



# P-GRADE Portal and GEMLCA: A workflow-oriented portal and application hosting environment

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[www.portal.p-grade.hu](http://www.portal.p-grade.hu)  
[www.cpc.wmin.ac.uk/gemlca](http://www.cpc.wmin.ac.uk/gemlca)



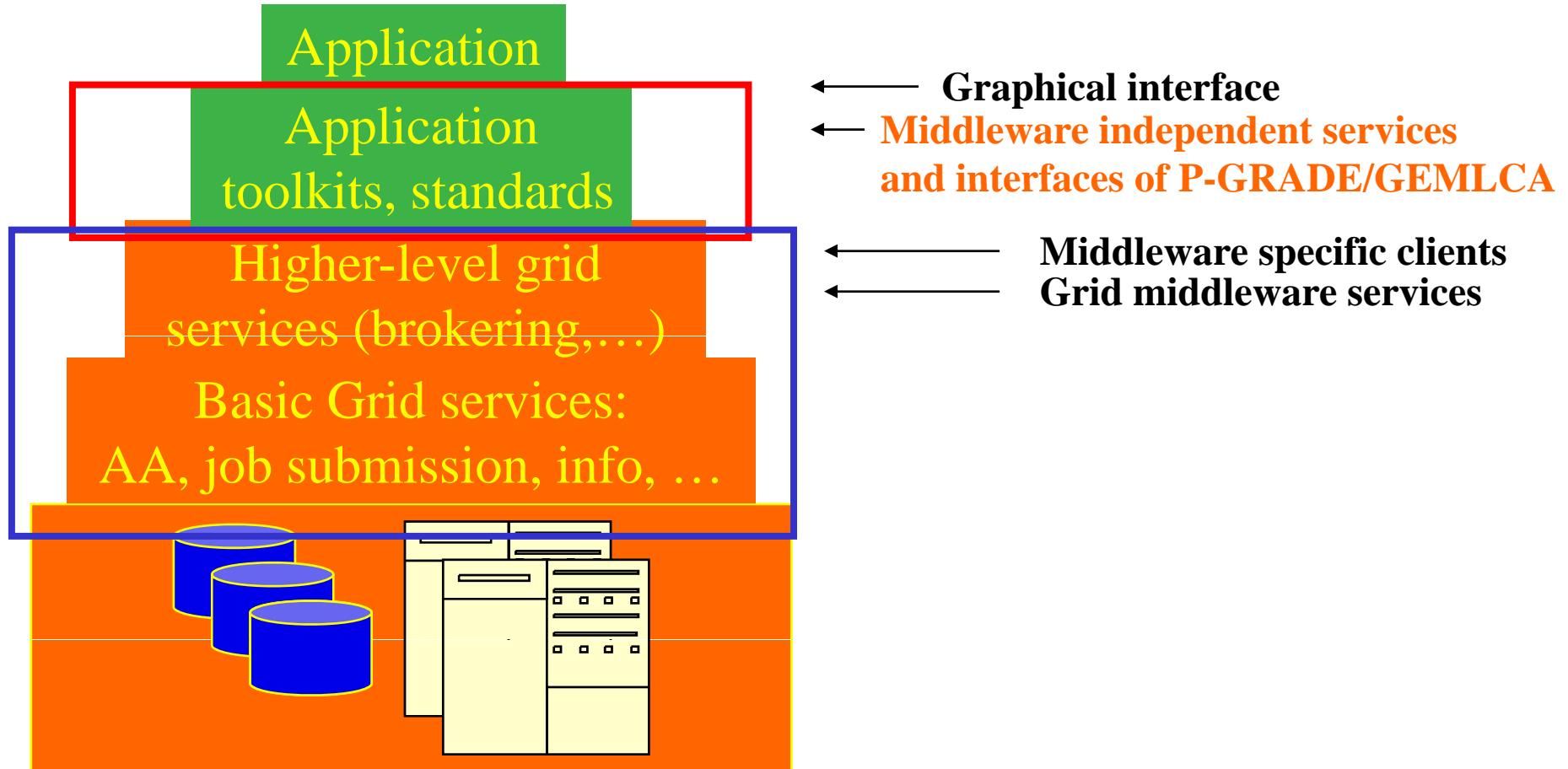
# *Contents*



- Motivation of creating the tools
- P-GRADE Portal and GEMMLCA in a nutshell
- Lifecycle of GEMMLCA / P-GRADE applications
- Services provided for application developers
  
- Introduction of the hands-on
- Hands-on
  
- How to use P-GRADE / GEMMLCA Portal for training and dissemination



# Context





# 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 (file management)
  - Computation services (job submission)
  - Security services (proxy based single sign-on)
  - Brokers (not in every middleware)



## *E-scientists' concerns*



- How to concentrate own **my own research** if the tool I would like to use is in continuous change?
- How can I learn and understand **the usage of the Grid**?
- How can I **develop Grid applications**?
- How can I **execute grid applications**?
- How to **tackle performance issues**?
- How to **use several Grids at the same time**?
- How to **migrate my application** from one grid to another?
- How can I **collaborate with fellow researchers**?

The GEMMLCA / P-GRADE Portal give you the answers!



# P-GRADE Portal in a nutshell



- **General purpose, workflow-oriented computational Grid portal.** Supports the development and execution of workflow based Grid applications – **a Grid orchestration environment**
- Based on **GridSphere** web portal framework
  - Functionalities are accessed through portlets
  - Easy to expand with new portlets (e.g. application-specific portlets)
  - Easy to tailor to end-user or community needs
- Developed by SZTAKI (1.0 in 2003, now 2.5)
- **Grid services** supported by P-GRADE Portal 2.5:

## TODAY'S FOCUS

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

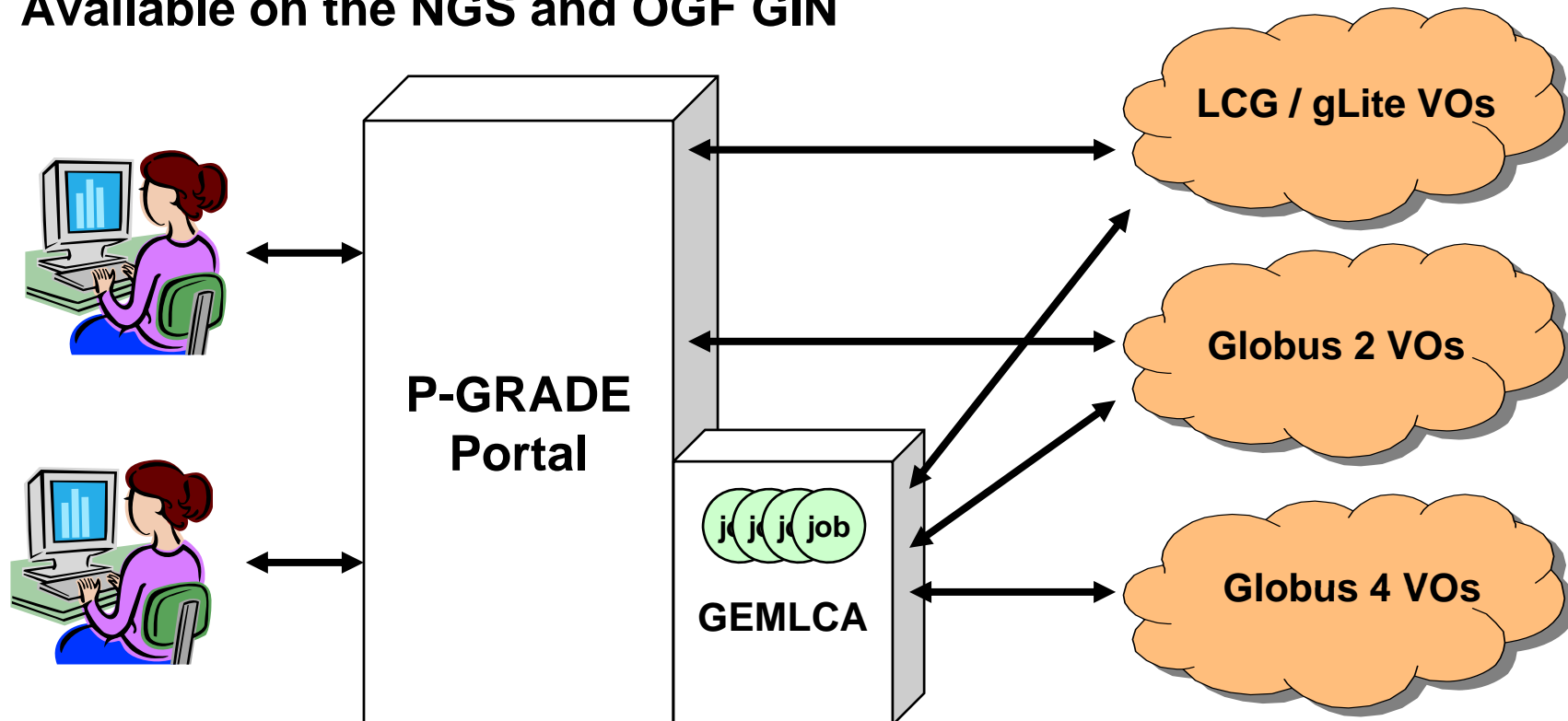
**Solves Grid interoperability problem at the workflow level**



# GEMMLCA extension of the P-Grade Portal



- P-Grade Portal extended with GEMMLCA Grid service back-end
  - To share jobs and legacy codes as application components with others
  - A step towards collaborative e-Science
- Developed by the University of Westminster (London)
- Support for Globus 4 grids (besides GT2 and EGEE)
- Available on the NGS and OGF GIN





## *Related projects*



The development, operation and training of P-Grade Portal and GEMMLCA is supported by the following projects:

- **SEE-GRID** [www.see-grid.eu](http://www.see-grid.eu)  
Development, application support



- **Coregrid** [www.coregrid.net](http://www.coregrid.net)  
Research, development



- **EGEE** [www.eu-egee.org](http://www.eu-egee.org)  
gLite training, application development



- **ICEAGE** [www.iceage-eu.org](http://www.iceage-eu.org)  
Grid training and education







