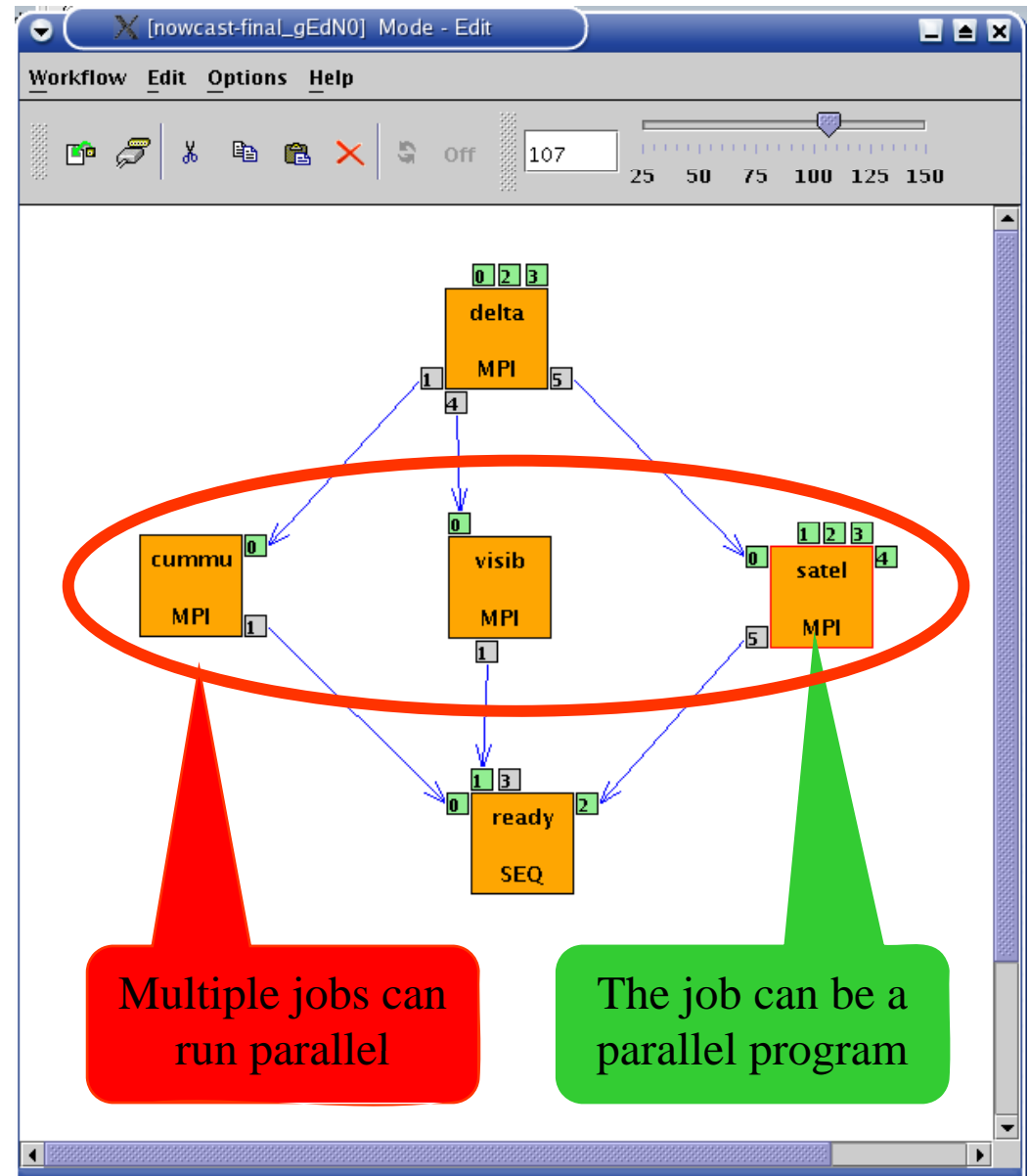
- **a directed acyclic graph where**
 - Nodes represent jobs (batch programs to be executed on a computing element)
 - Ports represent input/output files the jobs expect/produce
 - Arcs represent file transfer operations
- **semantics of the workflow:**
 - A job can be executed if all of its input files are available





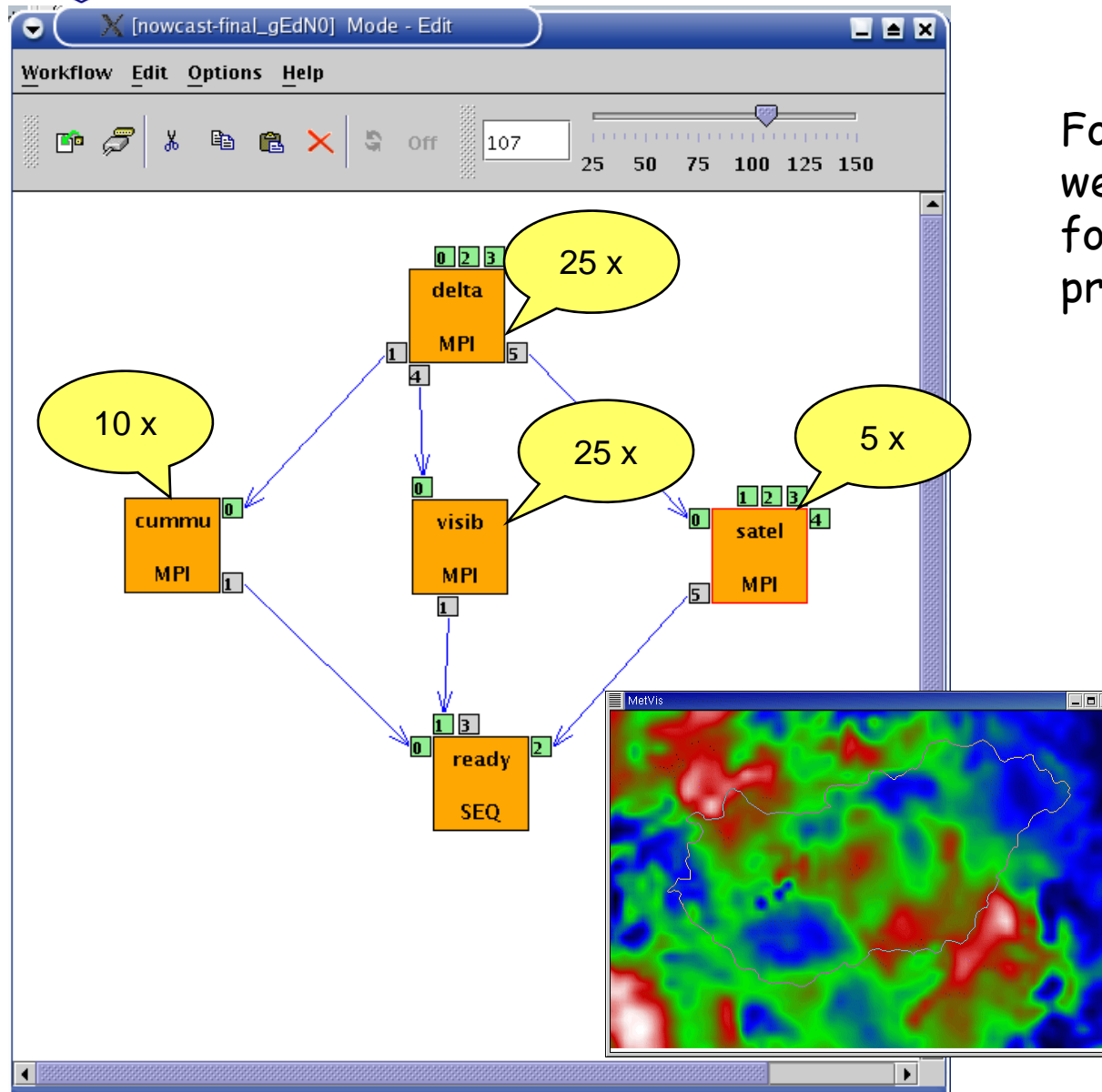
Two levels of parallelism by a workflow

- The workflow concept of the P-GRADE Portal enables the **efficient parallelization** of complex problems
- Semantics of the workflow enables two levels of parallelism:
 - **Parallel execution inside a workflow node**
 - **Parallel execution among workflow nodes**





Ultra-short range weather forecast (Hungarian Meteorology Service)



Forecasting dangerous weather situations (storms, fog, etc.), crucial task in the protection of life and property

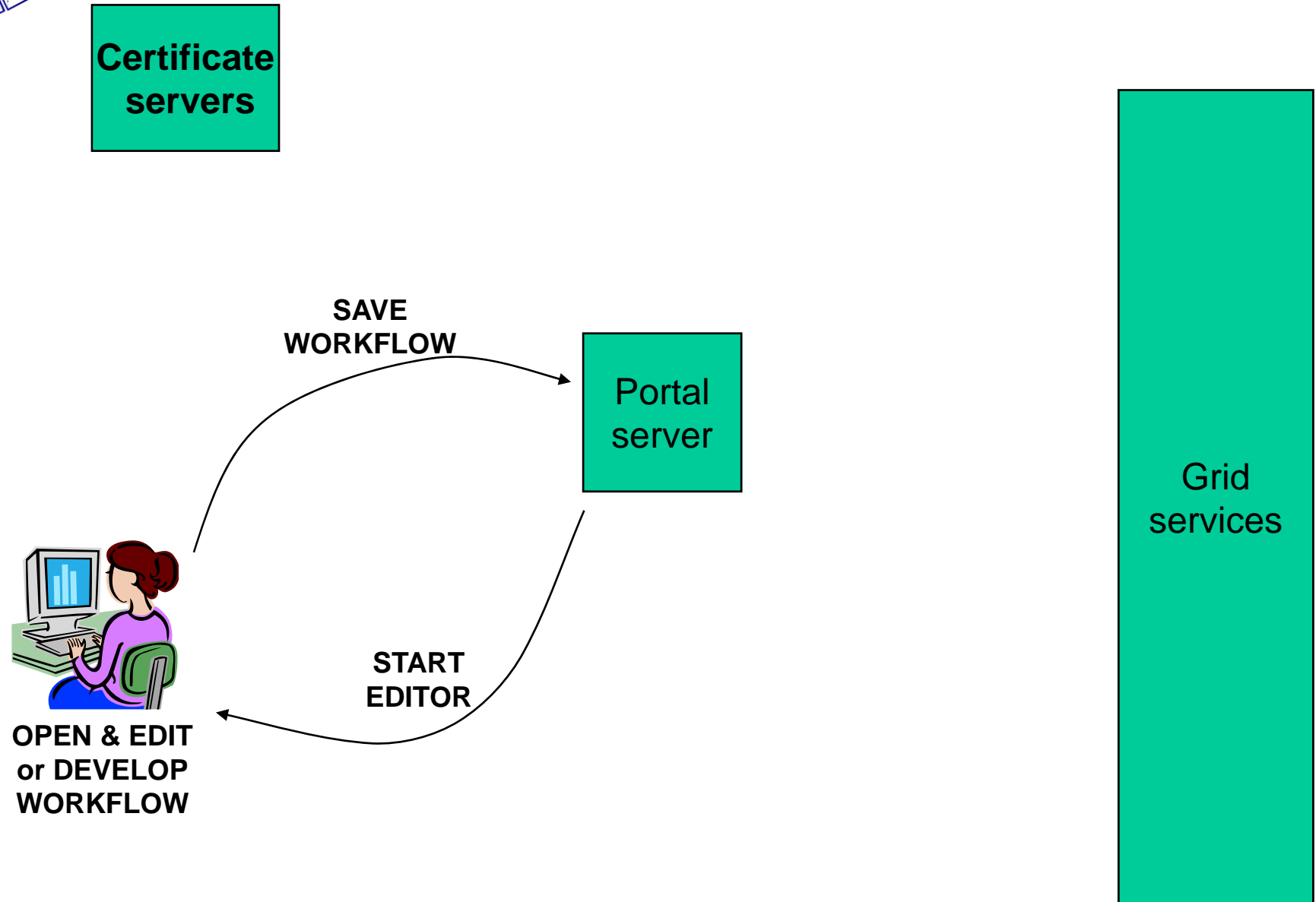
Processed information:
surface level measurements, high-altitude measurements, radar, satellite, lightning, results of previous computed models

Requirements:
• Execution time < 10 min
• High resolution (1km)