# A Grid application in the GEMLCA / P-Grade Portal

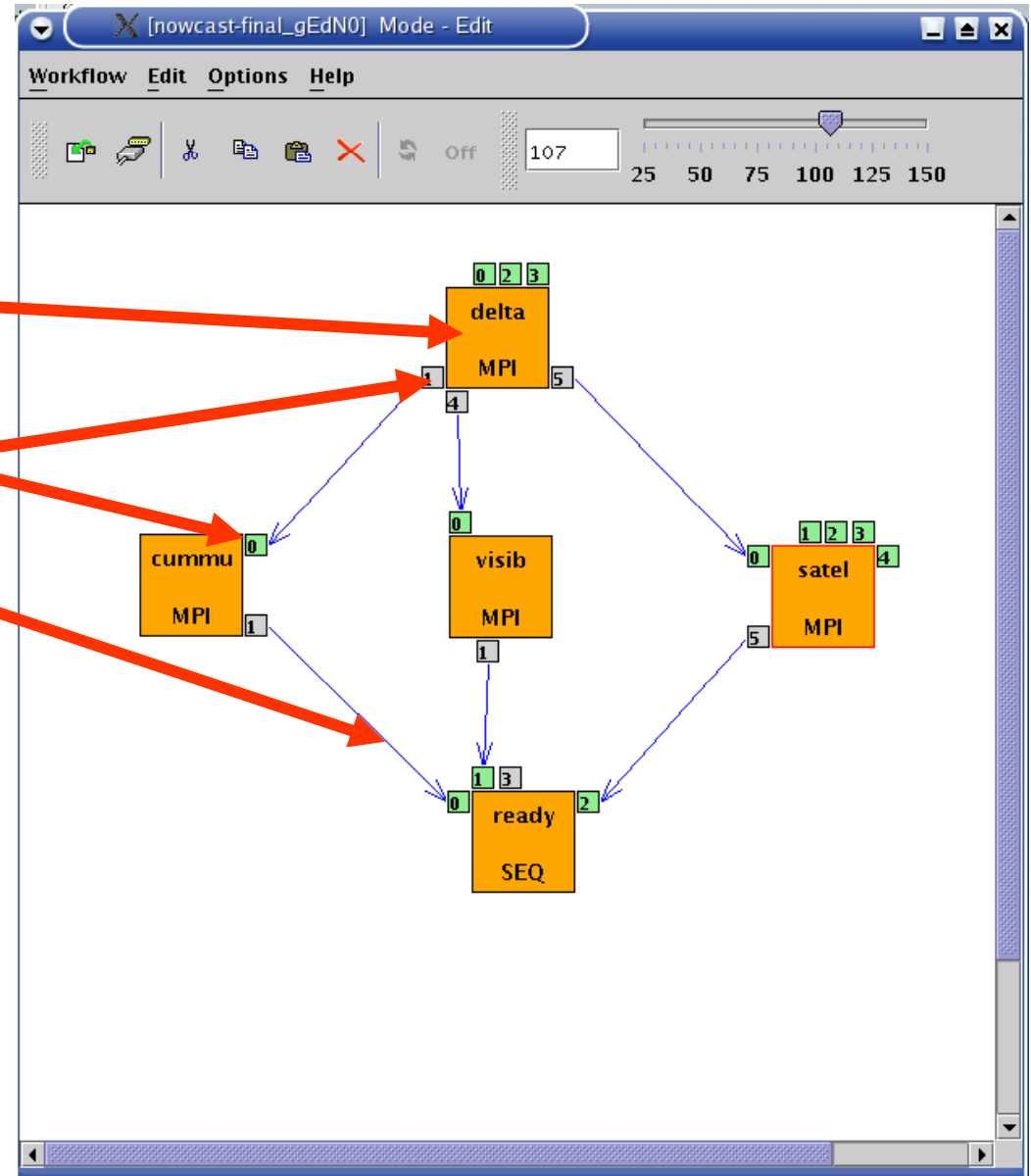


- **A directed acyclic graph where**

- Nodes represent **jobs or services** (a batch program executed on a computing resource)
- Ports represent input/output files the components expect/produce
- Arcs represent file transfer operations

- **Semantics of the workflow:**

- A job can be executed if all of its input files are available
- Responsibility of the built-in workflow manager

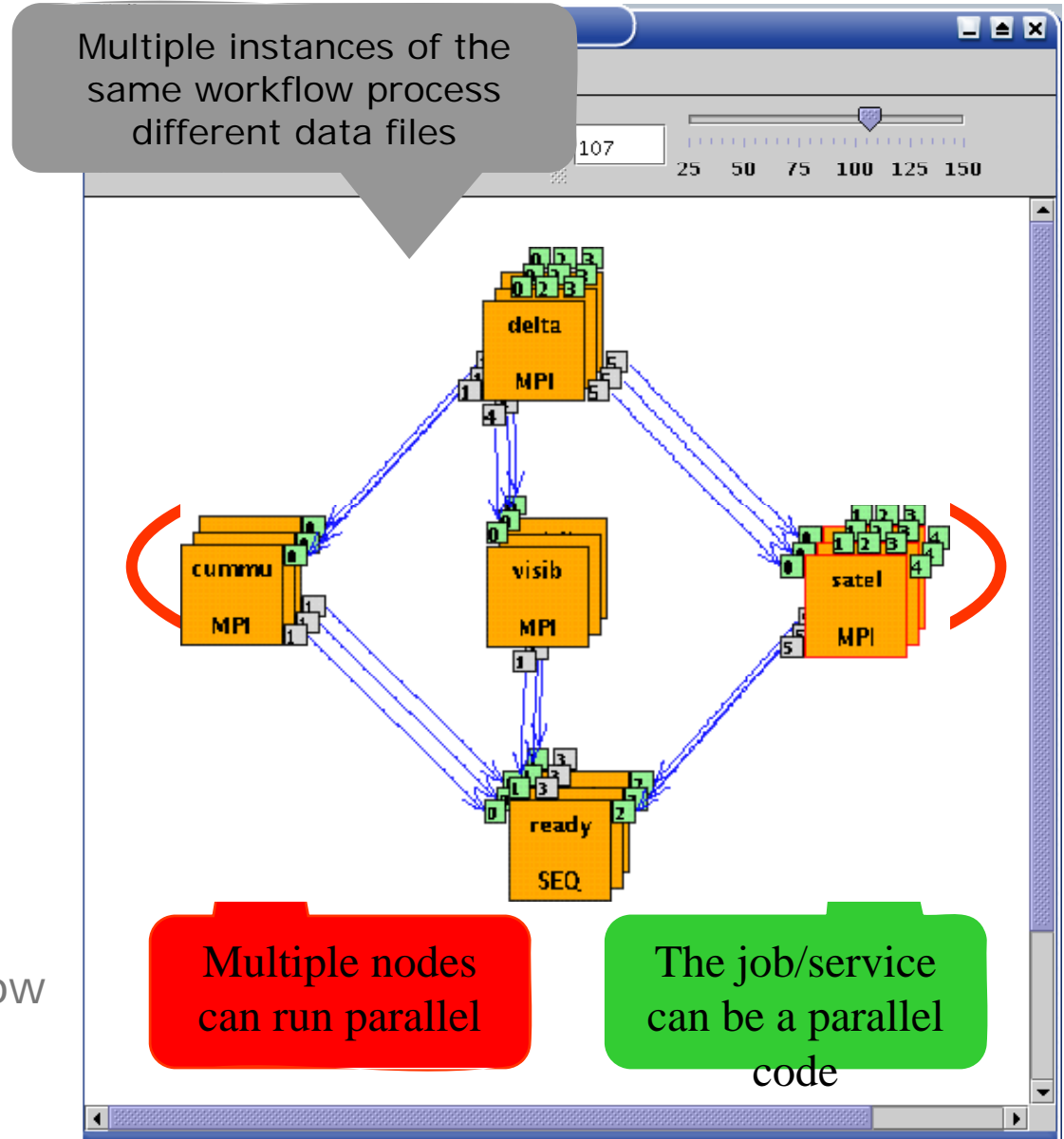




# Three levels of parallelism within a P-GRADE Portal application

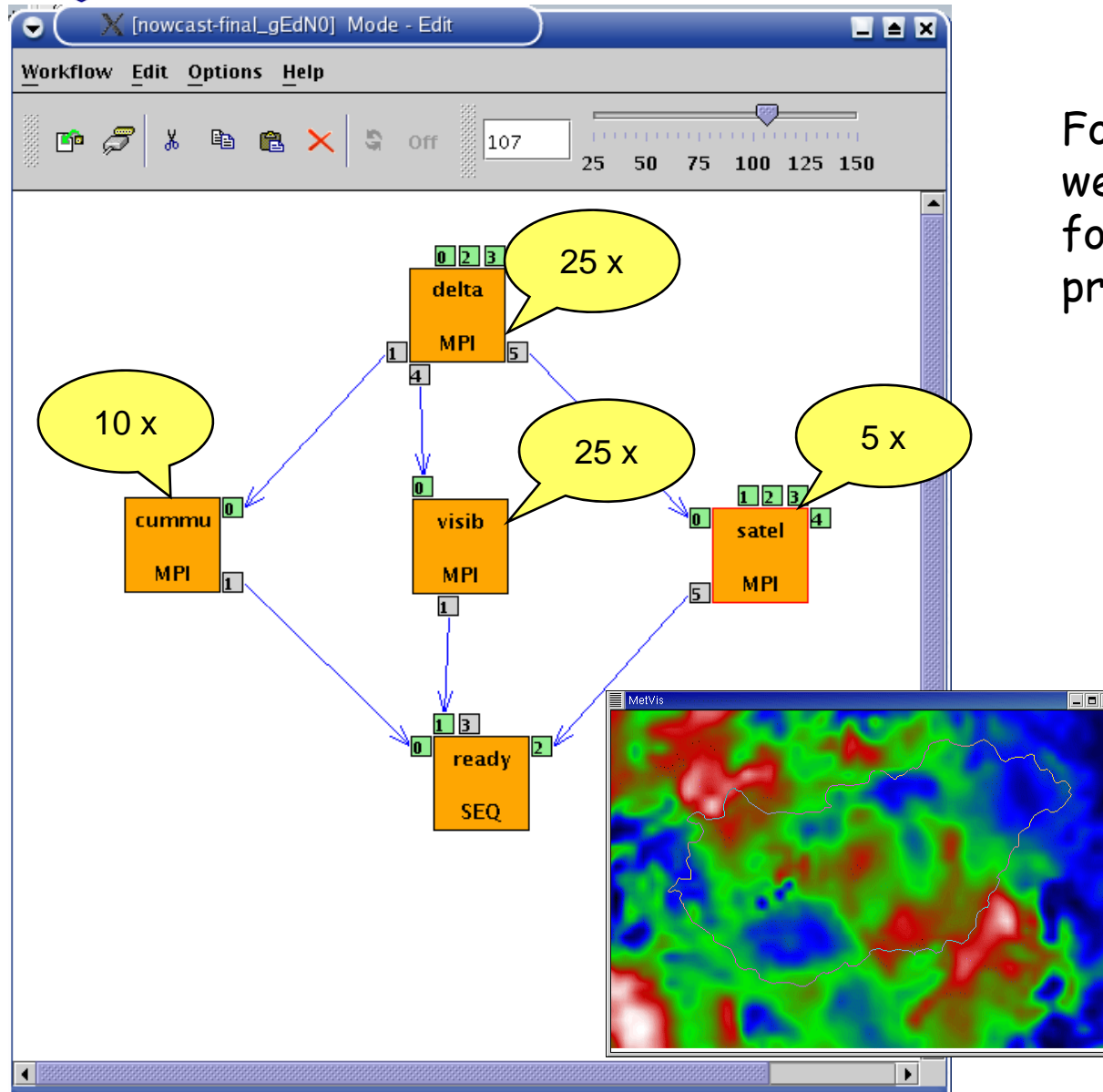


- The workflow concept of the GEMMLCA/ P-GRADE Portal enables the efficient parallelization of complex problems
- Semantics of the workflow enables two levels of parallelism:
  - Parallel execution inside a workflow node
  - Parallel execution among workflow nodes
  - Parametric sweep execution of the workflow (SIMD)





# 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

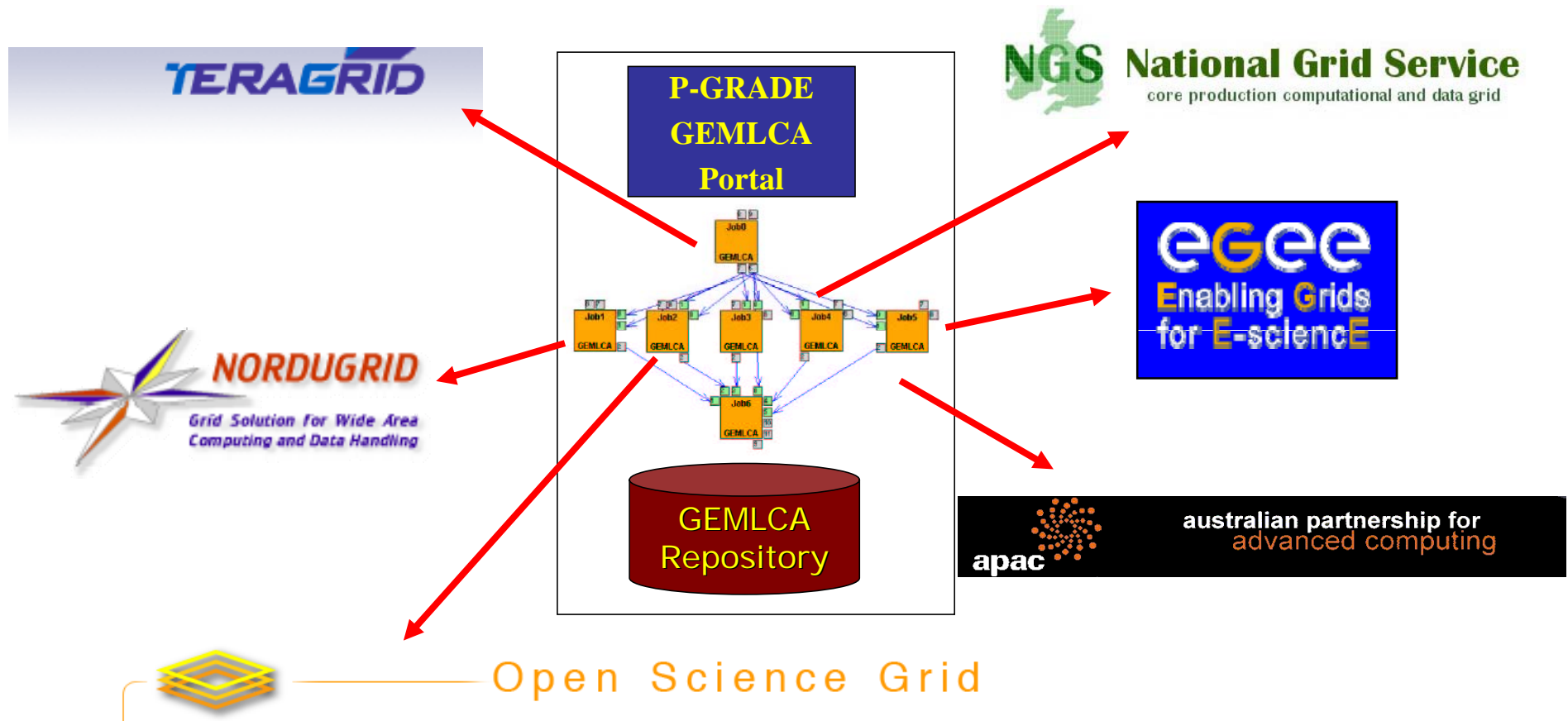
- Requirements:
- Execution time < 10 min
  - High resolution (1km)



# Workflow-level Grid interoperability: The GIN Resource Testing portal



OGF effort to demonstrate workflow level grid interoperability between major production Grids and to monitor OGF GIN VO resources