The typical user scenario

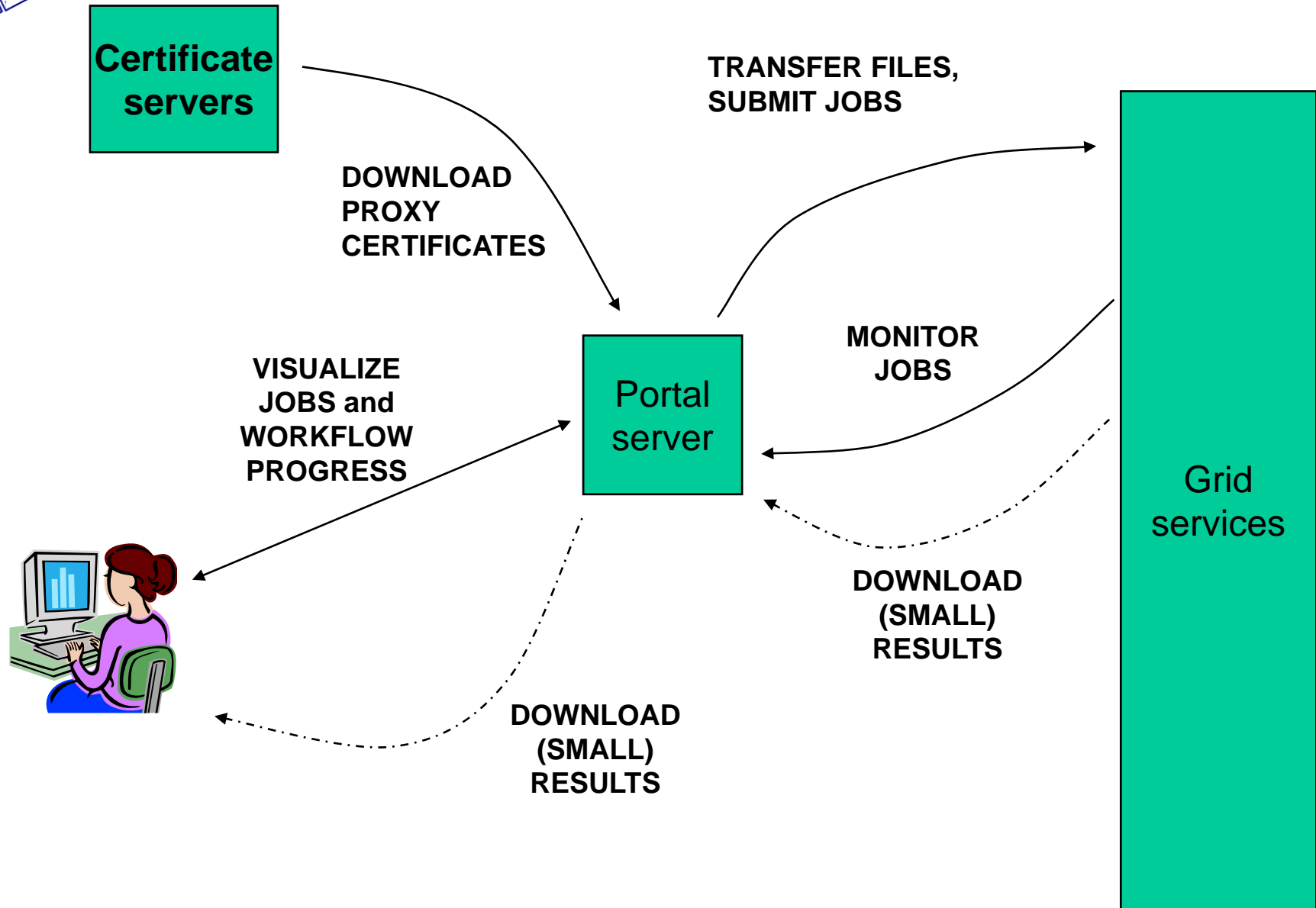
Part 1 - development phase





The typical user scenario

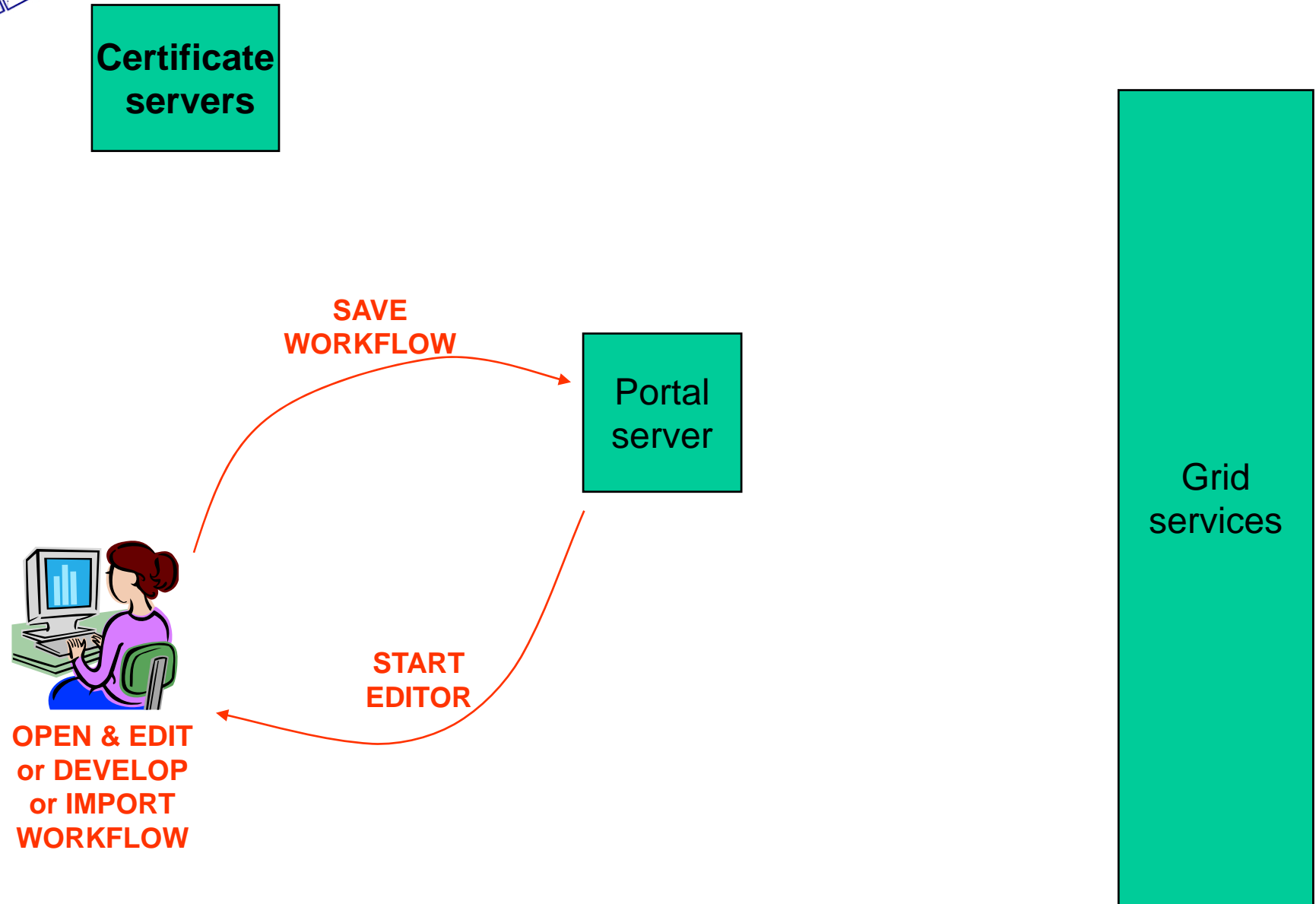
Part 2 - execution phase





The typical user scenario

Development phase:





Workflow development

Opening the workflow editor

The editor is a Java Webstart application



download and installation is only one click!

The screenshot shows a web browser window displaying the P-Grade Portal. The main content area features the P-Grade logo and the text 'portal'. Below this, there are several logos, including the European Union flag, the SEE-GRID logo, and the VERA logo. The browser's address bar shows the URL 'http://hgportal.hp...'. Below the browser window, a Java Webstart application window titled 'Workflow Manager' is open. The application has a menu bar with 'Certificates', 'Settings', 'Information System', and 'Help'. The main area of the application is titled 'Workflow Editor' and contains a 'Refresh' button. Below this is a table titled 'Workflow list' with the following data:

Workflow	Status	Size	Quota (100 Mb)	[Output]	[View]	[Action]
LM_9_DEMO_TOTAL	submitted	26.848 MB	26%	N/A	Details	Abort Attach Delete
		26.848 MB	26%			

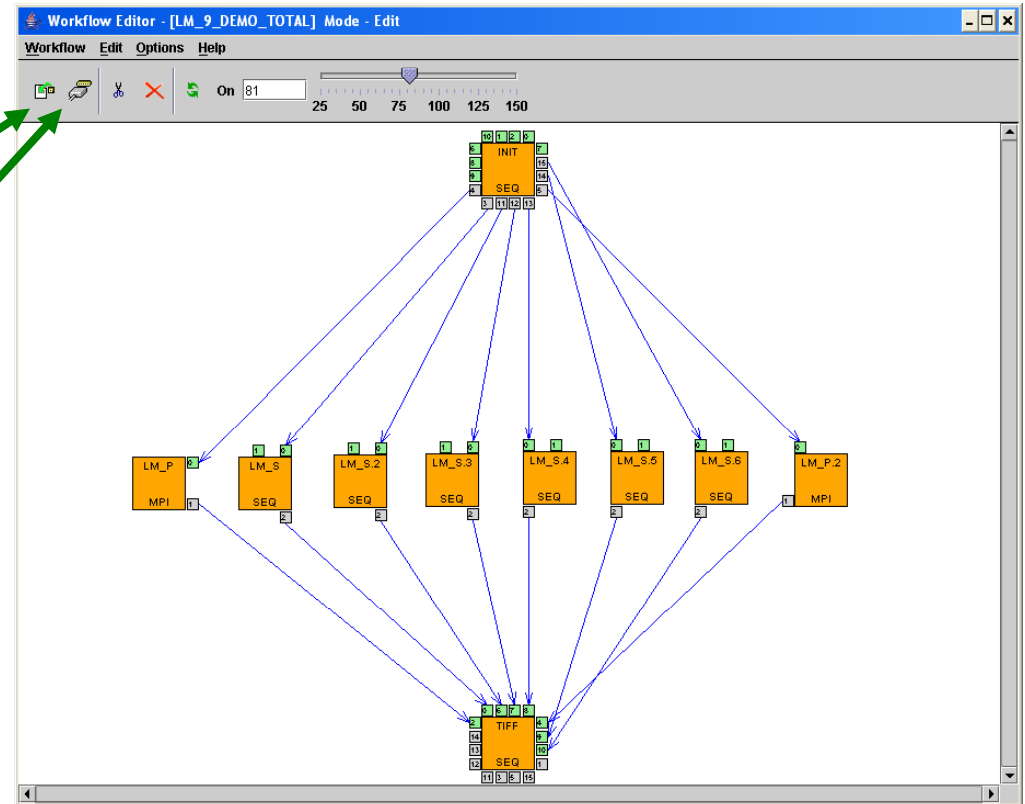
At the bottom of the application window, there is a 'Delete all' button and a message: 'Message: Workflow successfully submitted.'



Workflow Editor

Defining the graph

- The aim is to define a DAG of batch jobs:
 1. **Drag & drop components:**
jobs and ports
 2. **Define their properties**
 3. **Connect ports by channels**
(no cycles, no loops, no conditions)





Workflow Editor

Properties of a job

Workflow Editor - [LM_9_DEMO_TOTAL] Mode - Edit

Workflow Edit Options Help

LM_P properties

Name: LM_P

Job Type: SEQ MPI PVM

Job Executable: LM_5.bin
File Browser

Instrument

Process Number: 7

Attributes: -n -m

Grid: SEE-GRID

Monitor:

Resource: n40.hpcc.sztaki.hu:jobmanager-fork
ce01.grid.acad.bg:jobmanager-fork
grid-ce.ii.edu.mk:jobmanager-fork
grid1.irb.hr:jobmanager-fork
grid1.netmode.ece.ntua.gr:jobmanager-fork
n40.hpcc.sztaki.hu:jobmanager-fork
prof.salla6.inima.al:jobmanager-fork

Properties of a job:

- Binary executable
- Type of executable
- Number of required processors
- Command line parameters
- The resource to be used for the execution:
 - Grid/VO
 - ((Computing element))



Direct resource selection: Which computing element to use?

I still don't know which resource to use!



The information system portlet queries BDII and GUIS servers

PGrade Portal - Microsoft Internet Explorer

http://hgportal.hpcc.sztaki.hu:7080/gridsphere/gridsphere?action=doCh

Workflow Certificates Settings Information System Help

Grid: SEE-GRID VO: seegrid

	Computing Element						Storage Element		
	CPU		Job			Space			
	Free	Usage	Running	Waiting	Load	Total	Available	Usage	
	80	29%	7	0	0%	226.793 GB	216.34 GB	5%	
AEGIS02-RCUB	20	0%	0	0	0%	398.466 GB	396.58 GB	0%	
BG01-IPP	54	67%	4	0	0%	609.554 GB	473.543 GB	22%	
BG02-IM	20	20%	1	0	0%	131.775 GB	79.957 GB	39%	
BG03-IPP-N	3	0%	0	0	0%	566.608 GB	566.376 GB	0%	
BG04-ACAD	48	33%	2	5	71%	554.647 GB	475.767 GB	14%	
HR-01-RBI	60	80%	4	0	0%	78.317 GB	6.271 GB	92%	
MK-01-UKIM_II	28	0%	0	0	0%	69.709 GB	69.075 GB	1%	
RO-01-ICI	54	56%	5	36	88%	849.666 GB	828.387 GB	3%	
ROGRID-NIPNE-01	24	0%	0	0	0%	862.807 GB	848.676 GB	2%	
SZTAKI	4	0%	0	0	0%	4.566 GB	2.871 GB	37%	
tubitaklg2	35	20%	1	0	0%	1.335 TB	1.335 TB	0%	

Kész Internet



Automatic resource selection

1. **Select a broker Grid/VO for the job
(e.g. GILDA_LCG2_broker)**
2. (Describe the ranks & requirements of the job in JDL)
3. The portal will use the broker to find the best resource for the job!



Workflow Editor

Defining broker jobs

Workflow Editor - [default*] Mode - Edit

Workflow Edit Options Help

Off 100 25 50 75 100 125 150

BrokerTest properties

Name: BrokerTest

Job Type: SEQ MPI PVM

Job Executable: D:\A-TEST\Cell.exe

File Browser

Instrument

Process Number:

Attributes:

Grid: HUNGRID_LCG_2_B...

Monitor:

Resource: grid151.kfki.hu

JDL: JDL Editor...

Ok Cancel

Select a Grid with broker!
(*_BROKER)

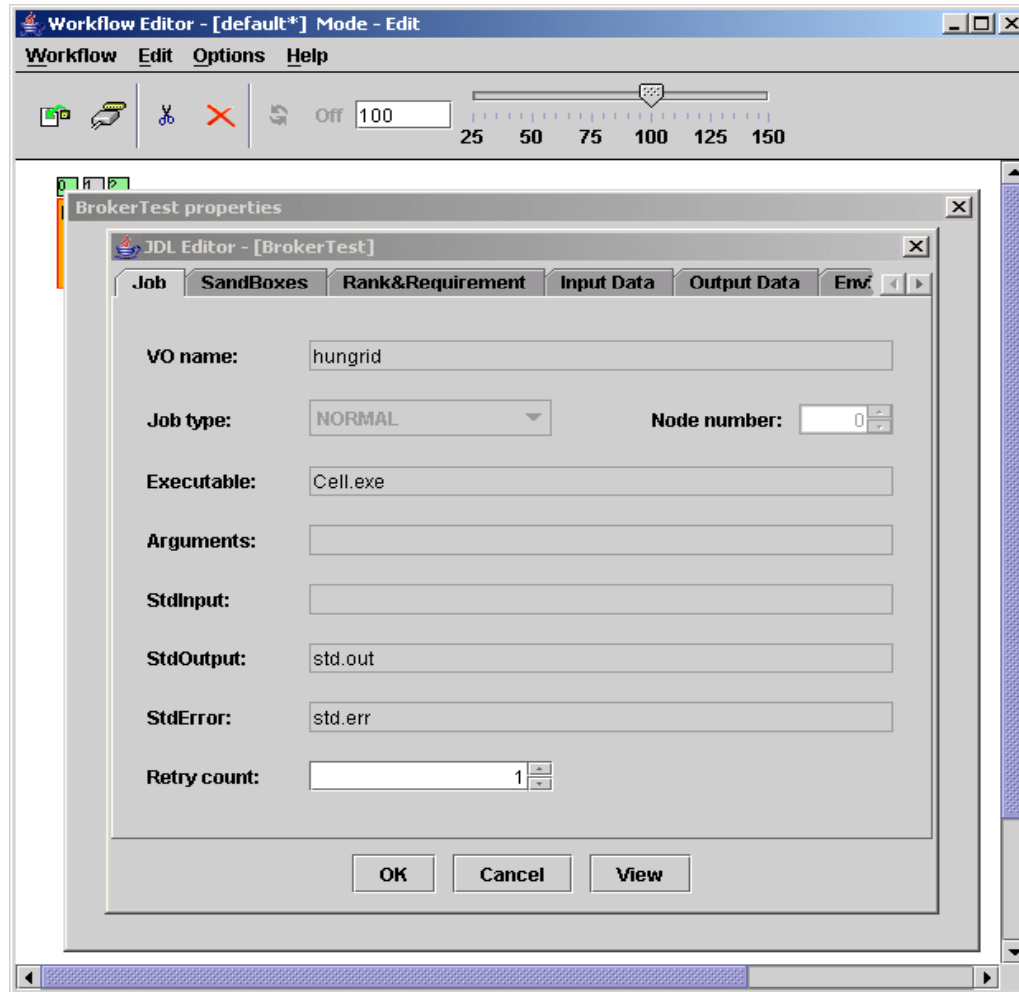
Ignore the resource field!

If default JDL is not sufficient
use the built-in JDL editor!



Workflow Editor

Built-in JDL editor

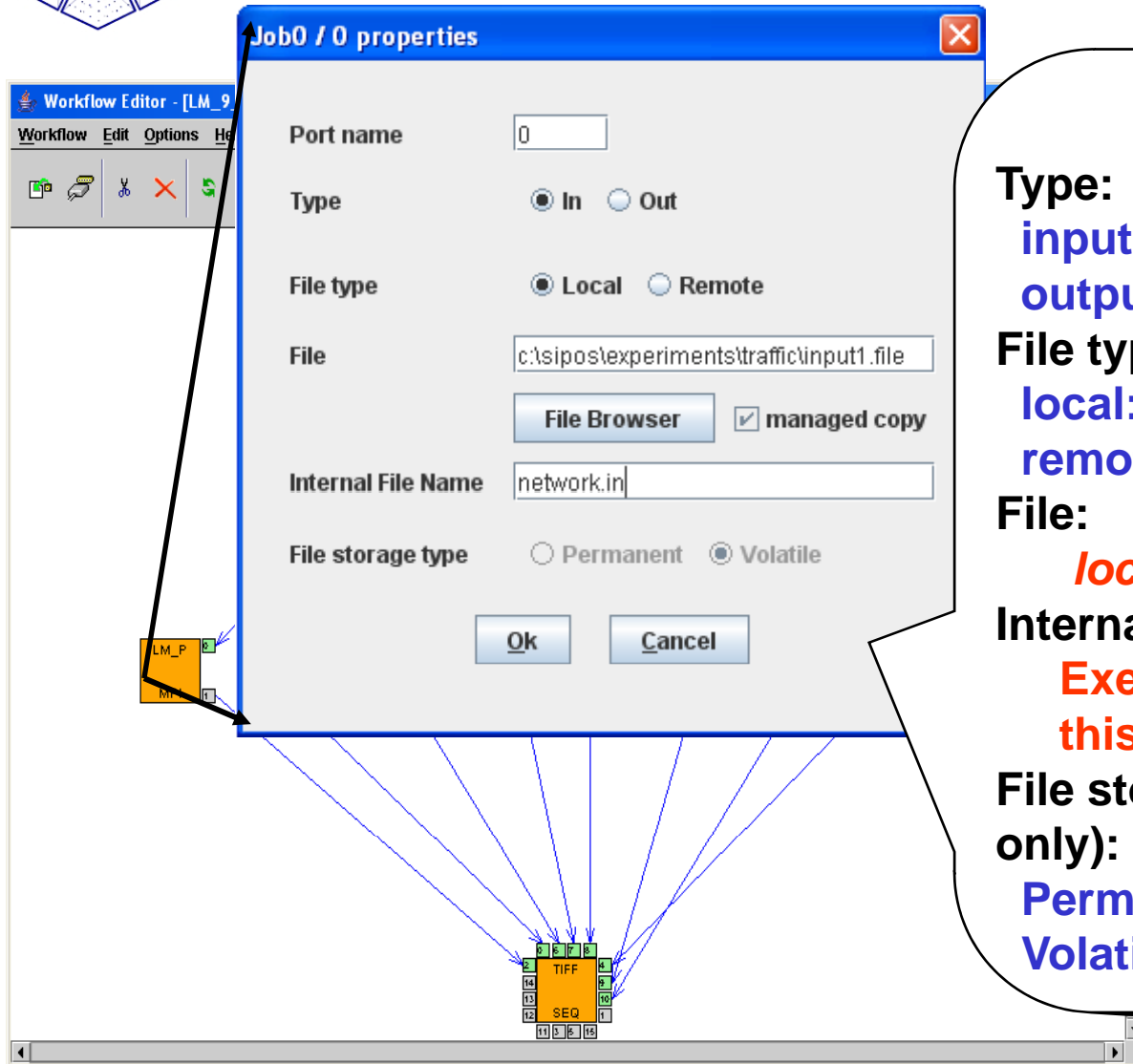


JDL → look at the gLite Users' manual!



Workflow Editor

Defining input-output files



File properties

Type:

input: *the job reads*

output: *the job generates*

File type:

local: *comes from my desktop*

remote: *comes from an SE*

File:

location of the file

Internal file name:

Executable reads the file in this name – fopen("file.in", ...)

File storage type (output files only):

Permanent: *final result*

Volatile: *only data channel*



How to refer to an I/O file?

Input file

Output file

Local file

- Client side location:
`c:\experiments\11-04.dat`
- LFC logical file name
`lfn:/grid/gilda/sipos/11-04.dat`

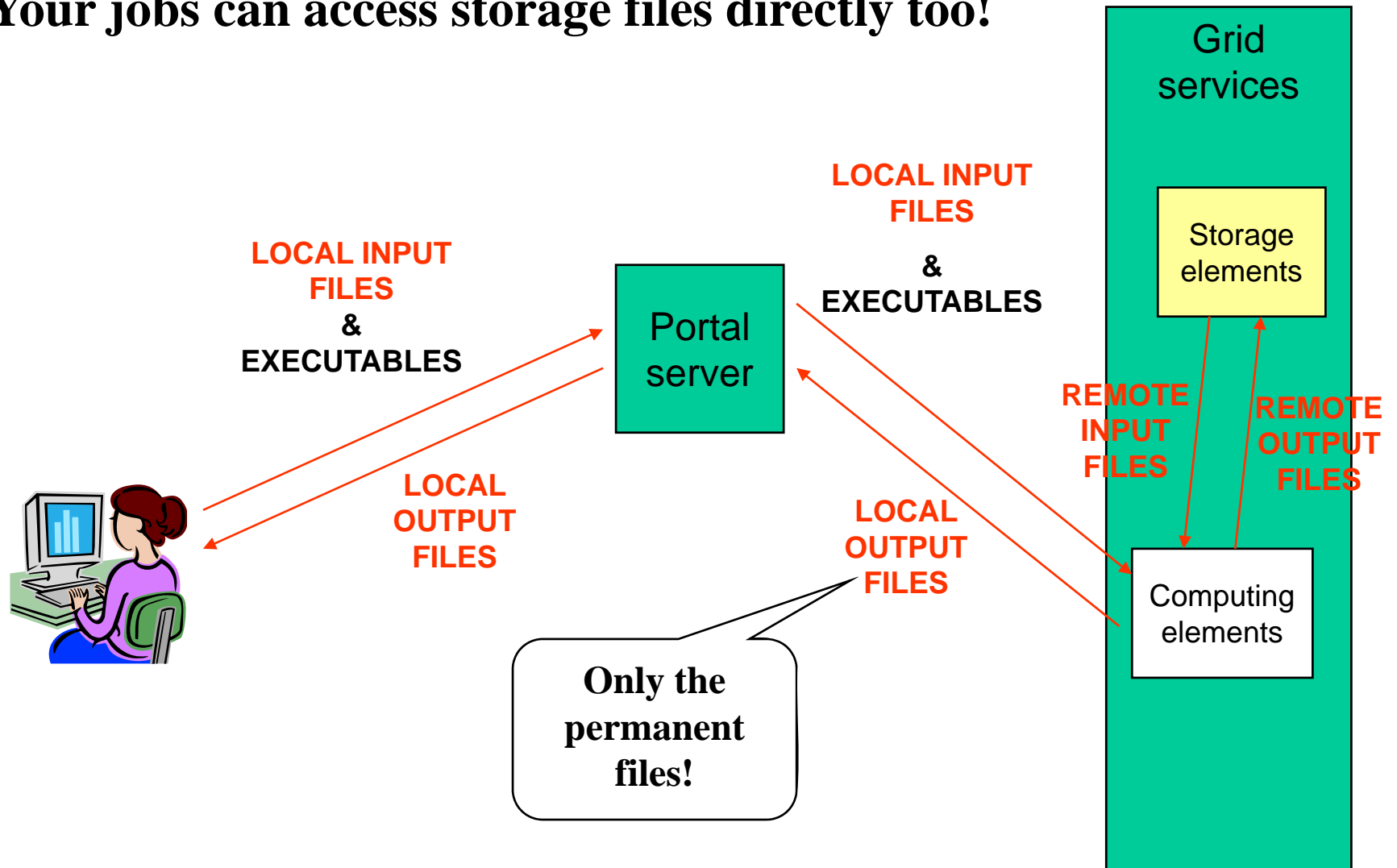
- Client side location:
`result.dat`
- LFC logical file name
`lfn:/grid/gilda/sipos/11-04_-_result.dat`

Remote file



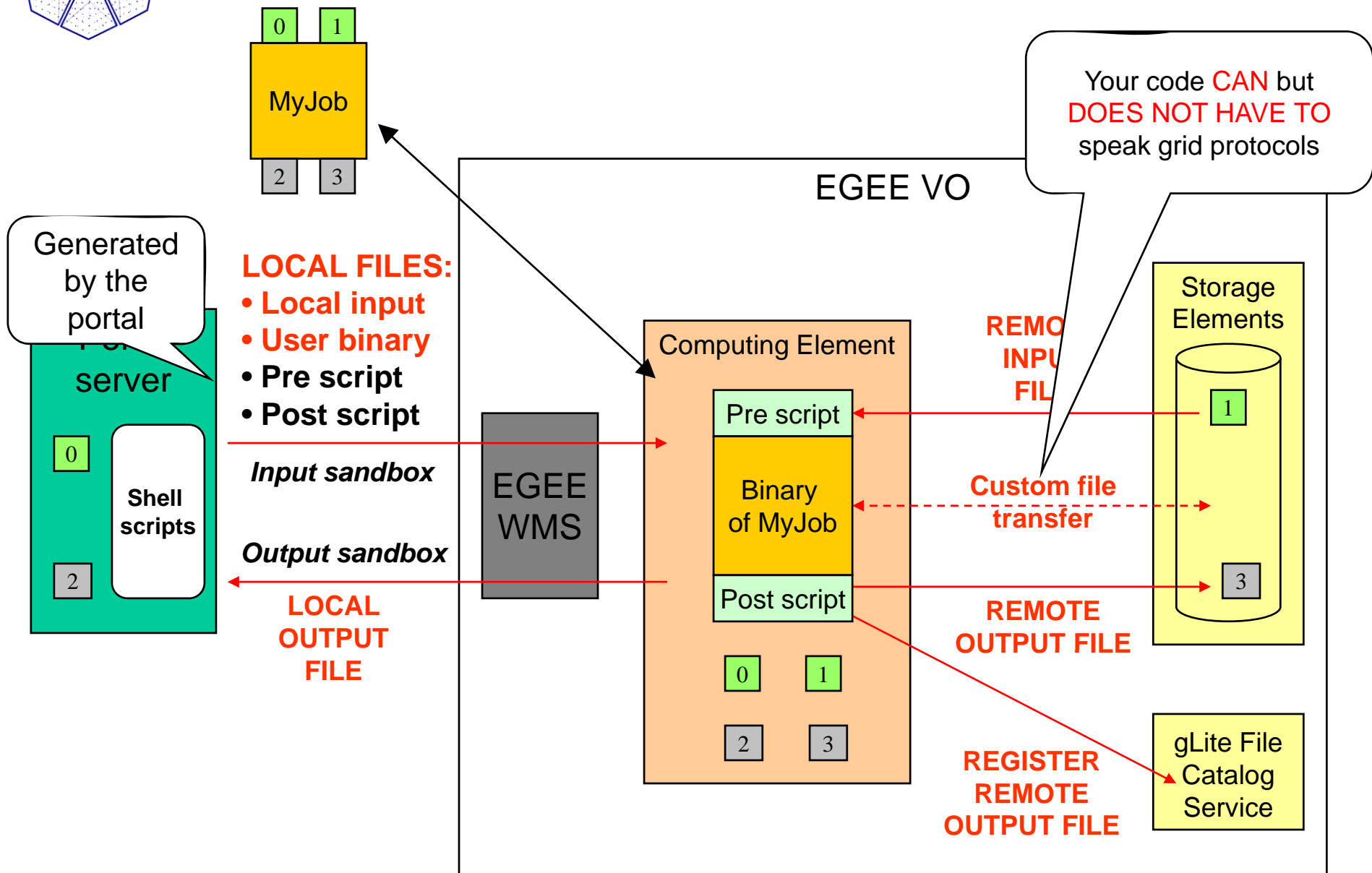
Local vs. remote files

Your jobs can access storage files directly too!





Job level file transfer in EGEE VOs





Reminder: Grid files and JDL

Example JDL file

```
Executable = "gridTest";
```

```
StdError = "stderr.log";
```

```
StdOutput
```

lfn: logical file name

```
InputSandbox = { "/home/gilda/test/";
```

```
OutputSandbox = { "stderr.log", "stdout.log";
```

```
InputData = "lfn:/grid/gilda/mydir/testbed0-00019";
```

```
OutputData = "lfn:/grid/gilda/mydir/result0-00019";
```

The file itself is NOT transferred by the gLite (or Globus) middleware!

Your binary must transfer input/output grid files!

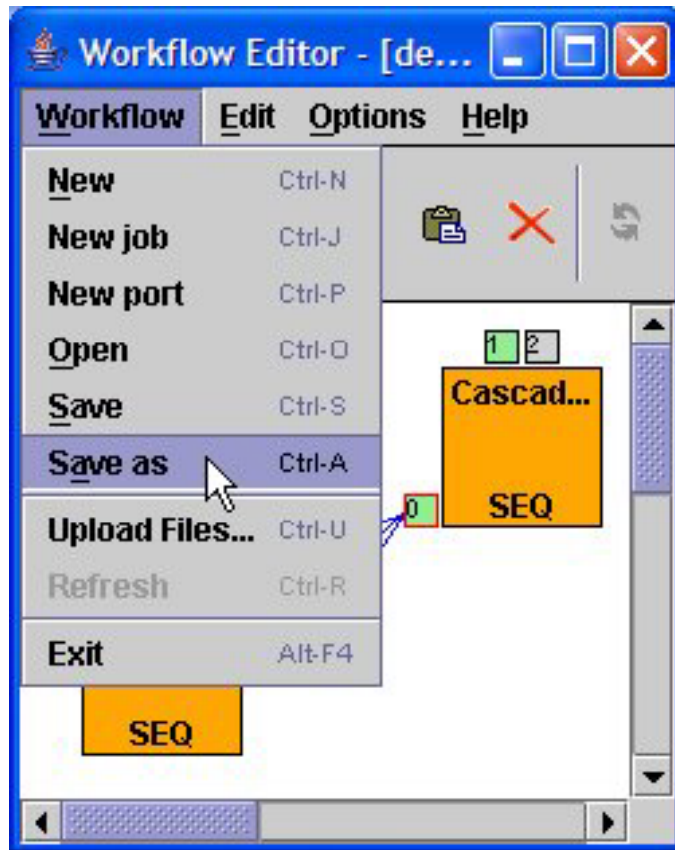
P-GRADE Portal transfers the file for you.

Your executable does not have to know any grid protocol if it is used in P-GRADE



Workflow Editor

Saving the workflow



Workflow is defined!

Let's execute it!



Executing workflows with the P-GRADE Portal

Main steps

- 1. Download proxies**
- 2. Submit workflow**
- 3. Observe workflow progress**
- 4. If some error occurs correct the graph**
- 5. Download result**



The typical user scenario

Execution phase – step 1:

Certificate servers

DOWNLOAD
PROXY
CERTIFICATES

Portal
server

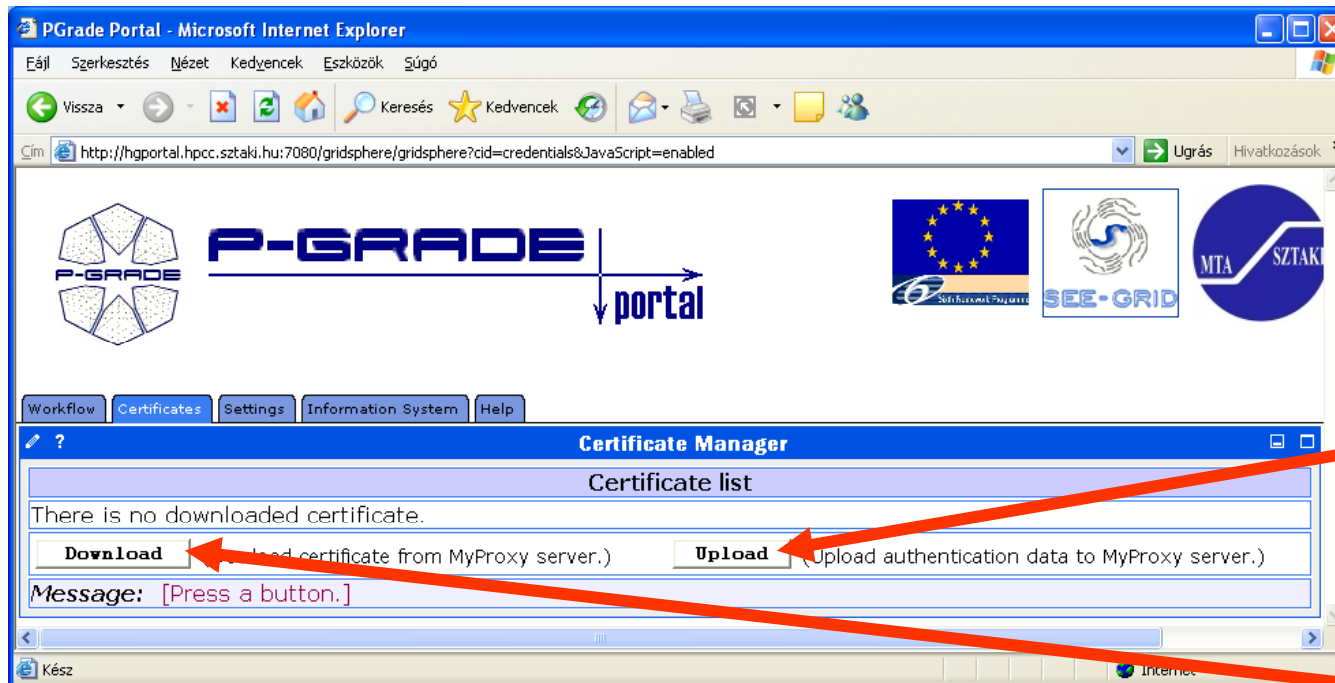
Grid
services





MyProxy interaction in P-GRADE: Certificate Manager

Certificates portlet



- To start your session on the Grid you must create a proxy certificate on the portal server

“Certificates” portlet:

- to upload a proxy into MyProxy servers

- to download a proxy from MyProxy into the portal server



Certificate Manager



Downloading a proxy

PGrade Portal - Microsoft Internet Explorer

Eőjl Szerkesztés Nézet Kedvencek Eszközök Sőgő

Vissza Keresés Kedvencek

http://hgportal.hpcc.sztaki.hu:7080/gridsphere/gridsphere?action=doGoDownload&cid=5

 **P-GRADE** portal 

Workflow Certificates Settings Information System Help

Certificate Manager

Download from MyProxy server

hostname	<input type="text" value="cvs.lpds.sztaki.hu"/> *	port	<input type="text" value="7512"/> *
login	<input type="text" value="seecert"/> *	password	<input type="password" value=""/>
lifetime (hours)	<input type="text" value="100"/> *	description	<input type="text"/>

*: Cannot be left empty.