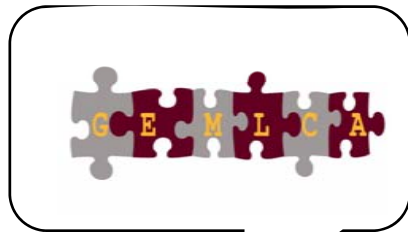


# The typical user scenario

## Part 1 - development phase



MyProxy  
servers



SAVE WF / PS

Portal  
server

REUSE  
WORKFLOW  
COMPONENTS



OPEN & EDIT  
or DEVELOP  
WORKFLOW  
or PS WF

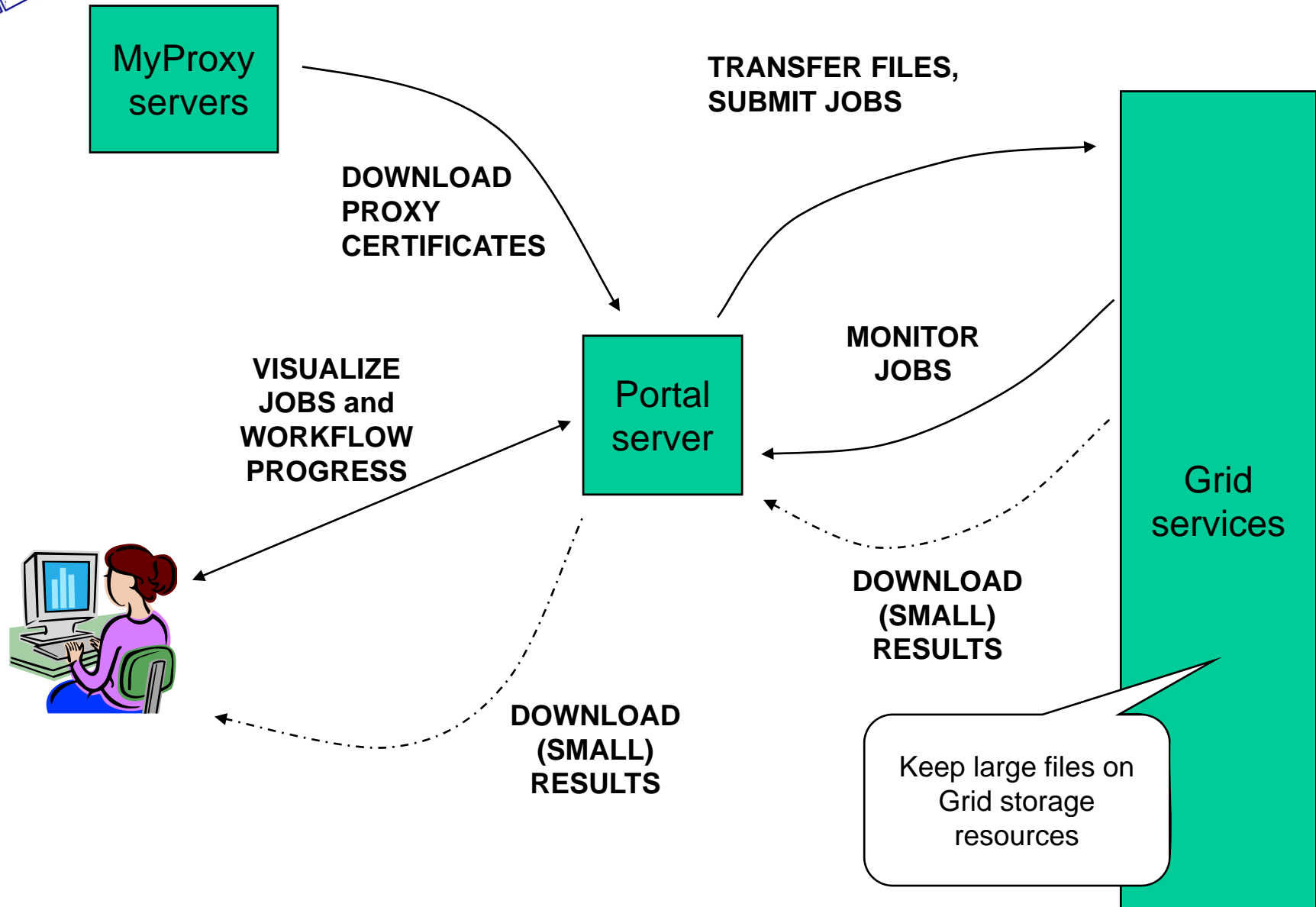
START  
EDITOR

Grid  
services



# The typical user scenario

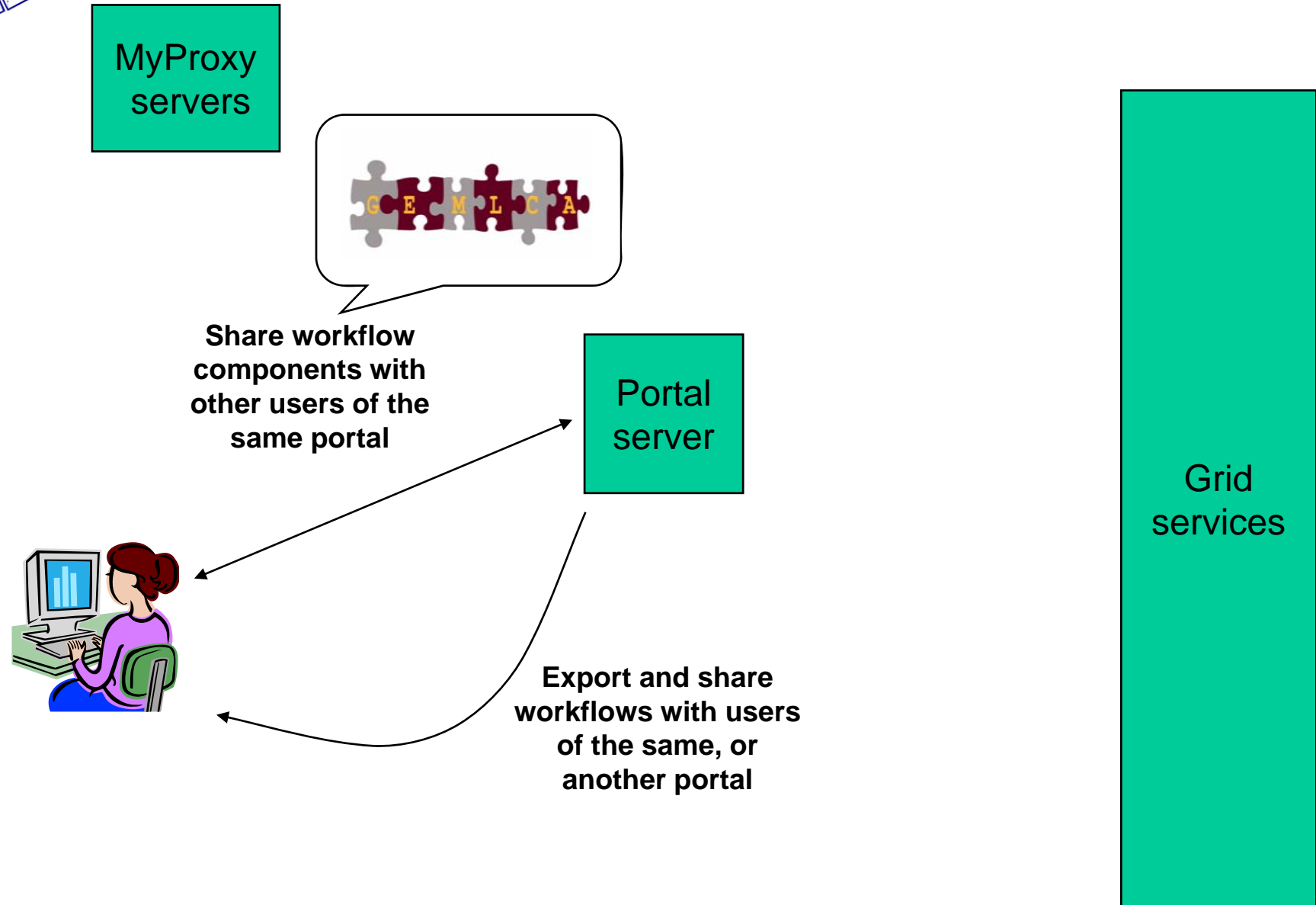
## Part 2 - execution phase





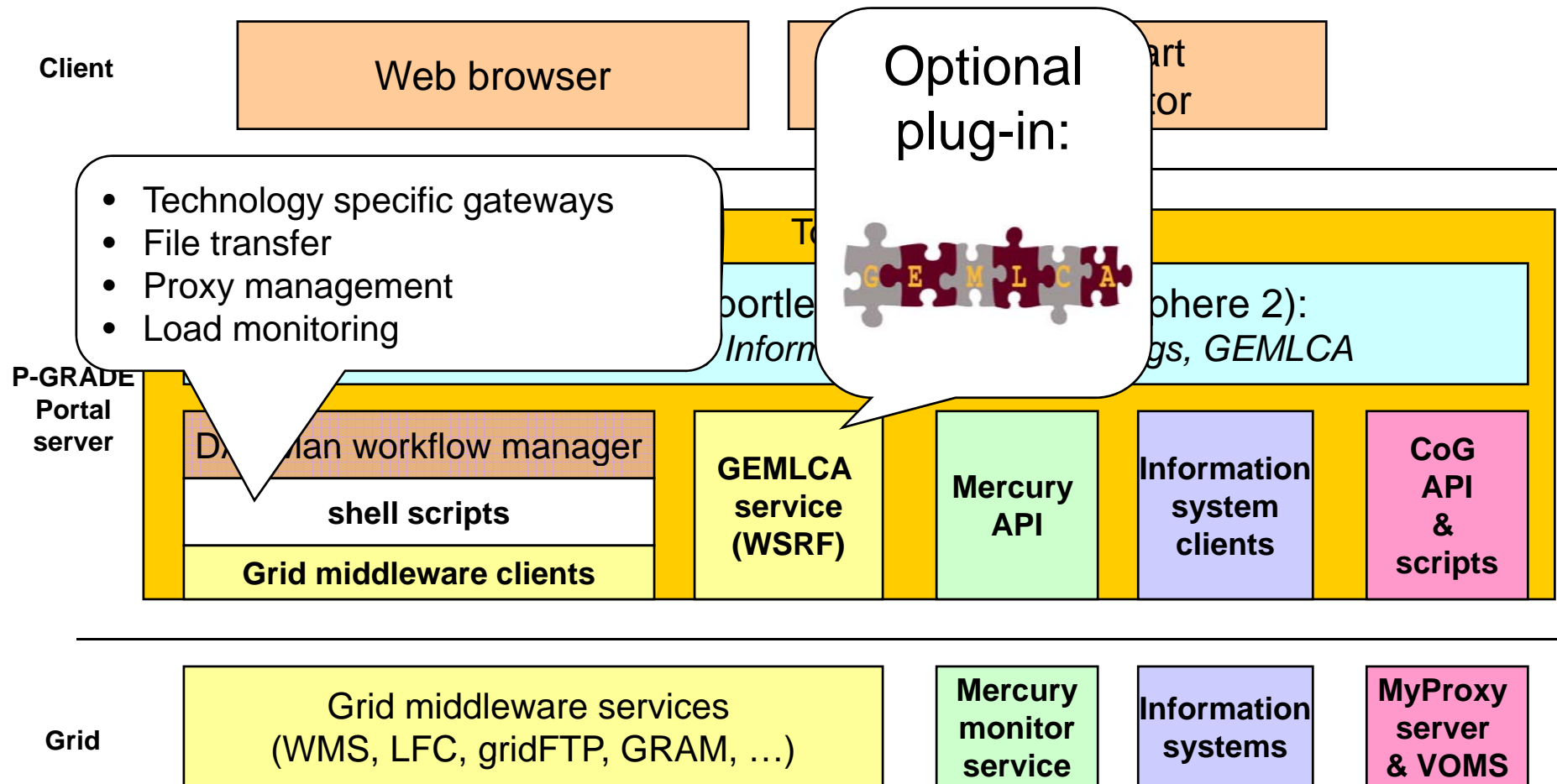
# The typical user scenario

## Part 3 - collaborative phase





# Inside the portal server







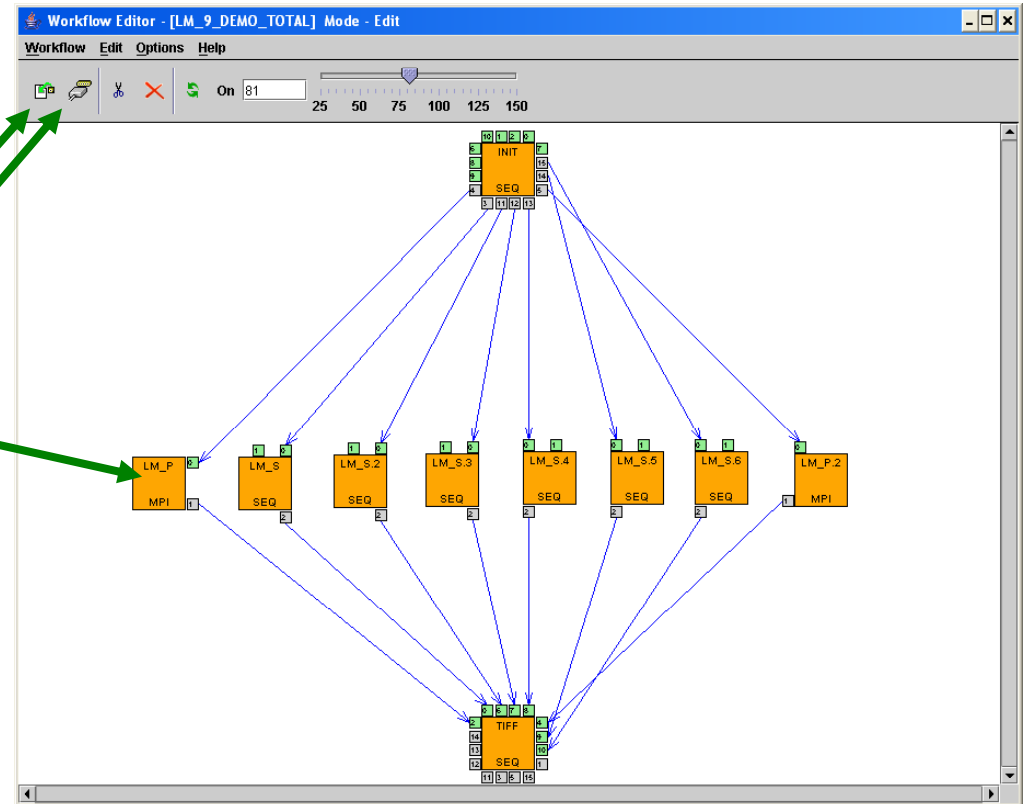
# Workflow Editor

Defining the graph



Define a Directed Acyclic Graph (*DAG*) of jobs and services (GEMMLCA jobs):

- 1. Drag & drop components:** nodes and ports
- 2. Define their properties**
- 3. Connect ports by channels**  
(no cycles, no loops, no conditions...)





# Workflow Editor

## Properties of a job component



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:

- Type of executable
- Client side location of the binary
- Number of required processors
- Command line parameters
- The resource to be used for the execution:
  - Grid (VO)
  - Resource / broker



# Workflow Editor

Properties of a service component (GEMMLCA job)



Workflow Editor - [LM\_9\_DEMO\_TOTAL] Mode - Edit

Workflow Edit Options Help

**Job0 properties**

Name: Job0

Job Type: GEMMLCA

Grid: Westfocus

Resource: http://gn6.cluster.cpc.wmin.ac.uk:8082/wsrp/service/...

Legacy Code: manhattan - Manhattan generator (Fork)

Parameters

Parameter ...	Mandatory	Type	Mode	Value	Unit
rows	No	Command...	Input	10	
columns	No	Command...	Input	10	
unit width	No	Command...	Input	150	nan
unit height	No	Command...	Input	150	null
columns o...	No	Command...	Input	2	null
rows of pa...	No	Command...	Input	2	null
net file	No	File	Output	file.net	null

LM\_P  
MPI

Ok Cancel

## Properties of a service:

- The location of the service:
  - Grid (VO)
  - Resource / broker
- An application (binary) associated with that resource
- Input parameter values for the service



# Workflow Editor

Defining job / service input-output data



Workflow Editor - [LM\_9\_DEMO\_TOTAL] Mode - Edit

Workflow Edit Options Help

INIT / 10 properties

Port name: 10

Type:  In  Out

File type:  Local  Remote

File: 2d200.inp

File Browser

File storage type:  Permanent  Volatile

Ok Cancel

Workflow components: LM\_P (MPI), LM\_S (SEQ), LM\_... (SEQ), TIFF (SEQ)

## File properties

### Type:

**input:** *the component reads*

**output:** *the component writes*

### File type:

**local:** *originates from my desktop*

**remote:** *originates from a grid storage element*

### File:

*location of the file*

### File storage type (for outputs only):

**Permanent:** *final result*

**Volatile:** *used only for inter-component data transfer*



# How to refer to an I/O file?



## Input file

## Output file

### Local file

- Client side location:  
[c:\experiments\11-04.dat](#)

- Client side location:  
[result.dat](#)

- LFC logical file name  
(LFC file catalog is required – EGEE VOs)  
[lfn:/grid/gilda/sipos/11-04.dat](#)

- LFC logical file name  
(LFC file catalog is required – EGEE VOs)  
[lfn:/grid/gilda/sipos/11-04\\_-\\_result.dat](#)

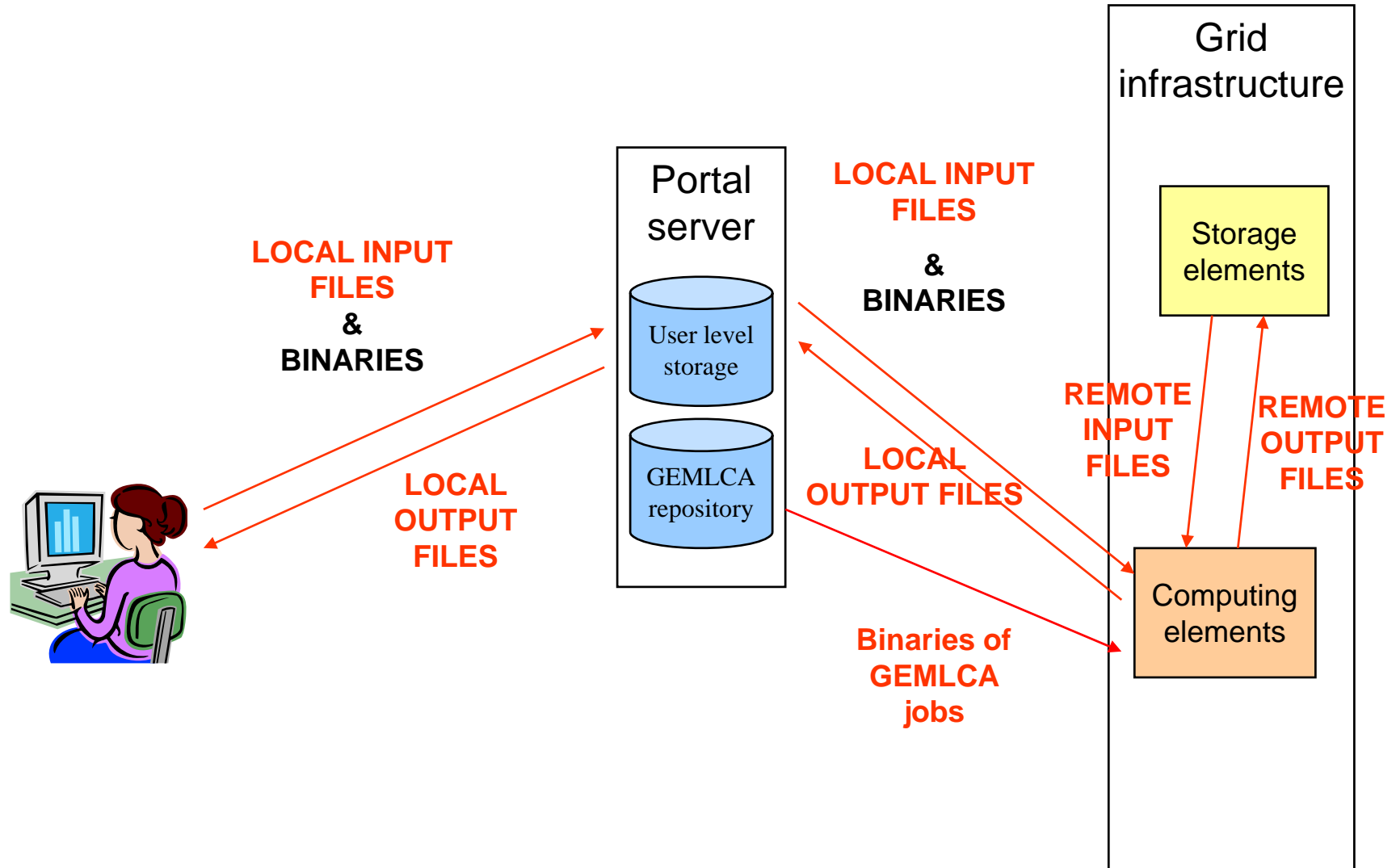
- GridFTP address (in Globus Grids):  
[gsiftp://somengshost.ac.uk/mydir/11-04.dat](#)