Message: Fill in the fields for download!

Internet

1. MyProxy server access details:

- Hostname
- Port number
- User name (from upload)
- Password (from upload)

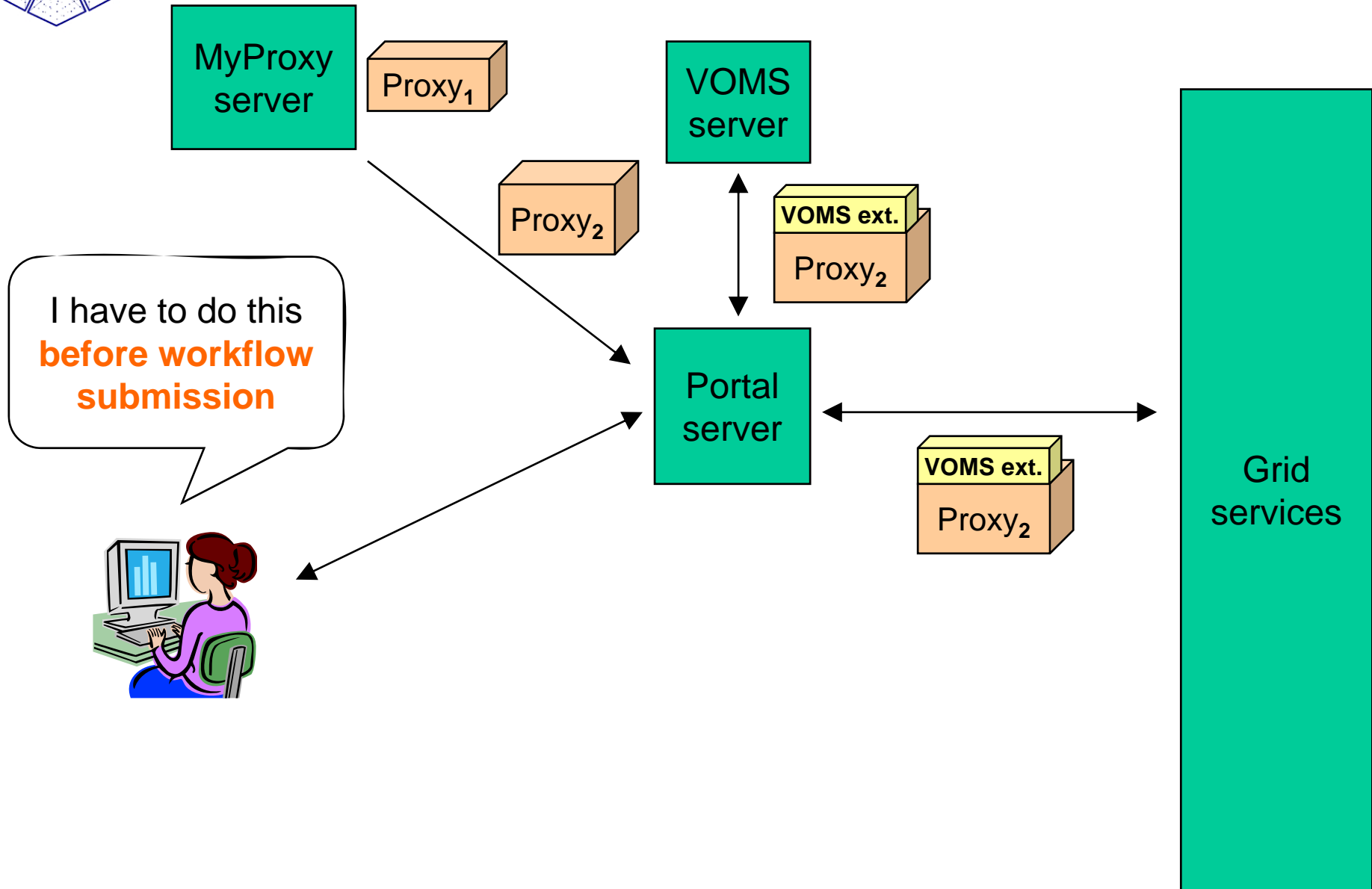
2. Proxy parameters:

- Lifetime
- Comment

3. Grid association



Certificates, proxies with gLite VOs: Download





Certificate Manager

associating the proxy with a grid

Certificate details	
Downloaded from:	cvs.lpds.sztaki.hu
Issued by:	DC=ORG,DC=SEE-GRID,O=People,O=SZTAKI,CN=Jozsef Patvarczki,CN=proxy
Subject:	DC=ORG,DC=SEE-GRID,O=People,O=SZTAKI,CN=Jozsef Patvarczki,CN=proxy,CN=proxy
Timeleft:	99:56:46
Proxy type:	full legacy globus proxy
Strength [bits]:	512
Description:	

Select GRID

Select from the list:

Message: Map proxy for any of the grids.

This operation displays the **details of the certificate** and the **list of available Grids** (defined by portal administrator)



Certificate Manager

browsing proxies

Multiple proxies can be available on the portal server at the same time!

Issuer	Set for Grids	Time left	[Actions]
DC=ORG,DC=SEE-GRID,O=People,O=SZTAKI,CN=Jozsef Patvarczki,CN=proxy	SEE-GRID	99:50:24	Details Set for Grid Delete
C=HU,O=KFKI RMKI CA,OU=SZTAKI,CN=Patvarczki Jozsef,CN=proxy	HUNGRID	99:57:25	Details Set for Grid Delete

[Refresh](#)

[Download](#) (Download certificate from MyProxy server.) [Upload](#) (Upload authentication data to MyProxy server.)

Message: Certificate successfully set for HUNGRID.

SEE-GRID CEs and SEs

HUNGRID CEs and SEs



The typical user scenario

Execution phase - step 2:

Certificate servers

TRANSFER FILES,
SUBMIT JOBS

Portal server

Grid services





Workflow Management

(workflow portlet)

- The portlet presents the status, size and output of the available workflow in the “**Workflow**” list
- It has a Quota manager to control the users’ storage space on the server
- The portlet also contains the “**Abort**”, “**Attach**”, “**Details**”, “**Delete**” and “**Delete all**” buttons to handle execution of workflows
- The “**Attach**” button opens the workflow in the Workflow Editor
- The “**Details**” button gives an overview about the jobs of the workflow

Workflow Manager

Workflow Editor Refresh

Workflow	Status	Size	Quota (100 Mb)	Output	[View]	[Action]
LM_9_DEMO_TOTAL	submitted	26.848 MB	26%	N/A	Details	Abort Attach Delete

Delete all

Message: Workflow successfully submitted.



Workflow Execution

(observation by the workflow portlet)

PGrade Portal - Microsoft Internet Explorer

http://hgportal.hpcc.sztaki.hu:7080/gridsphere/gridsphere?action=doShowWorkflowDetails&cid=2

Workflow Manager

Refresh Back

Workflow	Job	Gridname	Hostname	Status	[Logs]	[Output]	[Visualization]
LM_9_DEMO_TOTAL				submitted	-	N/A	Visualize All Abort
	INIT	SEE-GRID	ce01.grid.acad.bg	init	-	-	-
	LM_P	SEE-GRID	n40.hpcc.sztaki.hu	init	-	-	-
	LM_P.2	SEE-GRID	n40.hpcc.sztaki.hu	init	-	-	-
	LM_S	SEE-GRID	grid-ce.ii.edu.mk	init	-	-	-
	LM_S.2	SEE-GRID	grid1.irb.hr	init	-	-	-
	LM_S.3	SEE-GRID	grid1.netmode.ece.ntua.gr	init	-	-	-
	LM_S.4	SEE-GRID	grid1.irb.hr	init	-	-	-
	LM_S.5	SEE-GRID	testbed001.grid.icl.ro	init	-	-	-
	LM_S.6	HUNGRID	grid109.kfki.hu	init	-	-	-
	TIFF	HUNGRID	grid109.kfki.hu	init	-	-	-

Message: Workflow details successfully displayed.

White/Red/Green color means the job is initial/running/finished state



Workflow Execution

(observation by the workflow portlet)

The screenshot shows a web browser window titled "PGrade Portal - Microsoft Internet Explorer". The address bar shows the URL: `http://hgportal.hpcc.sztaki.hu:7080/gridsphere/gridsphere?action=doGotoPage&cid=2`. The page features a navigation menu with "Workflow", "Certificates", "Settings", "Information System", and "Help". The main content area is titled "Workflow Manager" and contains a "Job list" table. The table has columns for Workflow, Job, Gridname, Hostname, Status, Logs, Output, and Visualization. The "Status" column uses color coding: white for "init", red for "running", and green for "finished". A message at the bottom of the table area reads "Message: Job list refreshed."

Workflow	Job	Gridname	Hostname	Status	[Logs]	[Output]	[Visualization]
LM_9_DEMO_TOTAL				running	-	N/A	<input type="button" value="Visualize"/> <input type="button" value="All"/> <input type="button" value="Abort"/>
	INIT	SEE-GRID	ce01.grid.acad.bg	running	-	-	-
	LM_P	SEE-GRID	n40.hpcc.sztaki.hu	init	-	-	-
	LM_P.2	SEE-GRID	n40.hpcc.sztaki.hu	init	-	-	-
	LM_S	SEE-GRID	grid-ce.ii.edu.mk	init	-	-	-
	LM_S.2	SEE-GRID	grid1.irb.hr	init	-	-	-
	LM_S.3	SEE-GRID	grid1.netmode.ece.ntua.gr	init	-	-	-
	LM_S.4	SEE-GRID	grid1.irb.hr	init	-	-	-
	LM_S.5	SEE-GRID	testbed001.grid.icl.ro	init	-	-	-
	LM_S.6	HUNGRID	grid109.kfki.hu	init	-	-	-
	TIFF	HUNGRID	grid109.kfki.hu	init	-	-	-

White/Red/Green color means the job is initial/running/finished state



Workflow Execution

(observation by the workflow portlet)

The screenshot shows a web browser window titled "PGrade Portal - Microsoft Internet Explorer". The address bar shows the URL: `http://hgportal.hpcc.sztaki.hu:7080/gridsphere/gridsphere?action=doGotoPage&cid=2`. The page content includes a navigation menu with "Workflow", "Certificates", "Settings", "Information System", and "Help". Below this is a "Workflow Manager" section with "Refresh" and "Back" buttons. A "Job list" table is displayed with the following data:

Workflow	Job	Gridname	Hostname	Status	[Logs]	[Output]	[Visualization]
LM_9_DEMO_TOTAL				running	-	N/A	<input type="button" value="Visualize"/> <input type="button" value="All"/> <input type="button" value="Abort"/>
	INIT	SEE-GRID	ce01.grid.acad.bg	finished	- -		-
	LM_P	SEE-GRID	n40.hpcc.sztaki.hu	init	- -		-
	LM_P.2	SEE-GRID	n40.hpcc.sztaki.hu	init	- -		-
	LM_S	SEE-GRID	grid-ce.ii.edu.mk	running	- -		-
	LM_S.2	SEE-GRID	grid1.irb.hr	finished	<input type="button" value="Out"/>	-	-
	LM_S.3	SEE-GRID	grid1.netmode.ece.ntua.gr	running	<input type="button" value="Out"/>	-	-
	LM_S.4	SEE-GRID	grid1.irb.hr	finished	<input type="button" value="Out"/>	-	-
	LM_S.5	SEE-GRID	testbed001.grid.ici.ro	running	<input type="button" value="Out"/>	-	-
	LM_S.6	HUNGRID	chemgrid3.chemres.hu	finished	<input type="button" value="Out"/>	-	-
	TIFF	HUNGRID	grid109.kfki.hu	init	- -		-

Message: Job list refreshed.

White/Red/Green color means the job is initial/running/finished state



Workflow Execution

(observation by the workflow portlet)

PGrade Portal - Microsoft Internet Explorer

http://hgportal.hpcc.sztaki.hu:7080/gridsphere/gridsphere?action=doGotoPage&cid=2

Workflow Manager

Refresh Back

Workflow	Job	Gridname	Hostname	Status	[Logs]	[Output]	[Visualization]	
LM_9_DEMO_TOTAL				running	-	N/A	Visualize	All Abort
	INIT	SEE-GRID	ce01.grid.acad.bg	finished	-	-	-	
	LM_P	SEE-GRID	n40.hpcc.sztaki.hu	running	Out	-	Visualize	
	LM_P.2	SEE-GRID	n40.hpcc.sztaki.hu	running	Out	-	Visualize	
	LM_S	SEE-GRID	grid-ce.ii.edu.mk	finished	Out	-	-	
	LM_S.2	SEE-GRID	grid1.irb.hr	finished	Out	-	-	
	LM_S.3	SEE-GRID	grid1.netmode.ece.ntua.gr	finished	Out	-	-	
	LM_S.4	SEE-GRID	grid1.irb.hr	finished	Out	-	-	
	LM_S.5	SEE-GRID	testbed001.grid.ici.ro	finished	Out	-	-	
	LM_S.6	HUNGRID	chemgrid3.chemres.hu	finished	Out	-	-	
	TIFF	HUNGRID	grid109.kfki.hu	init	-	-	-	

Message: Job list refreshed.

White/Red/Green color means the job is initial/running/finished state



Workflow Execution

(observation by the workflow portlet)

PGrade Portal - Microsoft Internet Explorer

http://hgportal.hpcc.sztaki.hu:7080/gridsphere/gridsphere?action=doGotoPage&cid=2

Workflow Certificates Settings Information System Help

Workflow Manager

Refresh Back

Workflow	Job	Gridname	Hostname	Status	Job list		
					[Logs]	[Output]	[Visualization]
LM_9_DEMO_TOTAL				finished	Err	Being zipped..	Visualize All S
	INIT	SEE-GRID	ce01.grid.acad.bg	finished	-	-	-
	LM_P	SEE-GRID	n40.hpcc.sztaki.hu	finished	Out	-	Visualize
	LM_P.2	SEE-GRID	n40.hpcc.sztaki.hu	finished	Out	-	Visualize
	LM_S	SEE-GRID	grid-ce.ii.edu.mk	finished	Out	-	-
	LM_S.2	SEE-GRID	grid1.irb.hr	finished	Out	-	-
	LM_S.3	SEE-GRID	grid1.netmode.ece.ntua.gr	finished	Out	-	-
	LM_S.4	SEE-GRID	grid1.irb.hr	finished	Out	-	-
	LM_S.5	SEE-GRID	testbed001.grid.ici.ro	finished	Out	-	-
	LM_S.6	HUNGRID	chemgrid3.chemres.hu	finished	Out	-	-
	TIFF	HUNGRID	grid109.kfki.hu	finished	Out	-	-

Message: Job list refreshed.

White/Red/Green color means the job is initialised/running/finished



The typical user scenario

Execution phase – step 3:

Certificate servers



VISUALIZE
JOBS and
WORKFLOW
PROGRESS

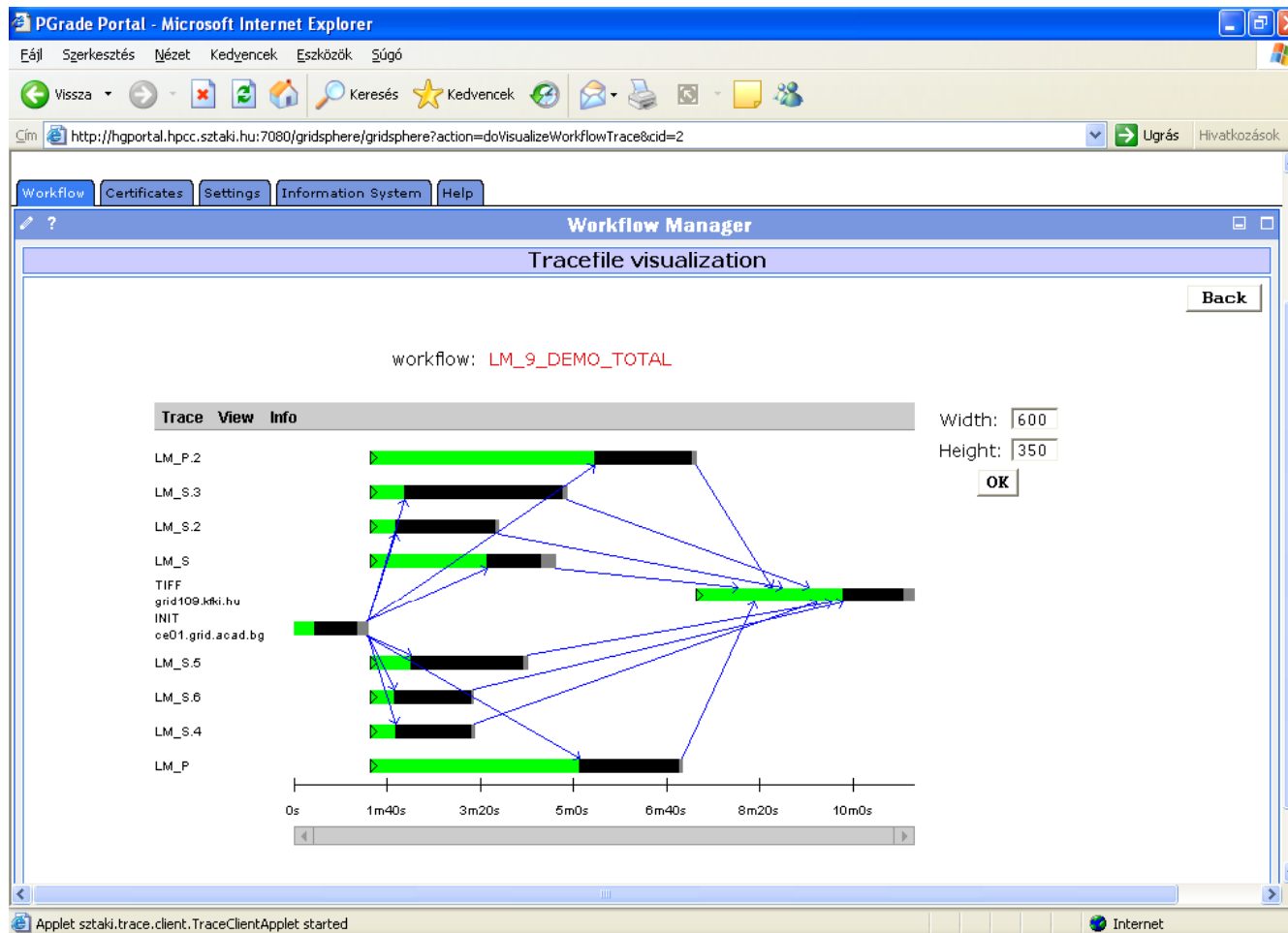
Portal
server

MONITOR
JOBS

Grid
services



On-Line Monitoring both at the workflow and job levels *(workflow portlet)*



- The portal monitors and visualizes workflow progress



Rescuing a failed workflow 1.

The screenshot shows the GridSphere Portal interface in Microsoft Internet Explorer. The main content area displays a 'Job list' table with columns for Workflow, Job, Gridname, Host, Status, and Action. A message at the bottom states 'Message: Workflow details successfully displayed.' and the date 'July 29, 2005' is shown.

Workflow	Job	Gridname	Host	Status	Logs	Output	View	Action
demo-RESCUE				rescue	Err	N/A		Rescue Abort Attach Delete
	Count1	SZTAKI-GRID	n0 .hpcc.sztaki.hu	finished	Out	-	-	-
	Count2	SZTAKI-GRID	n0 .hpcc.sztaki.hu	finished	Out	-	-	-
	Count3	HUNGRID	chemgrid3 .chemres.hu	error	- Err	-	-	-
	Count4	SZTAKI-GRID	n0 .hpcc.sztaki.hu	submitted	--	-	-	-

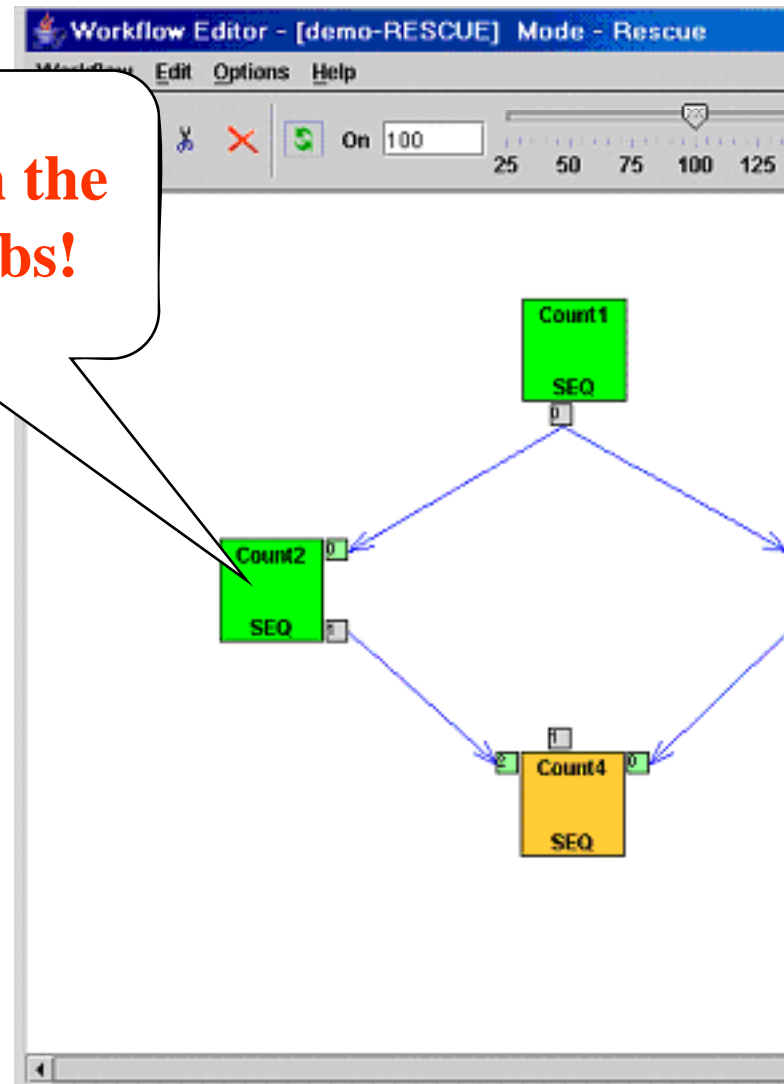
A job failed during workflow execution

Read the error log to know why



Rescuing a failed workflow 2.

Don't touch the finished jobs!

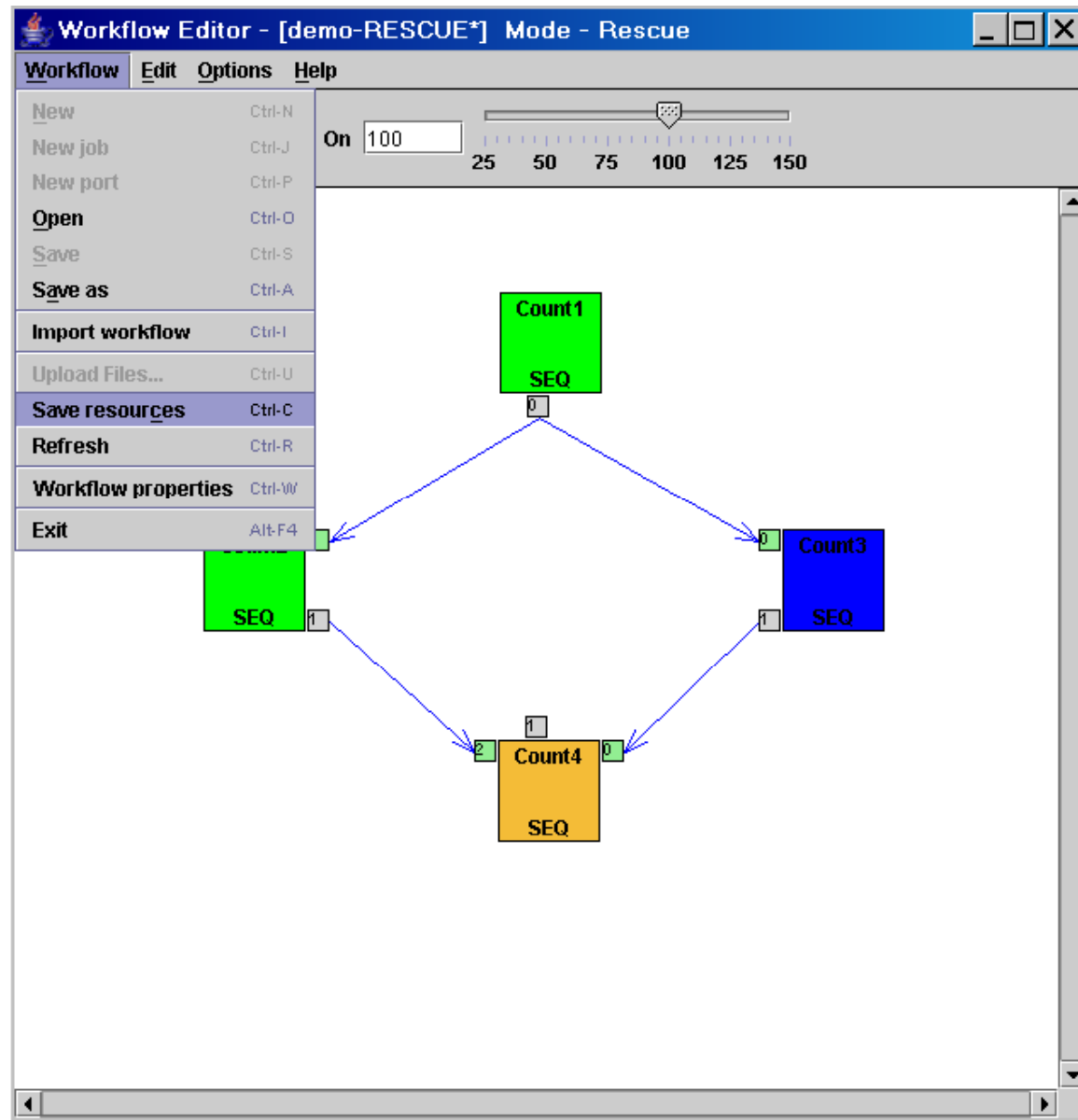


Map the failed job onto a different CE or download a new proxy for it.

The execution can continue from the point of failure!



Rescuing a failed workflow 3.





Rescuing a failed workflow 4.

The screenshot shows the P-Grade Workflow Manager interface in a Microsoft Internet Explorer browser window. The browser title is "GridSphere Portal - Microsoft Internet Explorer". The address bar shows the URL: http://hgportal.hpcc.sztaki.hu:9080/gridsphere/gridsphere?cid=63&gs_mode=view&gs_state=normal&gs_action=doShowWorkflowD. The page header includes the P-Grade logo, the text "P-GRADE", and "RELEASE 2.2". Below the header is a navigation menu with tabs: "Welcome", "Workflow", "Certificates", "Settings", "Information System", and "Help". The main content area is titled "Workflow Manager" and contains a "Job list" table. The table has columns for "Workflow", "Job", "Gridname", "Hostname", "Status", "[Logs]", "[Output]", "[Visualization]", and "[Action]". The "demo-RESCUE" workflow is selected, and its "Rescue" button is highlighted with a red circle. A speech bubble points to this button with the text "Resume workflow by the Rescue button".

Workflow	Job	Gridname	Hostname	Status	[Logs]	[Output]	[Visualization]	[Action]
demo-RESCUE				rescue	Err	N/A	Visualize All	Rescue Abort Attach Delete
	Count1	SZTAKI-GRID	n0 .hpcc.sztaki.hu	finished	Out	-	-	
	Count2	SZTAKI-GRID	n0 .hpcc.sztaki.hu	finished	Out	-	-	
	Count3	HUNGRID	chemgrid3 .chemres.hu	error	- Err	-	-	
	Count4	SZTAKI-GRID	n0 .hpcc.sztaki.hu	submitted	--	-	-	

Message: Workflow details successfully displayed.

July 29, 2005




Logs provided for each job

PGrade Grid portal - Microsoft Internet Explorer

Address: https://n42.hpcc.sztaki.hu:8443/gridsphere/gridsphere?cid=77&gs_action=doShowWorkflowDetails

RELEASE 2.6

 **P-GRADE** portal

Logout
Welcome, Peter Kacsuk

Welcome Workflow Certificates Settings Information System File Management Help

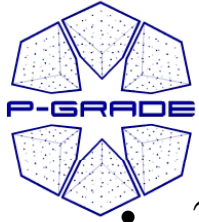
Workflow Manager Storage Upload

Workflow Manager

Refresh Back

Workflow	Job	Gridname	Hostname	Status	[Logs]	[Output]	[Visualization]	[Action]
Ax_EQUAL_B_gLite_broker_multi_VO				finished	-	✓	Visualize All	Submit Attach
	A_mul_X_BROKER	hungrid_LCG_2	eszakigrid66.inf.elte.hu	finished	Out - Log	✓		-
	Copy_A	seegrid_GLITE_BROKER	ce02.grid.acad.bg	finished	Out - Log	✓		-
	Copy_B	hungrid_LCG_2	eszakigrid66.inf.elte.hu	finished	Out - Log	✓		-
	Invert_A	gilda_LCG_2_BROKER	ce-nano-37.to.infn.it	finished	Out - Log	✓		-
	Multip_B	seegrid_GLITE_BROKER	ce001.grid.uni-sofia.bg	finished	Out - Log	✓		-
	Subtr-B	gilda_LCG_2_BROKER	ce-nano-37.to.infn.it	finished	Out - Log	✓		-

Done Internet



Analysis of the log

- 2008.01.09 09:32:19 - Proxy with VOMS extensions created for VO "voce" with accounting group "".
- 2008.01.09 09:32:19 - Job submission in progress...
- 2008.01.09 09:32:23 - Job has been submitted successfully!
- 2008.01.09 09:32:23 - Job identifier is:
- "https://skurut1.cesnet.cz:9000/mD_8VzPhm8AmIToTJKtigg"
- 2008.01.09 09:32:26 - EGEE job's status has changed to **"Waiting"** (host is).
- 2008.01.09 09:33:00 - EGEE job's status has changed to **"Ready"** (host is ce1-egee.srce.hr).
- 2008.01.09 09:35:46 - EGEE job's status has changed to **"Waiting"** (host is egee-ce.grid.niif.hu).
- 2008.01.09 09:36:19 - EGEE job's status has changed to **"Ready"** (host is ce.cyf-kr.edu.pl).
- 2008.01.09 09:36:53 - EGEE job's status has changed to **"Waiting"** (host is ce.cyf-kr.edu.pl).
- 2008.01.09 09:37:26 - EGEE job's status has changed to **"Done"** (host is egee-ce.grid.niif.hu).
- 2008.01.09 09:37:26 - Job found to be finished. **Checking again if this is really the case.**
- 2008.01.09 09:38:03 - EGEE job's status has changed to **"Ready"** (host is egee-ce1.gup.uni-linz.ac.at).