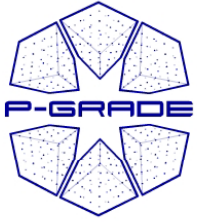
- GridFTP address (in Globus Grids):  
[gsiftp://somengshost.ac.uk/mydir/result.dat](#)

### Remote file

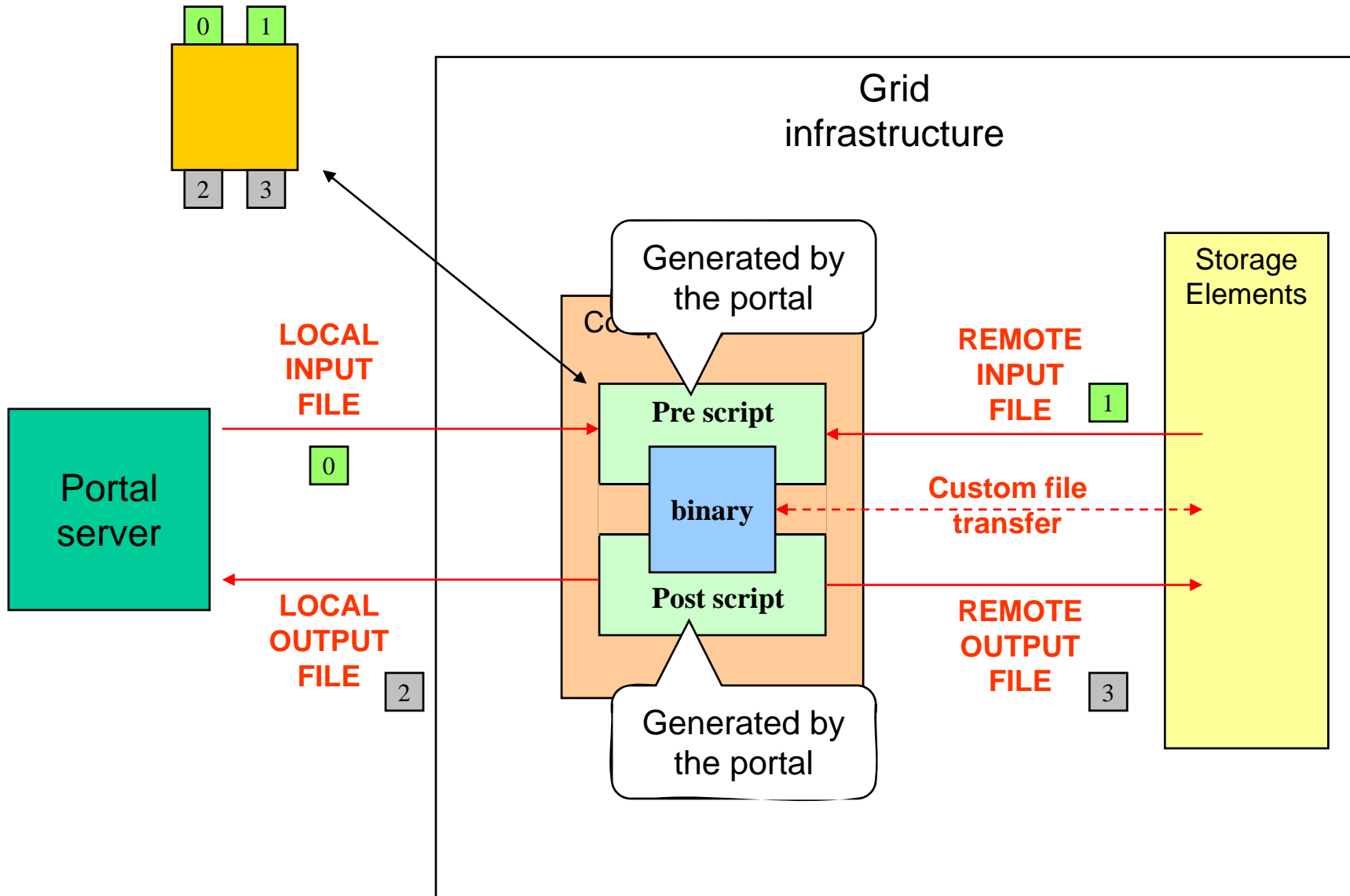


# Workflow level file transfer by the workflow manager





# Job / service level file transfer by the workflow manager





# Information system portlet to browse computing elements



PGrade Portal - Microsoft Internet Explorer

Egyéb Szoftverek Nézet Kétyencsek Eszközök Súgó

Vissza Keresés Kedvencek

Cím http://hgportal.hpcc.sztaki.hu:7080/gridsphere/gridsphere?action=doChangeVO&cid=15

Workflow Certificates Settings Information System Help

MDS Monitor LOG Monitor

Monitor

Select Grid: SEE-GRID View

Select VO: seegrid View

Grid: SEE-GRID VO: seegrid

Sites

Site Name	Computing Element						Storage Element		
	CPU			Job			Space		
	Total	Free	Usage	Running	Waiting	Load	Total	Available	Usage
AEGIS01-PHY-SCL	112	80	29%	7	0	0%	226.793 GB	216.34 GB	5%
AEGIS02-RCUB	20	20	0%	0	0	0%	398.466 GB	396.58 GB	0%
BG01-IPP	54	18	67%	4	0	0%	609.554 GB	473.543 GB	22%
	20	16	20%	1	0	0%	131.775 GB	79.957 GB	39%
	3	3	0%	0	0	0%	566.608 GB	566.376 GB	0%
	48	32	33%	2	5	71%	554.647 GB	475.767 GB	14%
	60	12	80%	4	0	0%	78.317 GB	6.271 GB	92%
	28	28	0%	0	0	0%	69.709 GB	69.075 GB	1%
	54	24	56%	5	36	88%	849.666 GB	828.387 GB	3%
-01	24	24	0%	0	0	0%	862.807 GB	848.676 GB	2%
	4	4	0%	0	0	0%	4.566 GB	2.871 GB	37%
	35	28	20%	1	0	0%	1.335 TB	1.335 TB	0%

Kész Internet

**Graphical interface for BDII servers**





# ***Workflow execution***

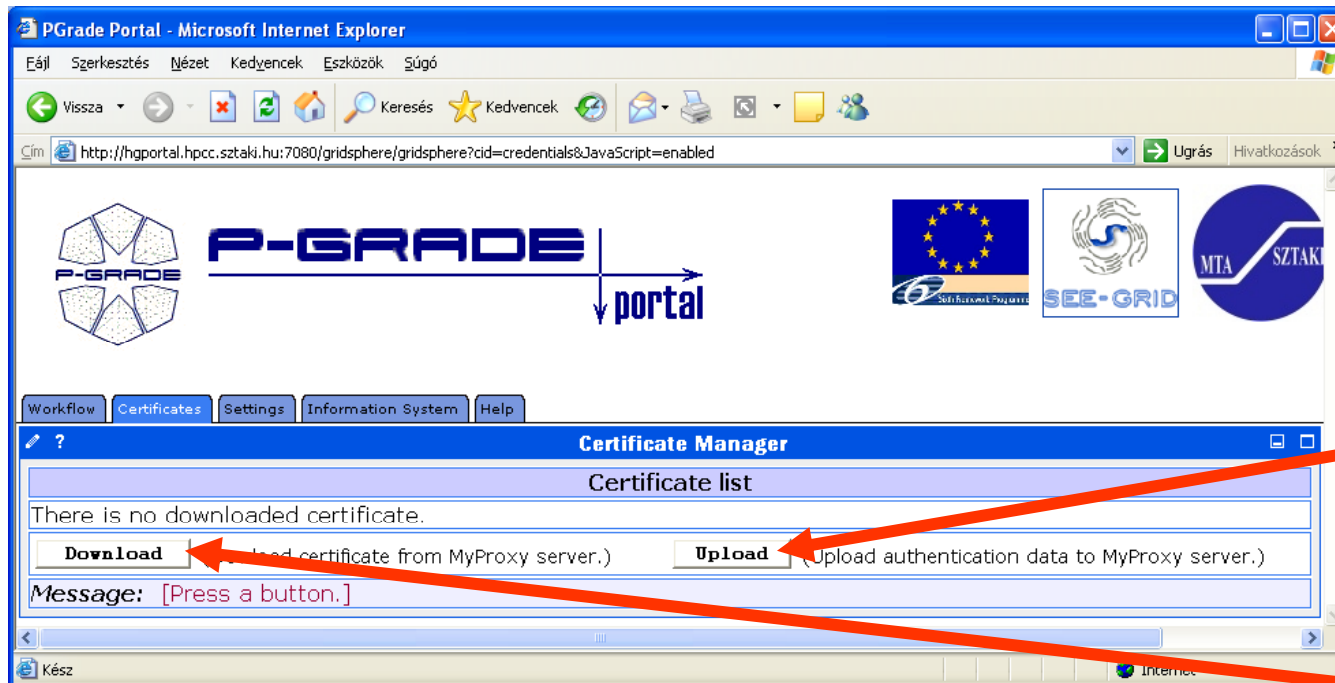
## **Main steps**

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



# 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



# Certificate Manager

Multi-grid portal → Multi-proxy environment



Workflow Certificates Settings Information System Help

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.

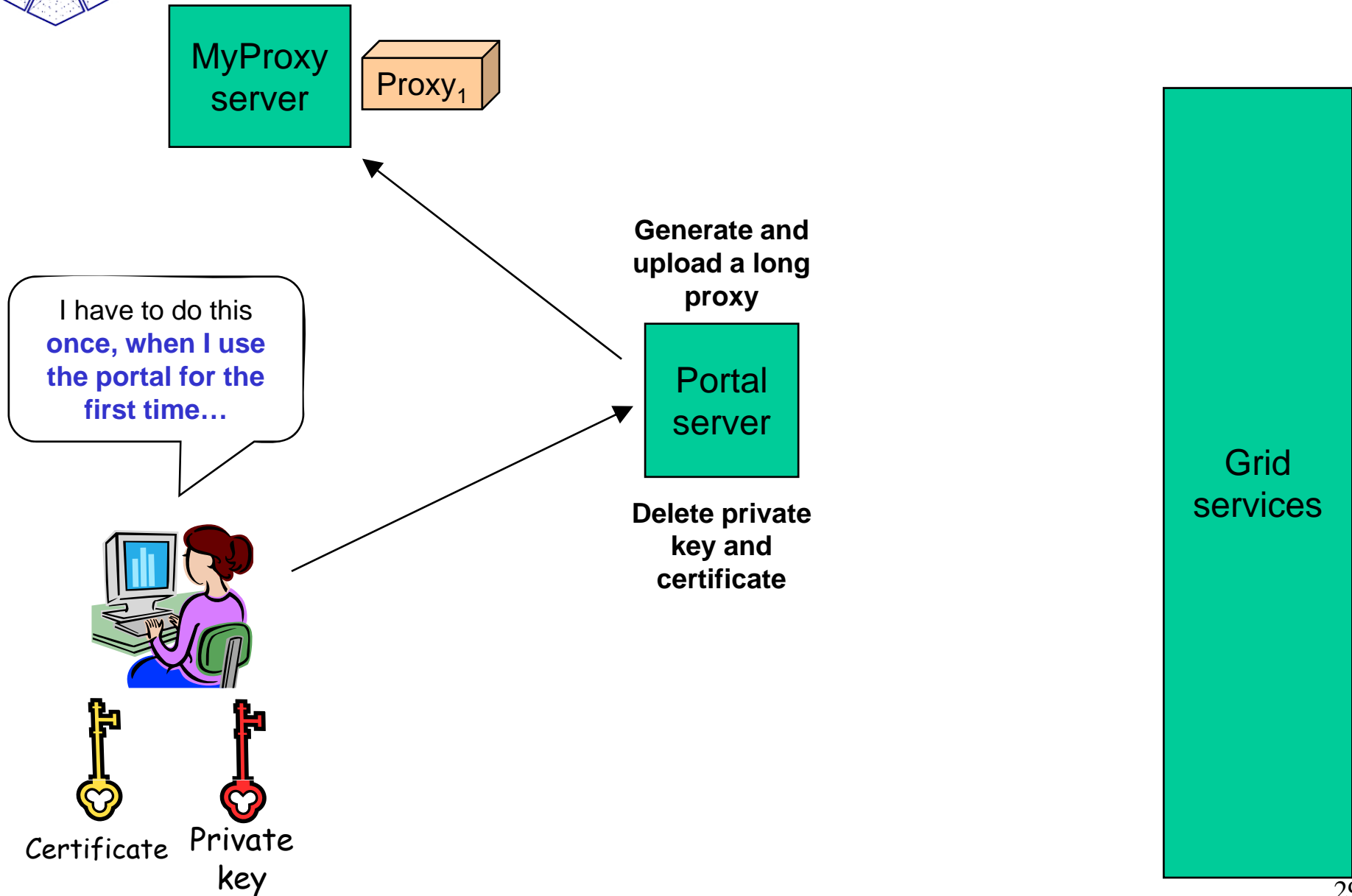
Multiple proxies can be available on the portal server at the same time!