Fault-tolerance by P-GRADE portal

- 09:33: the broker assigned the job to a site: ce1-egee.srce.hr
- 09:35: The broker moved the job to another site: egee-ce.grid.niif.hu
- 09:36: Again the broker moved the job to another site: ce.cyf-kr.edu.pl
- 09:37: The broker indicated that the job is **Done**, but .
- 09:38: ... It turned out that the job was not finished (**Done - Failed** status), only
- it was moved to another site: egee-ce1.gup.uni-linz.ac.at
- 09:39: Again the broker moved the job to another site: ares02.cyf-kr.edu.pl
- 09:39: Again the broker moved the job to another site: ce.cyf-kr.edu.pl
- 09:40: **After trying 10 different sites the VOCE broker gave it up and aborted the job** (the Shallow RetryCount was set for 10):
- 2008.01.09 09:40:16 - **The job has been aborted!**



Fault-tolerance by P-GRADE portal

- **Our fault-tolerant portal did not give it up:**
- 2008.01.09 09:40:16 - The job can be submitted again (try 1 out of 3,
- **excluding host(s): ce.cyf-kr.edu.pl)**
- 2008.01.09 09:40:17 - Proxy with VOMS extensions created for VO "voce" with
- accounting group "".
- 2008.01.09 09:40:17 - Job submission in progress...
- 2008.01.09 09:40:27 - Job has been submitted successfully!
- 2008.01.09 09:40:27 - Job identifier is:
- "https://skurut1.cesnet.cz:9000/o22BTVqQsvwzj2wn5KP8_A"
- 2008.01.09 09:40:30 - EGEE job's status has changed to "**Waiting**" (host is).
- 2008.01.09 09:41:04 - EGEE job's status has changed to "Ready" (host is
- **eszakigrid66.inf.elte.hu).**



Fault-tolerance by P-GRADE portal

- 2008.01.09 09:41:37 - EGEE job's status has changed to "**Scheduled**" (host is eszakigrid66.inf.elte.hu).
- 2008.01.09 09:44:57 - EGEE job's status has changed to "**Done**" (host is eszakigrid66.inf.elte.hu).
- 2008.01.09 09:44:57 - Job found to be finished. Checking again if this is really the case.
- 2008.01.09 09:45:34 - EGEE job's status has changed to "Waiting" (host is eszakigrid66.inf.elte.hu).
- 2008.01.09 10:06:06 - **The job's status hasn't changed for 20 minutes, resubmitting...**
- It is a quite frequently occurring problem in EGEE-like grids that the broker leaves jobs stuck in CEs. queues.) In such case the portal automatically kills the job on this site and resubmits it to the broker.
- 2008.01.09 10:06:06 - Proxy with VOMS extensions created for VO "voce" with accounting group "".
- 2008.01.09 10:06:06 - Job submission in progress...
- 2008.01.09 10:06:12 - Job has been submitted successfully!
- 10:10: **The job successfully finished** with exit code 0 on site: ce.ui.savba.sk



The typical user scenario

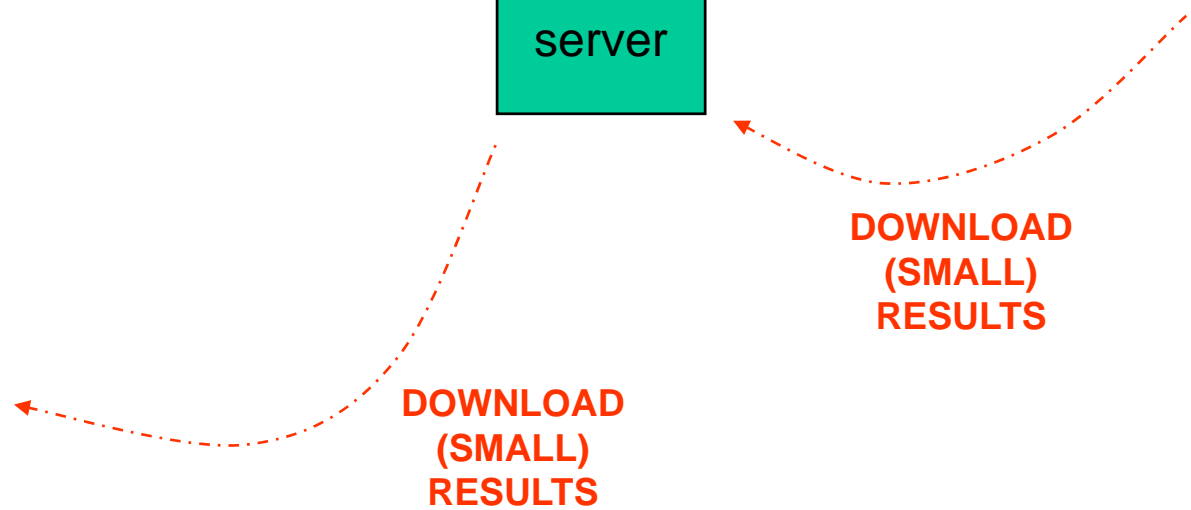
Execution phase – step 5

Certificate servers



Portal server

Grid services





Downloading the results...

Workflow Manager

Refresh Back

Workflow	Job	Hostname	Status	[Logs]	[Output]	[Visualization]	[Action]
nowcast-final-g_SGE			finished		<input checked="" type="checkbox"/>	Visualize All	Subm Attach Delete
	cummu	n0.hpcc.sztaki.hu	finished	--		Visualize	
	delta	n0.hpcc.sztaki.hu	finished	--		Visualize	
	ready	n0.hpcc.sztaki.hu	finished	--		Visualize	
	satel	n0.hpcc.sztaki.hu	finished	--		Visualize	
	visib	n0.hpcc.sztaki.hu	finished	--		Visualize	

Message: Job list refreshed.

Opening nowcast_final_g.zip

The file "nowcast_final_g.zip" is of type application/x-zip-compressed, and Mozilla does not know how to handle this file type. This file is located at:
e:\pri\mc04

What should Mozilla do with this file?

- Open it with the default application
- Open it with Choose...
- Save it to disk
- Always perform this action when handling files of this type

OK Cancel



File management portlet

PGrade Grid portal - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <https://n42.hpcc.sztaki.hu:8443/gridsphere/gridsphere?cid=127>

Welcome Workflow Certificates Settings Information System **File Management** Help

file

File Management

Select Grid:
Select VO:
Select LFC Host:
or Enter

File Browser

- + Balasko
 - POSIX-TEST-10485-24626
 - POSIX-TEST-11134-23067
 - POSIX-TEST-12464-3948
 - POSIX-TEST-16138-5559
 - POSIX-TEST-17957-20543
 - POSIX-TEST-20716-13234
 - POSIX-TEST-24498-25005
 - POSIX-TEST-24776-20792
 - POSIX-TEST-27728-19524
 - POSIX-TEST-29926-26667
 - POSIX-TEST-3182-23422
 - POSIX-TEST-6451-13508
 - POSIX-TEST-7730-27146
- + SAM
 - SE-lcg-cr-cluster1.csk.kg.ac.yu-temp-1177332816

Go Up
Change Directory
Remove
Details
Replicas
Make Directory
Rename

Current Path: /grid/seegrid

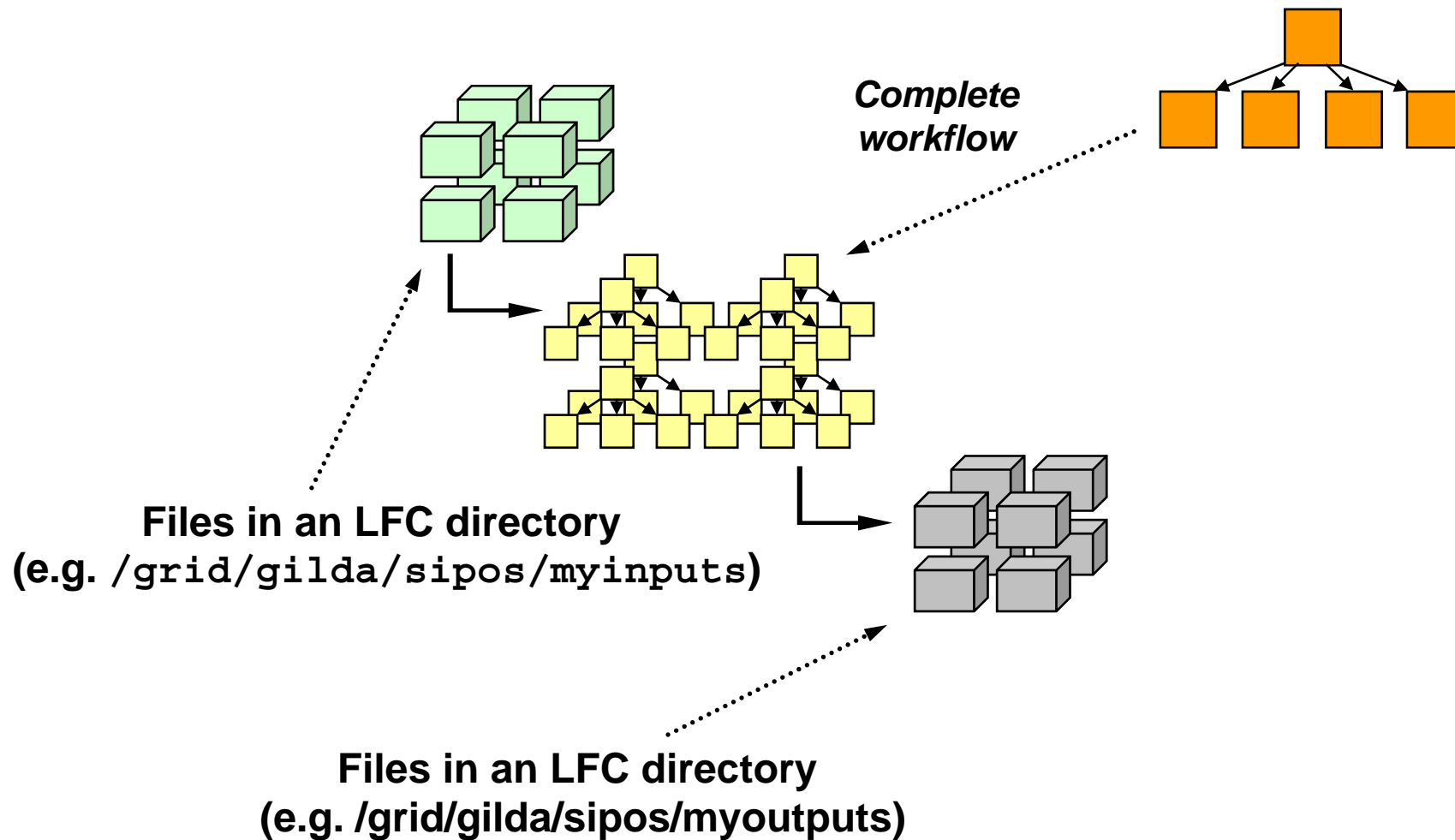
Download Upload

Message: LFC name server directory/file entries listed

<http://www.lpds.sztaki.hu/pgportal/>

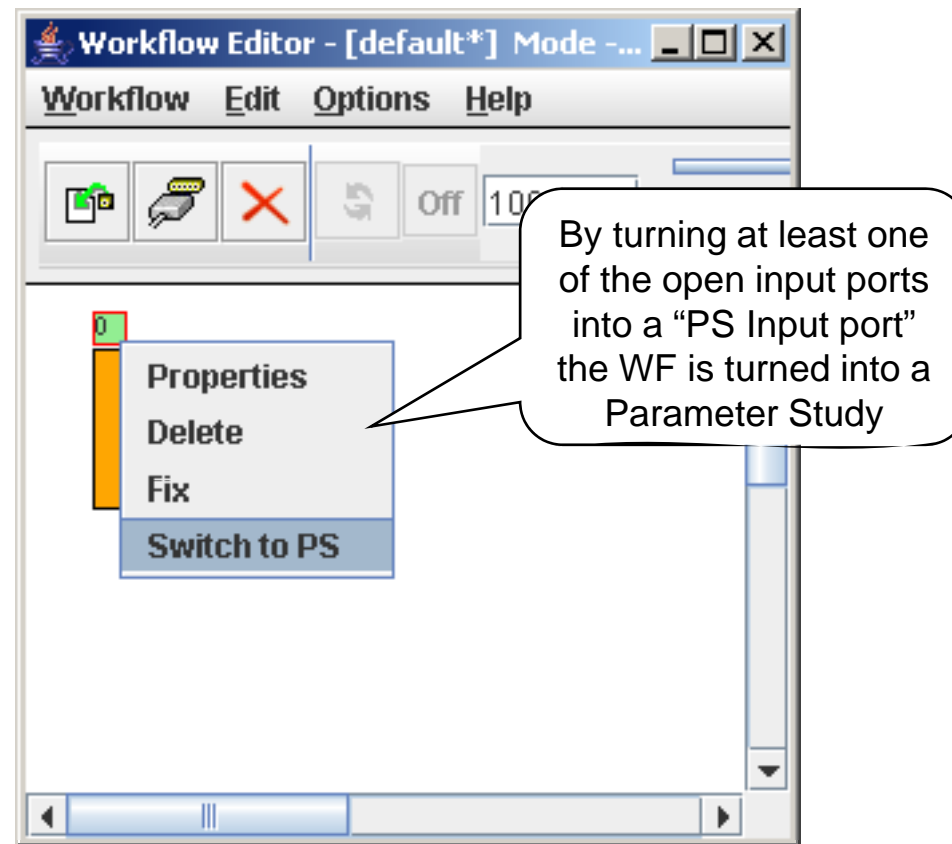


Scaling up a workflow to a parameter study with P-GRADE



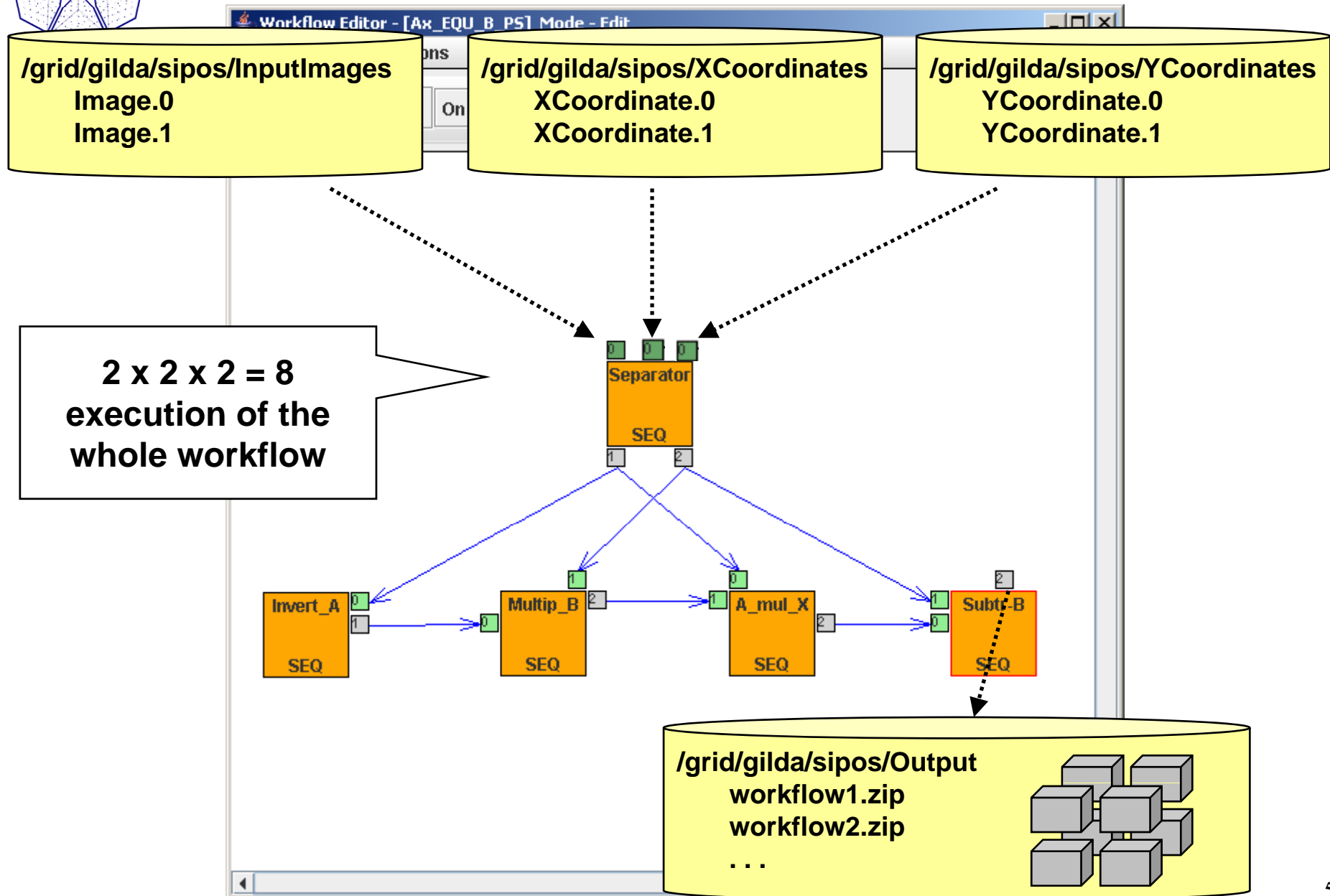


Turning a WF into a parameter study





Input-output files are stored in SEs





PS Input Port of Simple PS

The screenshot shows the Workflow Editor interface with a 'Separator / 0 PS properties' dialog box open. The dialog box contains the following fields and options:

- PS Port name: []
- Type: In Out
- Directory type: Local Remote
- Directory: nann/PS/EQU_AGEN_11_10/A_GEN12
- File Browser: [] managed copy
- Internal File Name: INPUT
- File storage type: Permanent Volatile

Annotations in the image include:

- A green callout bubble pointing to the 'Directory' field with the text: "Remote file **Directory** instead of **FILE** reference".
- A green callout bubble pointing to the 'Directory' field with the text: "Do not use the prefix **lfn:** if the directory is EGEE Grid file catalogue".



Simple PS Activity 2: placement of result

The screenshot shows the PGrade Grid portal interface. The main window is the 'Workflow Editor' for a workflow named 'MultiplyPS_GILDA_LCG2_gabor'. A 'PS Properties' dialog box is open, showing configuration for a PS (Process Set). The dialog includes fields for 'Output Directory' (set to '/grid/gilda/debrecen00/MatrixPS/results'), 'Grid' (set to 'gilda_LCG_2_BROKER'), 'LCG Catalog Type' (radio buttons for 'lfc' and 'edg', with 'lfc' selected), 'LFC Host' (set to 'lfc-gilda.ct.infn.it'), and 'SE' (set to 'aliserv6.ct.infn.it'). Below the dialog, a table lists several Virtual Objects (VOs) with their status, size, and percentage of completion.

Status	Size	Percentage	Other Info
finished	73 KB	0.07%	Not defined.
	1.039 MB	1.04%	

Menu item **PS Properties** can be called within the **Workflow** menu

The **Output directory** will contain the set of individual compressed files. Each compressed file contains the outputs of an element Workflow have been elaborated over an item of the PS Input Set

Properties of the VO File Catalog

One SE of the chosen VO



Executing PS workflows

The screenshot shows a web browser window titled "PGrade Grid portal - Windows Internet Explorer". The address bar contains the URL: `http://n43.hpcc.sztaki.hu:8080/gridsphere/gridsphere?cid=77&gs_action=doRefreshList`. The browser interface includes a search bar with "Google" and various toolbars. The main content area displays a table of workflow jobs with the following data:

Job Name	Status	Size	Progress	Completion	Actions
Ax_EQUAL_B_PS_G_C_sztaki_fork	finished	253 KB	0.25%	✓	PS Details, Submit, Attach, Delete
Ax_EQU_B	init	112 KB	0.11%	N/A	Details, Submit, Attach, Delete
Ax_EQU_B_voice_PS	init	151 KB	0.15%	N/A	PS Details, Submit, Attach, Delete

The "PS Details" button for the "Ax_EQU_B_voice_PS" job is circled in red. A callout box points to this button with the text: "PS Details for parameter sweep workflows applications".

PS Details for parameter sweep workflows applications

Workflow Manager List PS Details view showing eWF-s



New, middle level list to render the details of a PS Workflow

Statistics shows the progress of the elaboration of the whole PS

The eWorkflow buffer list shows the state of the Workflows being processed.

PGrade Grid portal - Windows Internet Explorer

http://n44.hpcc.sztaki.hu:8080/gridsphere/gridsphere?cid=72&gs_action=doShowWorkflowDetails

RELEASE 2.4

P-GRADE portal

MTA SZTAKI

Logout
Welcome, Peter Kacsuk

Welcome Workflow States Settings Information System Help

Workflow Manager Storage Upload

Workflow Manager

Refresh Back

PS workflow details

PS Workflow	Status	[Output]	[Logs]	[Action]
Ax_EQU_B_voce_PS	submitted	N/A	-	Abort Attach Delete

eWorkflow list

Statistics

Total	Init	Submitted	Rescue	Error	Finished
12	2	5	0	0	5

Workflow	Status	[Output]	[View]	[Action]
Ax_EQU_B_voce_PS.10	submitted	N/A	Details	Suspend Abort
Ax_EQU_B_voce_PS.6	running	N/A	Details	Suspend Abort
Ax_EQU_B_voce_PS.7	running	N/A	Details	Suspend Abort
Ax_EQU_B_voce_PS.8	running	N/A	Details	Suspend Abort
Ax_EQU_B_voce_PS.9	submitted	N/A	Details	Suspend Abort

Message: eWorkflow list successfully shown.

Internet 100%



Details view of the eWF Ax_EQU_B_voce_PS.6

Job level details of an eWorkflow

Workflow Manager

Refresh Back

Workflow	Job	Gridname	Hostname	Status	[Logs]	[Output]	[Visualization]	[Action]
Ax_EQU_B_voce_PS.6				running	-	N/A	Visualize	Suspend Abort
	A_mul_X	voce_LCG_2_BROKER	ares02.cyf-kr.edu.pl	running	--		-	
	Invert_A	voce_LCG_2_BROKER	skurut17.cesnet.cz	finished	Out		-	
	Multip_B	voce_LCG_2_BROKER	fangorn.man.poznan.pl	finished	Out		-	
	Separator	voce_LCG_2_BROKER	egee-ce1.gup.uni-linz.ac.at	finished	Out		-	
	Subtr-B	voce_LCG_2_BROKER	unknown	init			-	

Message: Workflow details successfully displayed.

ber 13, 2006

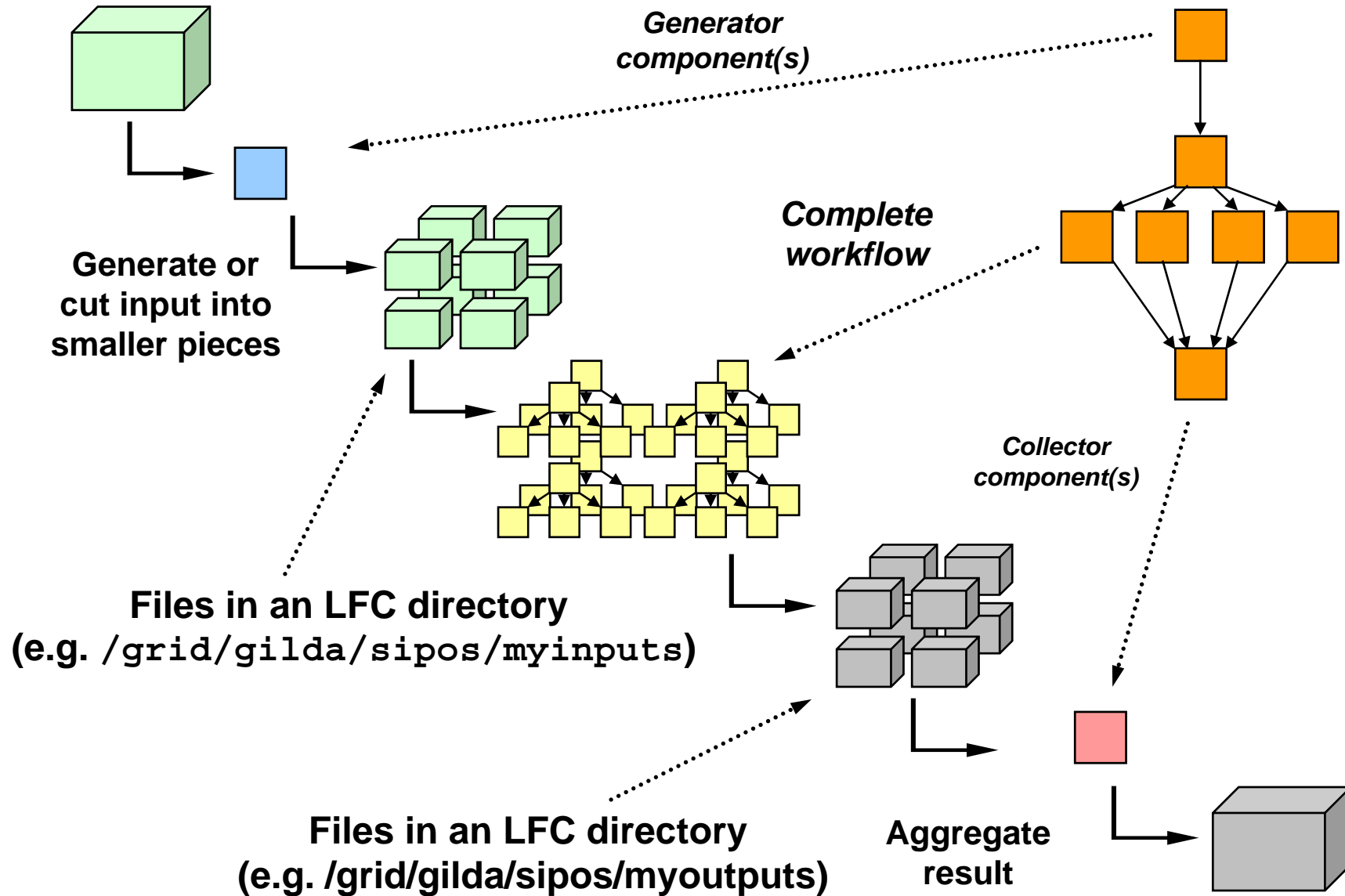
See, that the button **Attach** is missing as there is not to much importance to access the WE until the eWorkflow list is exhausted