Certificate from EGEE CA:  
SEE-GRID CEs and SEs

Certificate from Hungarian CA:  
HUNGRID CEs and SEs

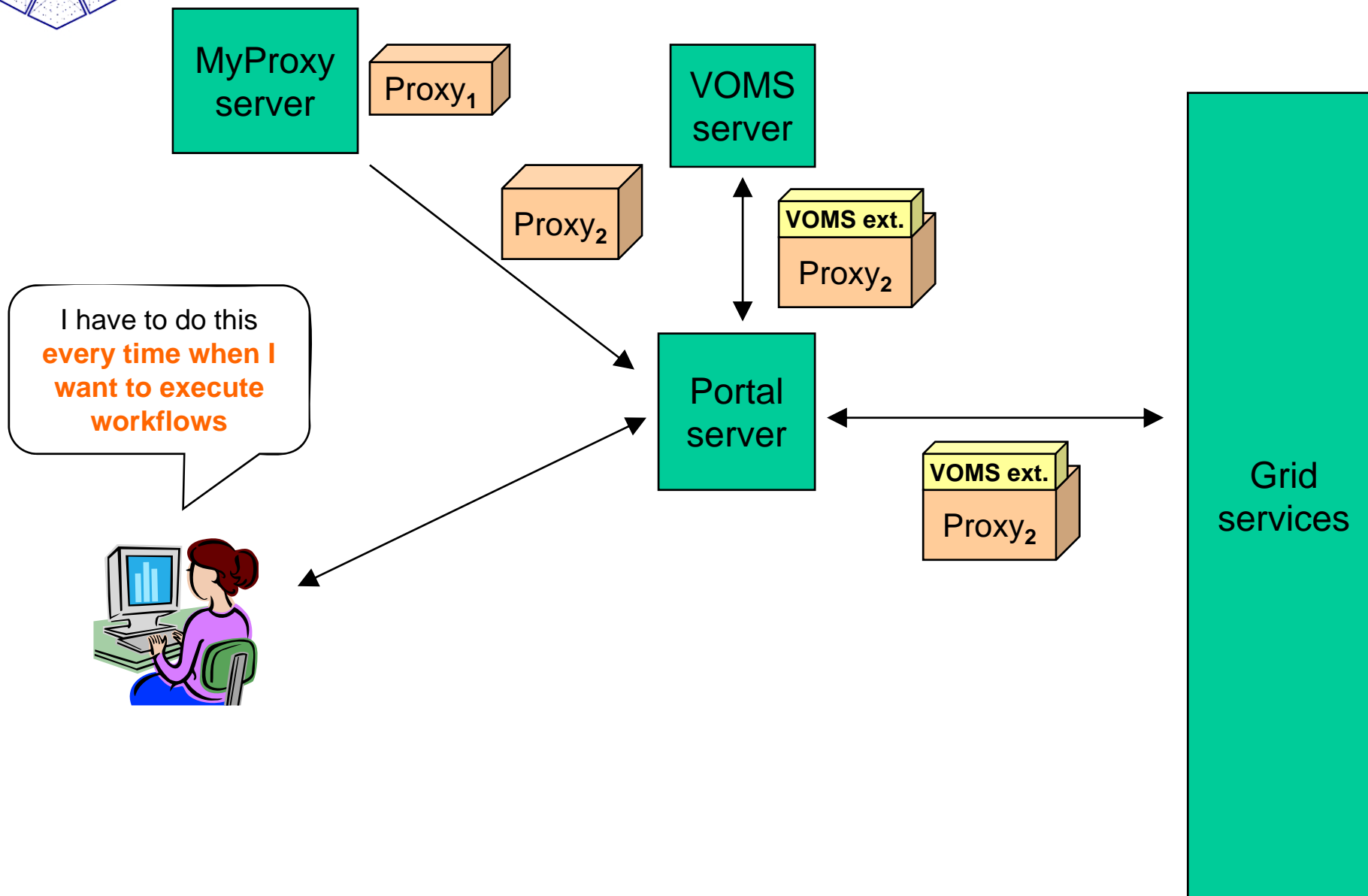


# Certificates, proxies: Upload





# Certificates, proxies with gLite VOs: Download





# 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

The screenshot shows a Microsoft Internet Explorer browser window displaying the P-Grade Portal. The address bar shows the URL: <http://hgportal.hpcc.sztekl.hu:7080/gridSphere/gridSphere?action=doSubmitReallyWorkflow&add=2>. The page header includes the P-Grade logo, the text "P-Grade portal", and logos for the European Union, SEE-GRID, and VIKI. Below the header, there are navigation tabs for "Certificates", "Settings", "Information System", and "Help". The main content area is titled "Workflow Manager" and contains a "Workflow Editor" button and a "Refresh" button. A table titled "Workflow list" displays 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 table, there is a "Delete all" button. A message at the bottom of the page reads: "Message: Workflow successfully submitted."



# 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=doShowWorkflowDetails&cid=2`. The page features a navigation menu with "Workflow", "Certificates", "Settings", "Information System", and "Help". Below the menu 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				submitted	-	N/A	<input type="button" value="Visualize"/> <input type="button" value="All"/> <input type="button" value="Abor"/>
	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	-	-	-

A message at the bottom of the page reads: "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)



PGrade Portal - Microsoft Internet Explorer

Workflow Certificates Settings Information System Help

### Workflow Manager

Refresh Back

Job list									
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	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	Out	-	-		
	LM_S.3	SEE-GRID	grid1.netmode.ece.ntua.gr	running	Out	-	-		
	LM_S.4	SEE-GRID	grid1.irb.hr	finished	Out	-	-		
	LM_S.5	SEE-GRID	testbed001.grid.ici.ro	running	Out	-	-		
	LM_S.6	SEE-GRID	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 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			S
					[ Logs ]	[ Output ]	[ Visualization ]	
LM_9_DEMO_TOTAL				finished	Err	Being zipped..	Visualize All	
	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.

Kész Internet

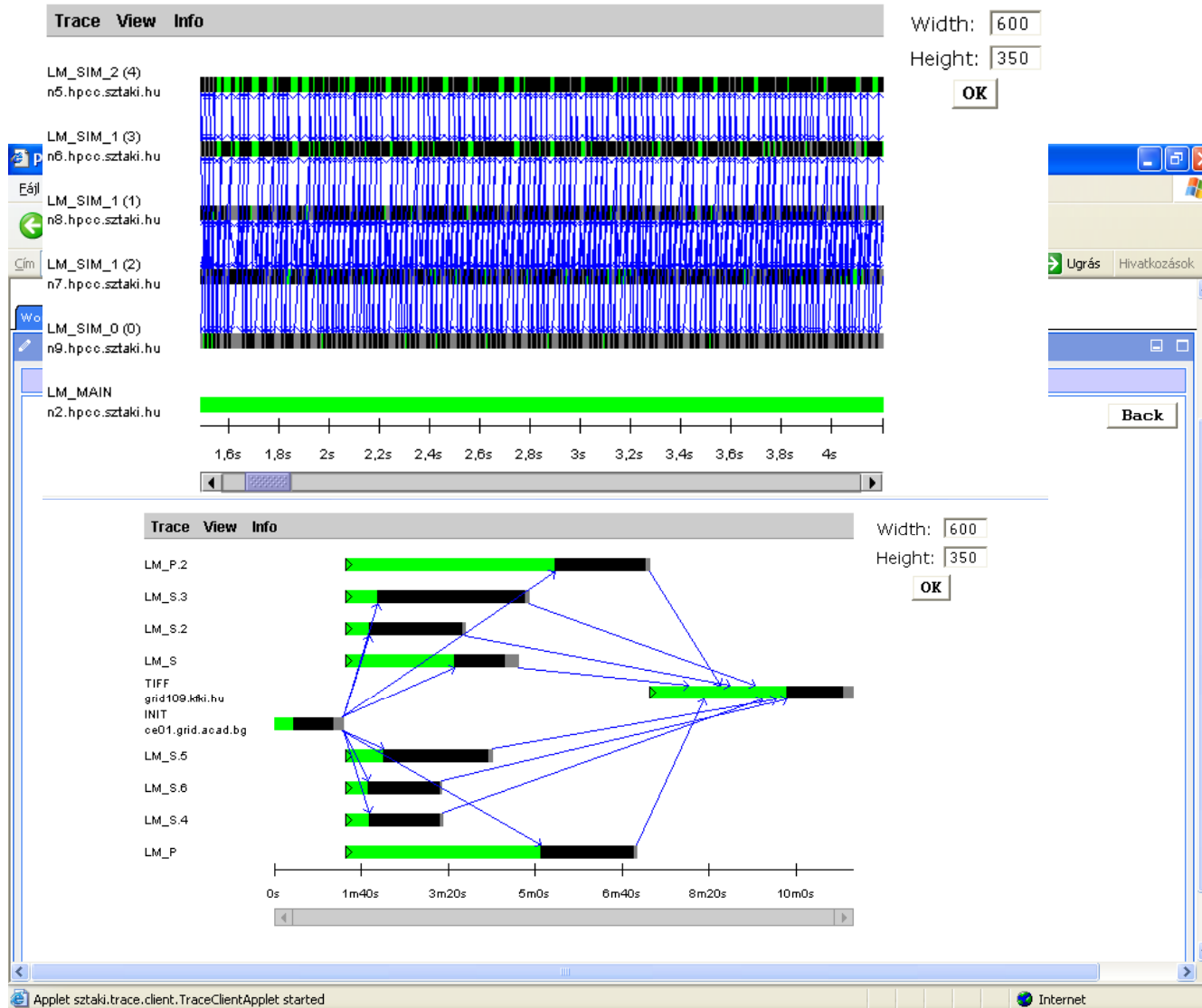
White/Red/Green color means the job is initialised/running/finished



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



workflow / job: LM\_9\_DEMO\_TOTAL / LM\_P



- The portal monitors and visualizes workflow progress

- The portal monitors and visualizes parallel jobs (if they are prepared for Mercury monitor)



# Downloading the results...



PGrade Portal - Mozilla

File Edit View Go Bookmarks Tools Window Help

http://fn2.hpcc.sztaki.hu:9080/gridsphere/gridsphere?action=doGotoPage&cid=2

Home Bookmarks The Mozilla Or... Latest Builds

**P-GRADE** portal

Logout

Welcome, Nemeth Csaba

Workflow Credentials Settings Demo Help

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.