Advanced PS WFs in P-GRADE Portal

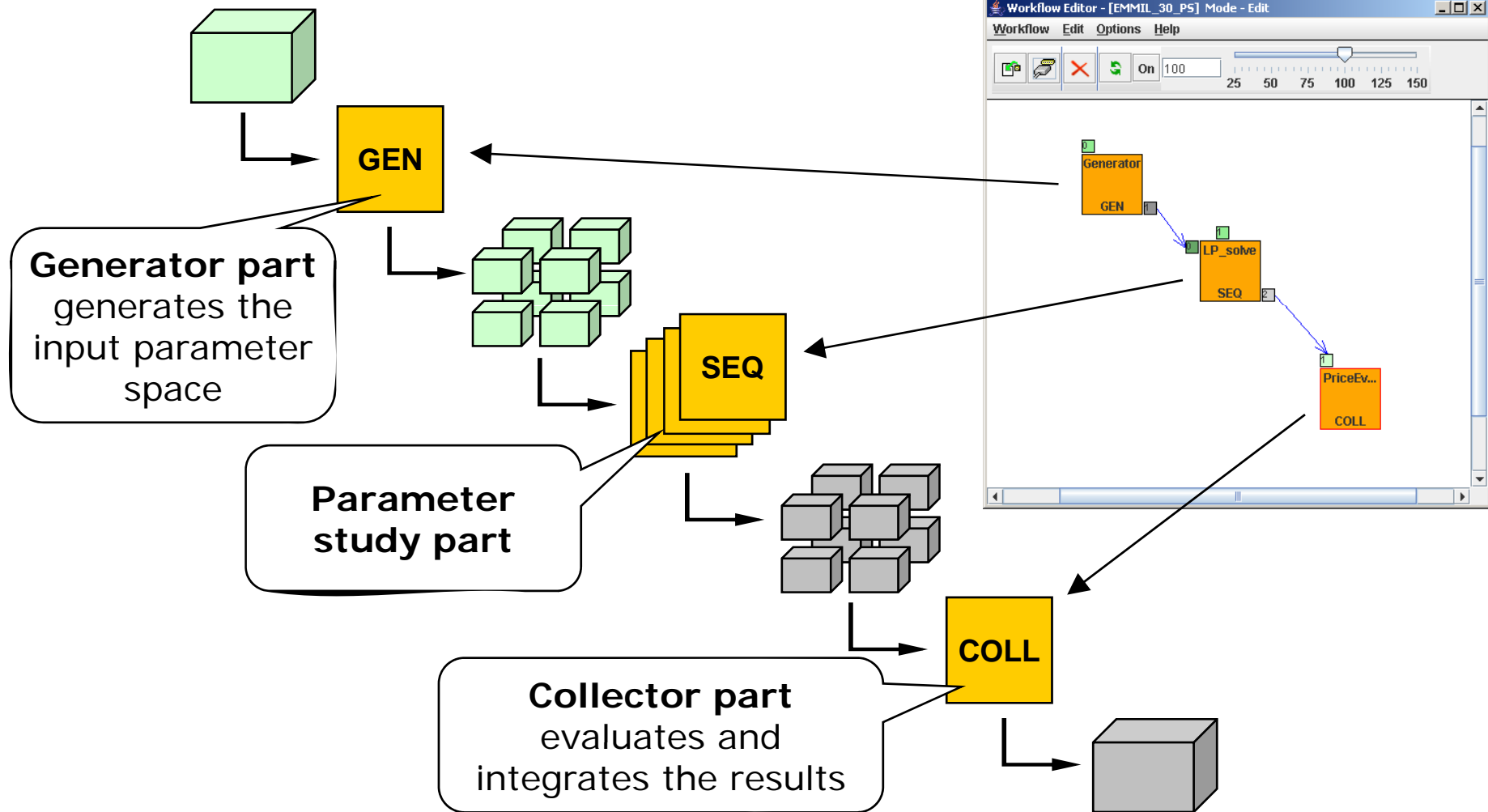


Advanced parameter studies



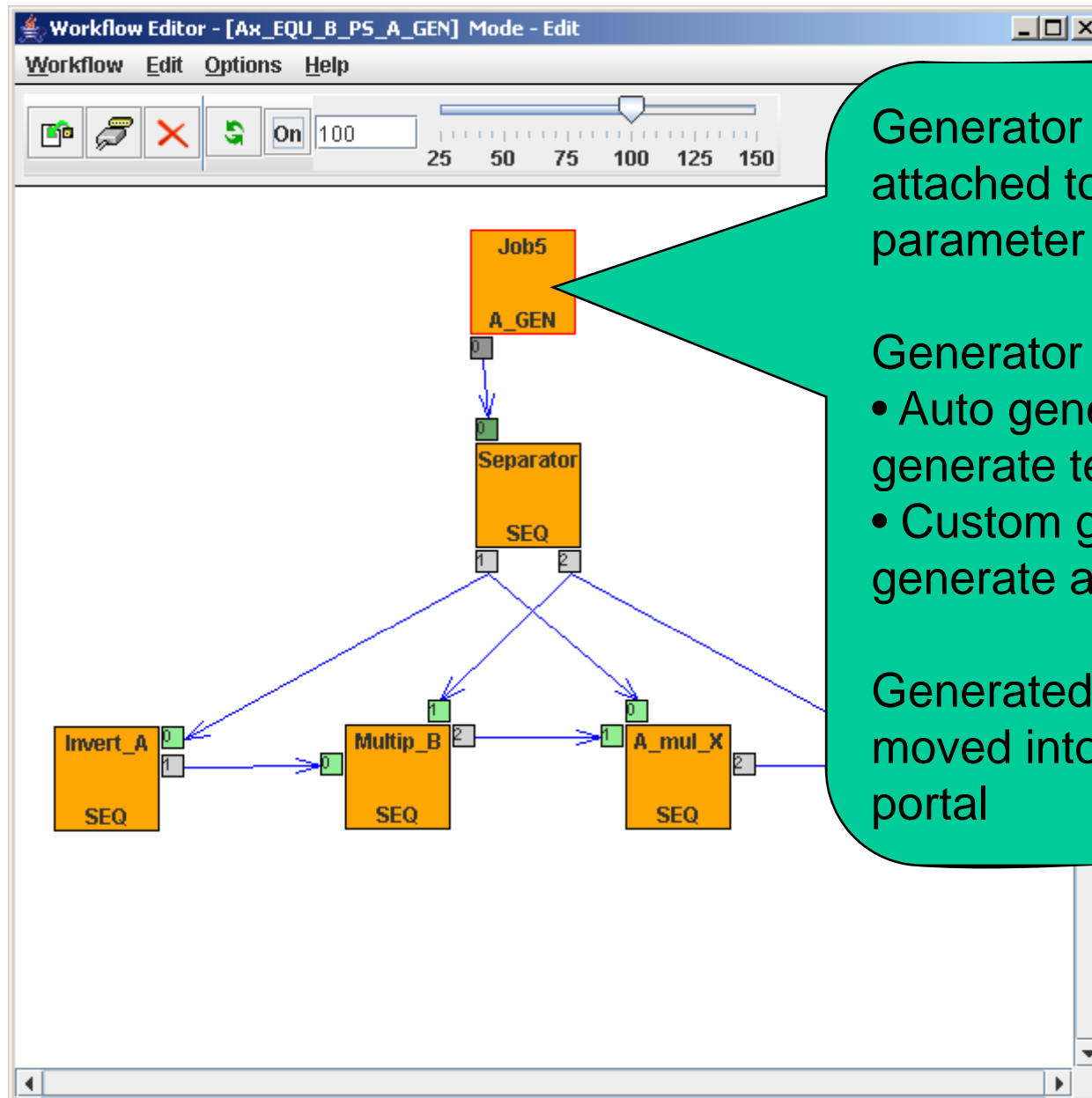


Concept of advanced parameter study workflows





Parameter generator



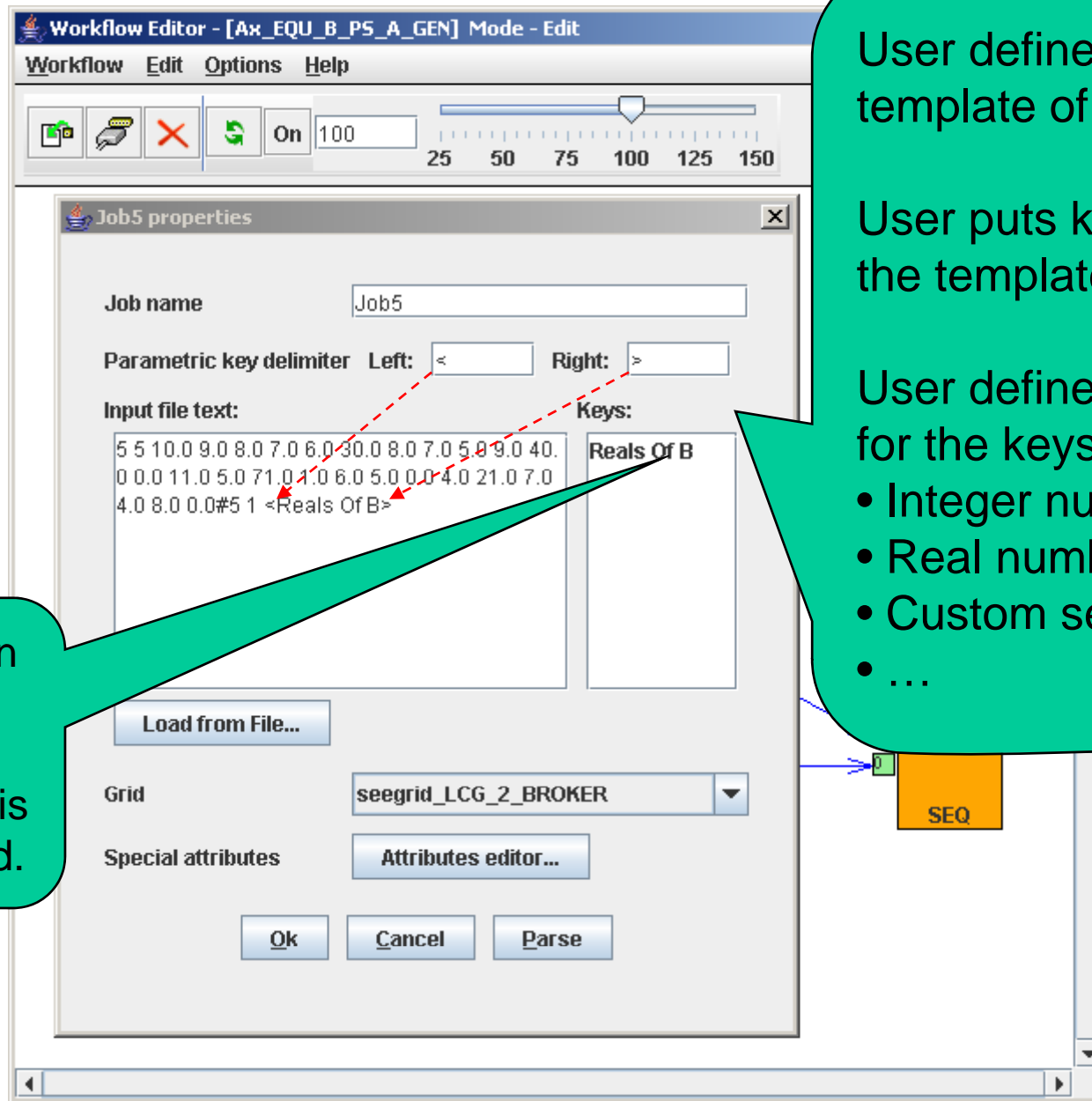
Generator can be attached to any parameter input port

- Generator can be
- Auto generator: to generate text files
 - Custom generator: to generate any content

Generated files are moved into SE by the portal



Definition Window of Auto Generator Job



User defines the template of the text file

User puts keys into the template

User defines values for the keys

- Integer number
- Real number
- Custom set
- ...

By clicking on a key the definition window for this key is opened.



(Auto) Generator Attribute Editor for SE definition

Attribute Editor defines the properties of remote files created by the Generator:

1. Storage Element must be defined if an LCG like (EGEE) file access has been defined in the PS Output Port belonging to the Generator

Workflow Editor - [Job5] Attributes Editor - [Job5]

Output Data Environment

Output Data

Output file	Storage Element	Logical Filename
OUTPUT		/grid/seegrid/hermann/P...

Output Storage Element:

Output SE: se.phy.bg.ac.yu

OK Cancel

Attributes editor...

Ok Cancel Parse



Detailed view of a PS workflow

The screenshot shows the P-Grade Grid portal interface. The main content area is titled "Workflow Manager" and displays the following sections:

- PS workflow details:** A table showing the workflow "Ax_EQU_B_PS_A_GEN_Collector" with a status of "submitted".
- Jobs in generator phase:** A table showing a job named "Job5" with a status of "finished".
- eWorkflow list Statistics:** A summary table showing 2 total workflows, 0 in the initial state, 2 submitted, 0 rescued, 0 errors, and 0 finished.
- Workflow instances:** A table listing two instances of the workflow, both with a status of "submitted".
- Jobs in collector phase:** A table showing a job named "Collector" with a status of "init".

A message at the bottom states: "Message: eWorkflow list successfully shown." The date "November 13, 2006" is displayed at the bottom of the page.

Generator job(s)

Overall statistics of workflow instances

Workflow instances

Collector job(s)



Additional features

- **Workflows and traces** can be exported from the portal server onto your client machine
- **Workflows and traces** can be imported into the Portal



- **Share your workflows or results with other researchers!**
- **Migrate your application from one portal into another!**



Workflow/trace export/import

To export a workflow from the portal onto your machine

To delete every unnecessary files of the workflow

To delete trace/output of the workflow (if any)

Workflow	Size	Action
WF1	27 276 Byte	Download set init
WF12	77 964 Byte	Download set init
WF12Sz	95 528 Byte	Download set init Delete

P-GRADE on SourceForge.net

SourceForge.net: Project Statistics for P-GRADE Grid Portal - Microsoft Internet Explorer

File Edit View Favorites Tools Help

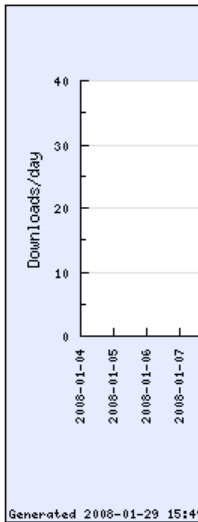
Address https://sourceforge.net/project/stats/detail.php?group_id=213502&ugn=pgportal&type=prdownload&mode=60day&package_id=0

P-GRADE Grid Portal

Project Tracker Mailing Lists Code Services Download Documentation

Project Web Site Stats RSS

[Overview](#) | [Downloads](#) | [Project Web Traffic](#) | [Tracker Activity](#) | [Forum Traffic](#) | [SourceForge Traffic](#) | [CVS Activity](#)



SourceForge.net: Project Statistics for P-GRADE Grid Portal - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address https://sourceforge.net/project/stats/detail.php?group_id=213502&ugn=pgportal&type=prdownload&mode=60day&package_id=0

Download History Statistics

Date (UTC)	Downloads	Bytes Served
29 Jan 2008	3	214.6 MB
28 Jan 2008	3	214.6 MB
27 Jan 2008	3	214.6 MB
26 Jan 2008	0	0 bytes
25 Jan 2008	0	0 bytes
24 Jan 2008	10	841.1 MB
23 Jan 2008	6	267.4 MB
22 Jan 2008	6	623.1 MB
21 Jan 2008	0	0 bytes
20 Jan 2008	4	228.6 MB
19 Jan 2008	0	0 bytes
18 Jan 2008	3	214.6 MB
17 Jan 2008	1	14.0 MB
16 Jan 2008	0	0 bytes
15 Jan 2008	0	0 bytes
14 Jan 2008	39	3.3 GB
13 Jan 2008	22	2.0 GB
12 Jan 2008	3	214.6 MB
11 Jan 2008	0	0 bytes
10 Jan 2008	0	0 bytes
09 Jan 2008	0	0 bytes
08 Jan 2008	0	0 bytes
07 Jan 2008	0	0 bytes
06 Jan 2008	0	0 bytes
05 Jan 2008	0	0 bytes
04 Jan 2008	0	0 bytes
Total	103	8.4 GB

Partial data: End of dav not vet reached

Figures authoritative as of:



Hands-on



References

- **P-GRADE Portal service is available for**
 - **SEE-GRID infrastructure**
 - **Central European VO of EGEE**
 - **GILDA: Training VO of EGEE**
 - **Many national Grids (UK National Grid Service, HunGrid, etc.)**
 - **US Open Science Grid, TeraGrid**
 - **Economy-Grid, Swiss BioGrid, Bio and Biomed EGEE VOs, BioInfoGrid, BalticGrid**
 - **GIN VO**



- >> Portal installations
- Service portal installations
- Portals under installation
- Client requirement
- Install the portal
- Testing the portal
- How to get access
- Documents
- Publications
- Workflow repository
- Developer Alliance
- User Forum

visitors >> 34955

Name of the portal installation	Connected to the following grid(s)	Release
Multi-Grid portal operated by SZTAKI	SEE-GRID South-Eastern European Grid VOCE Virtual Organization Central Europe of EGEE HunGrid Hungarian Grid VO of EGEE GILDA Training VO of EGEE and other projects	2.6
HunGrid Portal operated by Eötvös Loránd University	HunGrid Hungarian Grid VO of EGEE	2.5
GILDA Portal operated by SZTAKI	GILDA Training VO of EGEE and other projects	2.5
EGRID Portal operated by Abdus Salam ICTP	EGRID Economics VO	2.4
SEE-GRID Portal operated by SZTAKI	SEE-GRID South-Eastern European Grid	2.5
WPI Portal operated by Worcester Polytechnic Institute	OSG and SEE-GRID Open Science Grid and South Eastern European Grid	2.5
Turkish Grid Portal operated by ULAKBIM & METU	TR-Grid Turkish Grid	2.5
NGS P-GRADE GEMLCA Portal operated by University of Westminster	NGS and GILDA UK National Grid Service and Training VO of EGEE and other projects	GEMLCA 2.4.1
GIN resource testing Portal operated by University of Westminster	OGF GIN VO and NGS and OSG and TeraGrid and Westfocus Grid and Voce	GEMLCA 2.4
Baltic Grid Portal operated by Estonian Educational and Research Network (EENet)	Baltic Grid Baltic Grid	2.6



Multi-VO service portal

PGrade Grid portal - Microsoft Internet Explorer

Address: <https://n42.hpcc.szaki.hu:8443/gridsphere/gridsphere?cid=99>

Welcome Workflow Certificates **Settings** Information System File Management Help

Settings

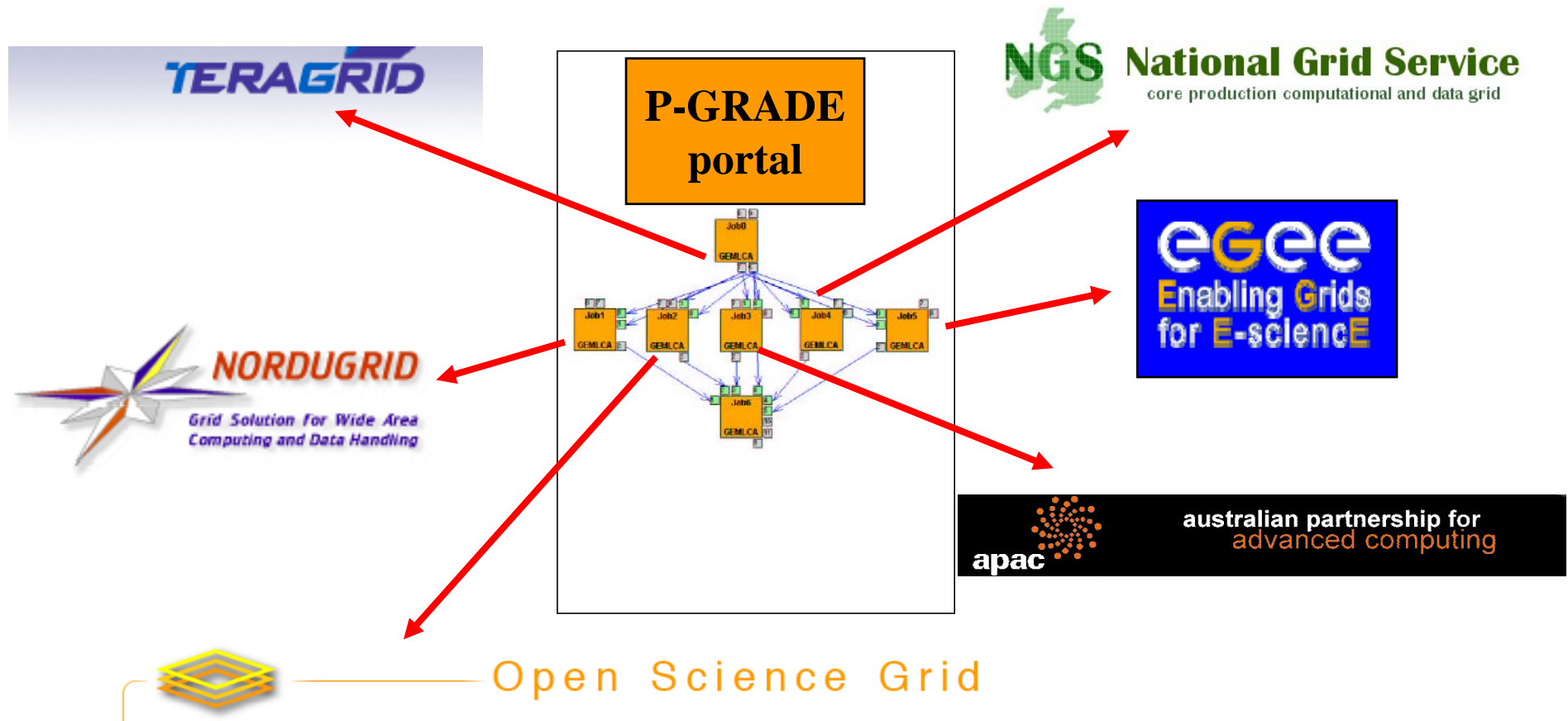
GRID configurations

Name	Information System			BaseDn	[Actions]
	Type	Host	Port		
compchem	LCG2	bdii.phy.bg.ac.yu	2170	Mds-vo-name=local,o=grid	Resources
compchem_GLITE_BROKER			N/A		Resources
compchem_LCG_2_BROKER			N/A		Resources
gilda	LCG2	glite-rb.ct.infn.it	2170	mds-vo-name=local,o=grid	Resources
gilda_GLITE_BROKER			N/A		Resources
gilda_LCG_2_BROKER			N/A		Resources
hungrid	LCG2	grid152.kfki.hu	2170	mds-vo-name=local,o=grid	Resources
hungrid_GLITE_BROKER			N/A		Resources
hungrid_LCG_2_BROKER			N/A		Resources
seegrid	LCG2	bdii.phy.bg.ac.yu	2170	mds-vo-name=local,o=grid	Resources
seegrid_GLITE_BROKER			N/A		Resources
seegrid_LCG_2_BROKER			N/A		Resources
voce	LCG2	bdii.cyf-kr.edu.pl	2170	mds-vo-name=local,o=grid	Resources
voce_GLITE_BROKER			N/A		Resources



The OGF-GIN Resource Testing portal

To test GIN resources and to demonstrate WF level interoperability





Learn once, use everywhere
Develop once, execute anywhere

Thank you!

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