Transferring data from fn2.hpcc.sztaki.hu...

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



# Sharing a successfully finished job with other users: GEMLCA repository



Workflow Certificates Settings Demo Help GEMLCA Administration Tools Macroscopic Visualiser

Resource Selector Legacy Code Information Descriptor Creator

GEMLCA LCID Administration Portl

GEMLCA Legacy Code Interface Descriptor

Legacy code Environment Paramaters:

maximumProcessors

executable

minimumProcessors

maximumJob

jobManager

id

description

List of legacy code Arguments:

name	file	order	fixed	inputOutput	mandatory	regexp	friendlyName	commandline
-p	No	0	No	Input	No		Folder to be created	Yes

New argument entry form:

name

file

order

fixed

inputOutput

mandatory

regexp

friendlyName

commandline

initialValue

## Mkdir Legacy Code exposed as a Grid Service

**Folder** : /../.gemlca/legacycodes/mkdir

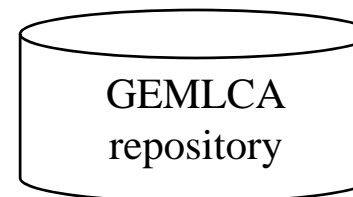
**Content** : i) mkdir binary or link ii) config.xml

## Legacy Code Interface Description File: config.xml

```

<?xml version="1.0"?>
<!DOCTYPE GLCEnvironment "gemlcaconfig.dtd">
<GLCEnvironment
  id="mkdir" executable="LINUX/mkdir" jobManager="Fork"
  maximumJob="11" minimumProcessors="1"
  maximumProcessors="1" universe="PVM"
>
<Description>Unix mkdir program</Description>
<GLCParameters>
  <Parameter name="-p" friendlyName="Folder to be created"
    fixed="No" inputOutput="Input" order="0"
    mandatory="No" fileCommandline="Commandline">
    <initialValue> </initialValue>
  </Parameter>
</GLCParameters>
</GLCEnvironment>

```

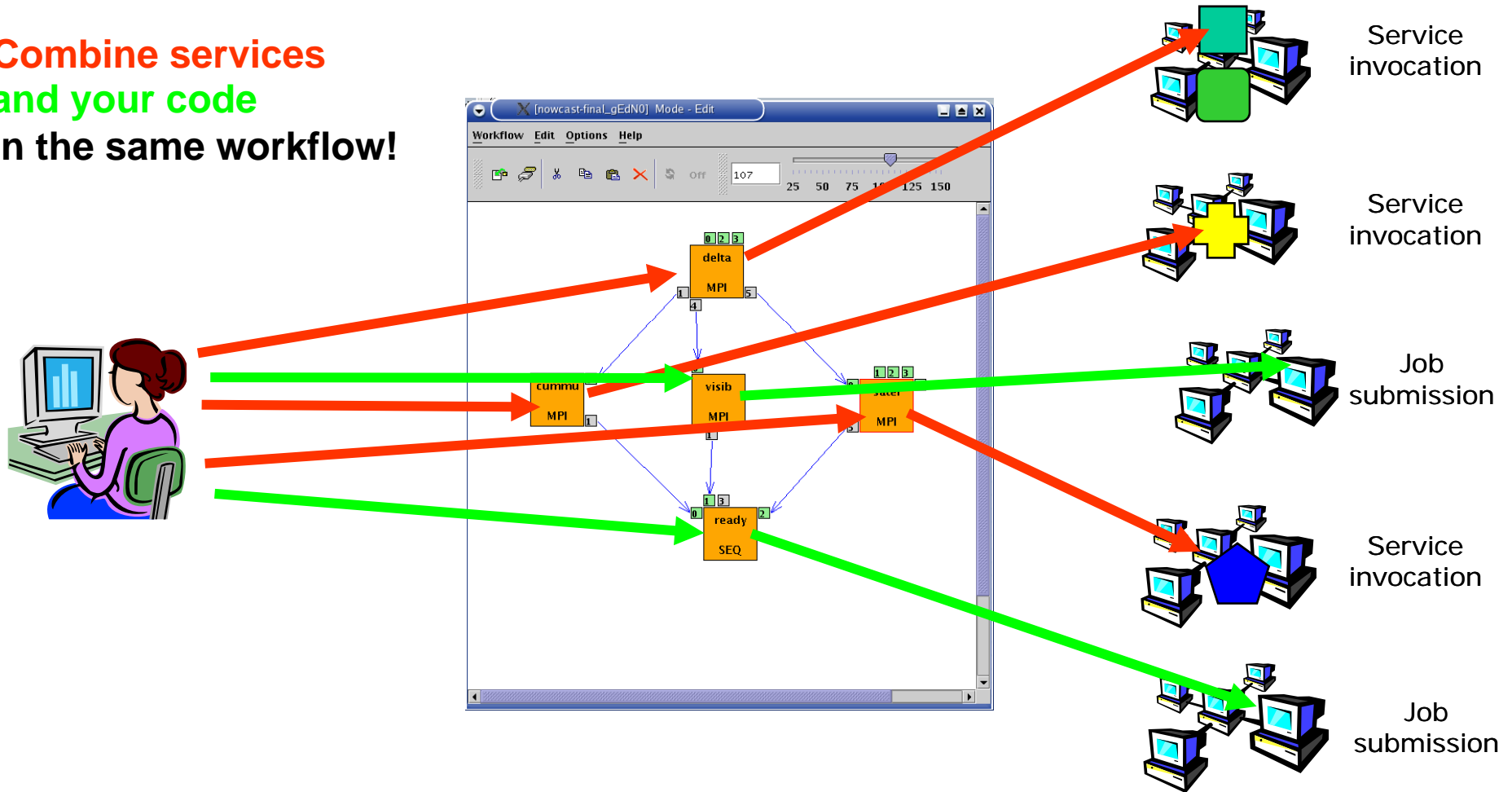




# Collaborative grid applications



Combine services  
and your code  
in the same workflow!





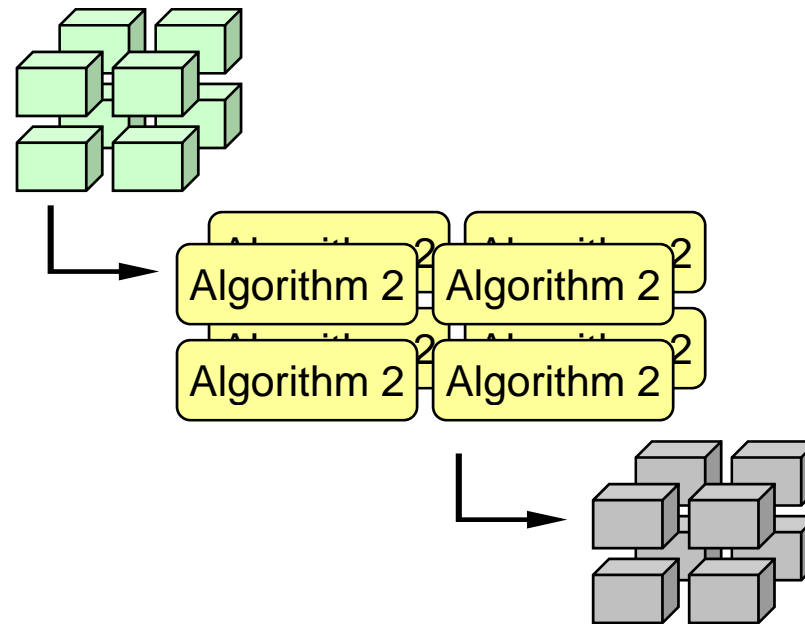


# ***Support for parametric study workflows***

Since P-GRADE Portal v2.5

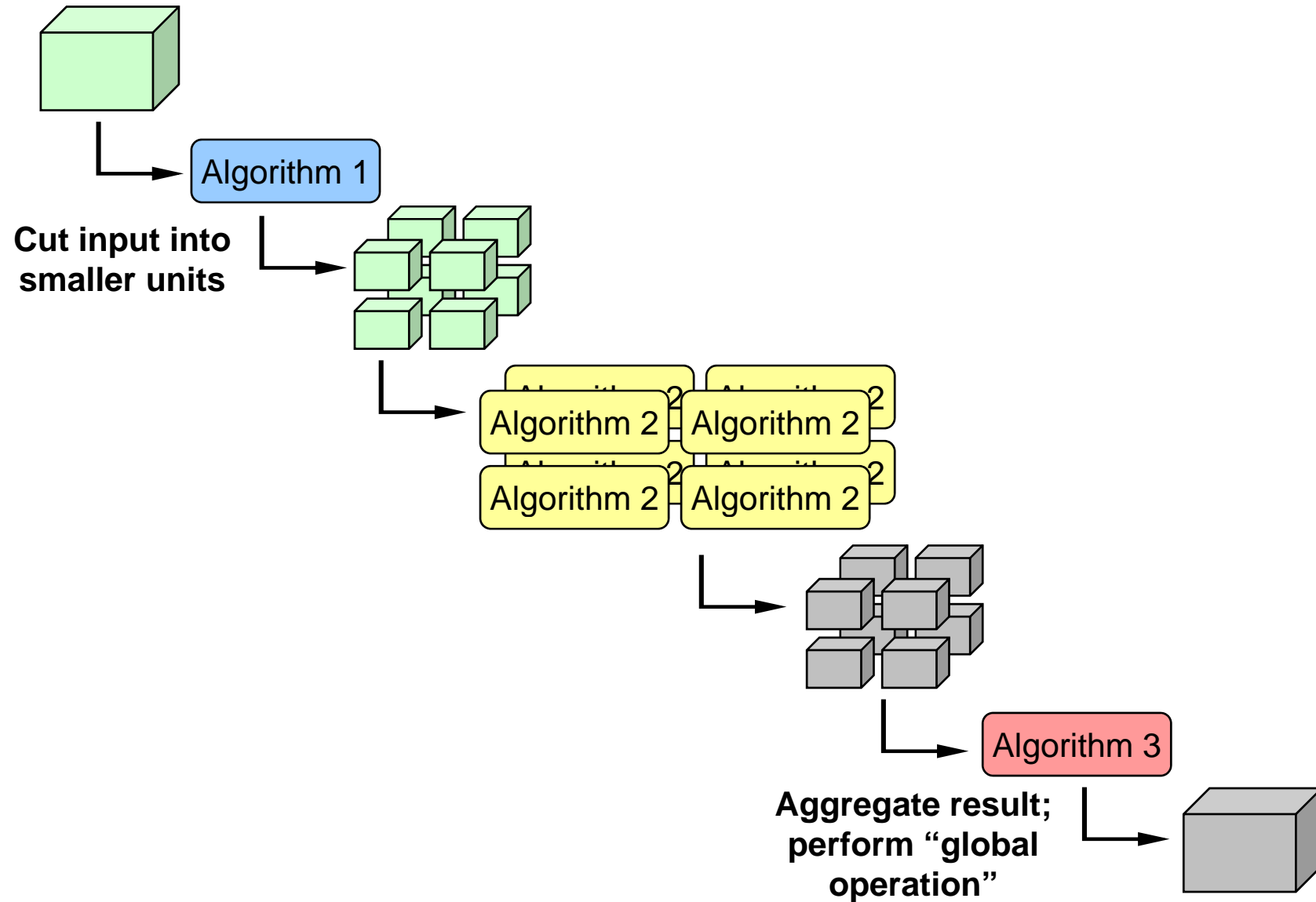


# General structure of a PS applications



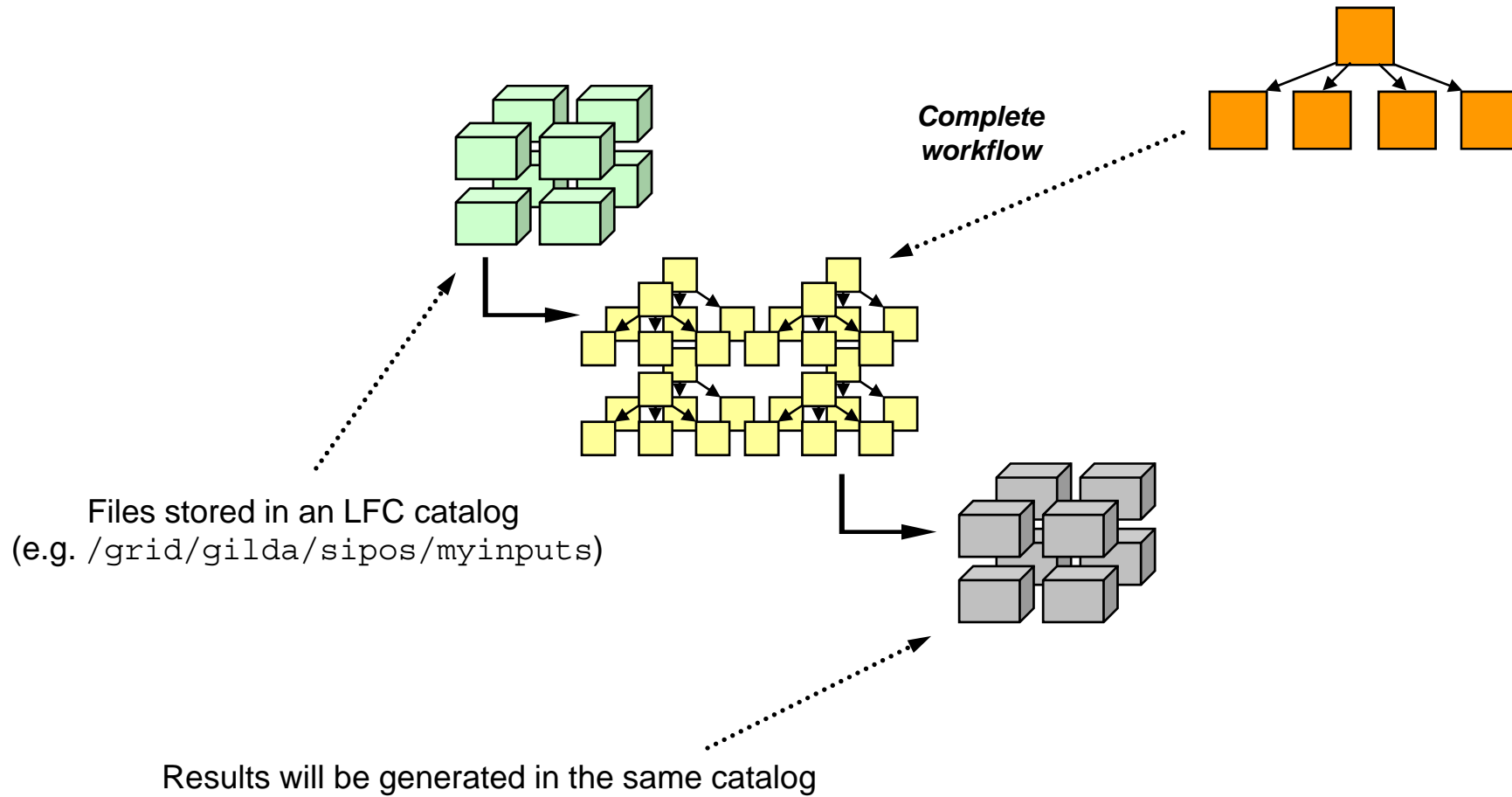


# Advanced PS applications



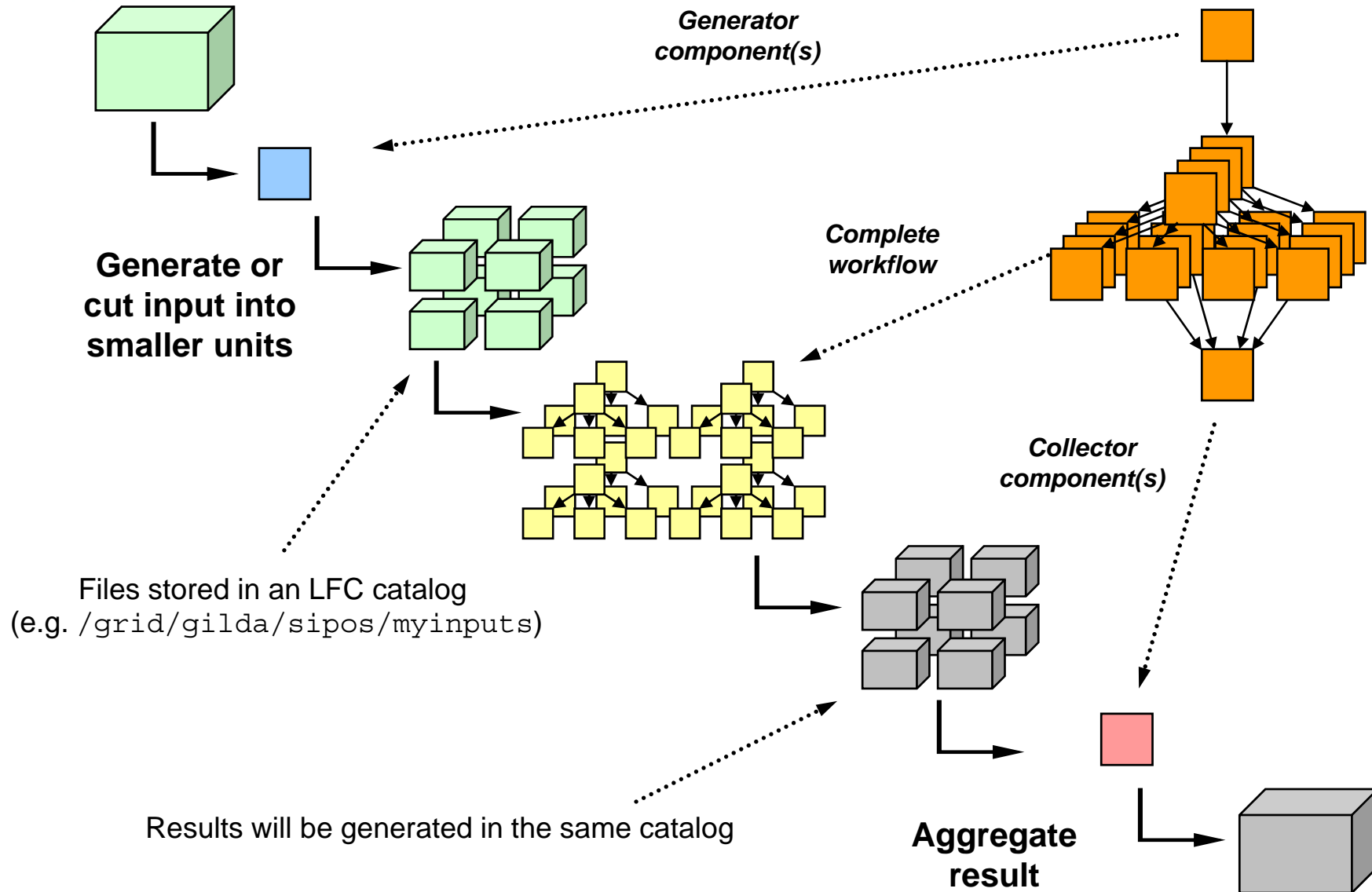


# PS applications in P-GRADE Portal 2.5





# Advanced PS applications in P-Grade Portal 2.5

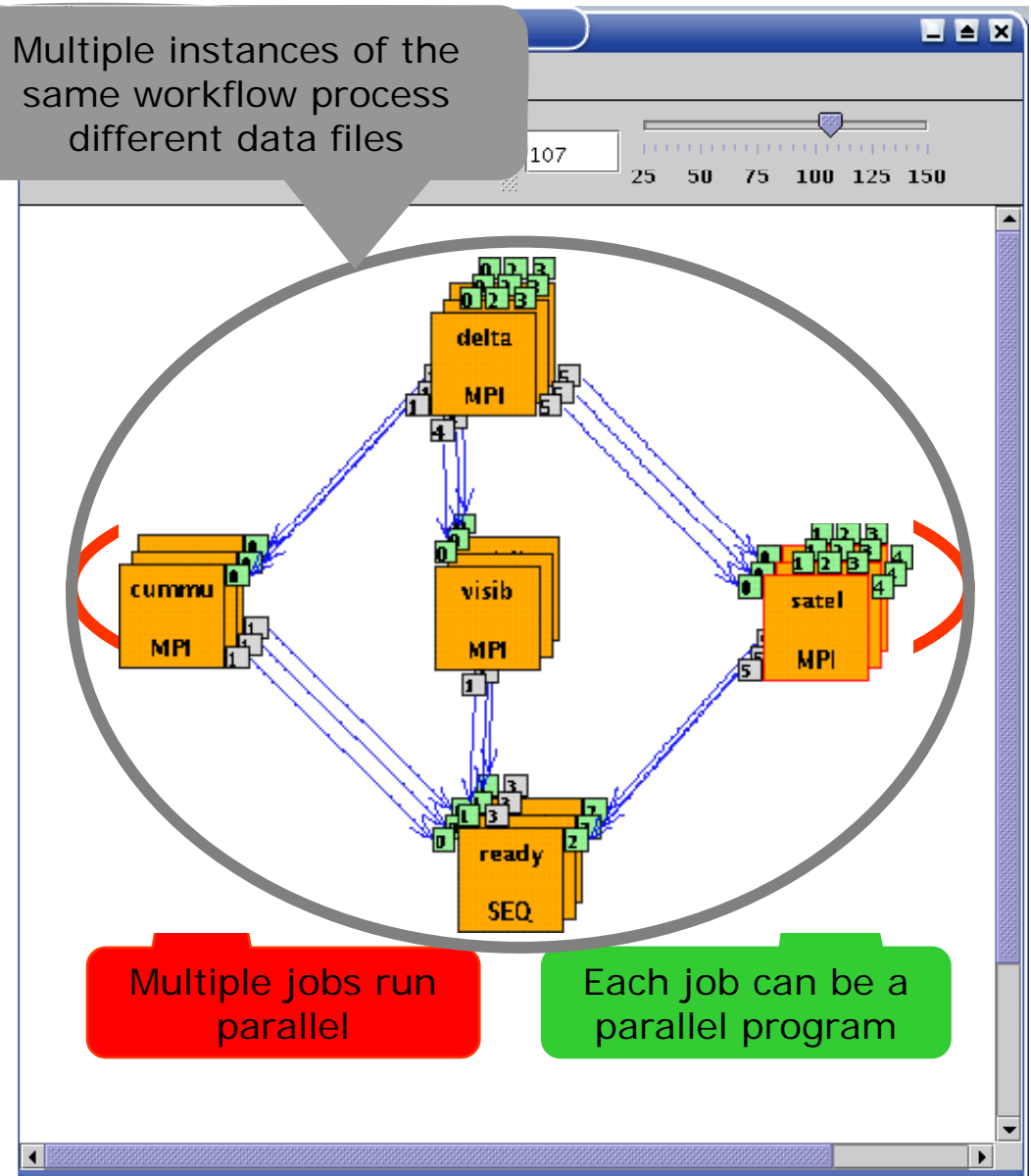




# Third level of parallelism



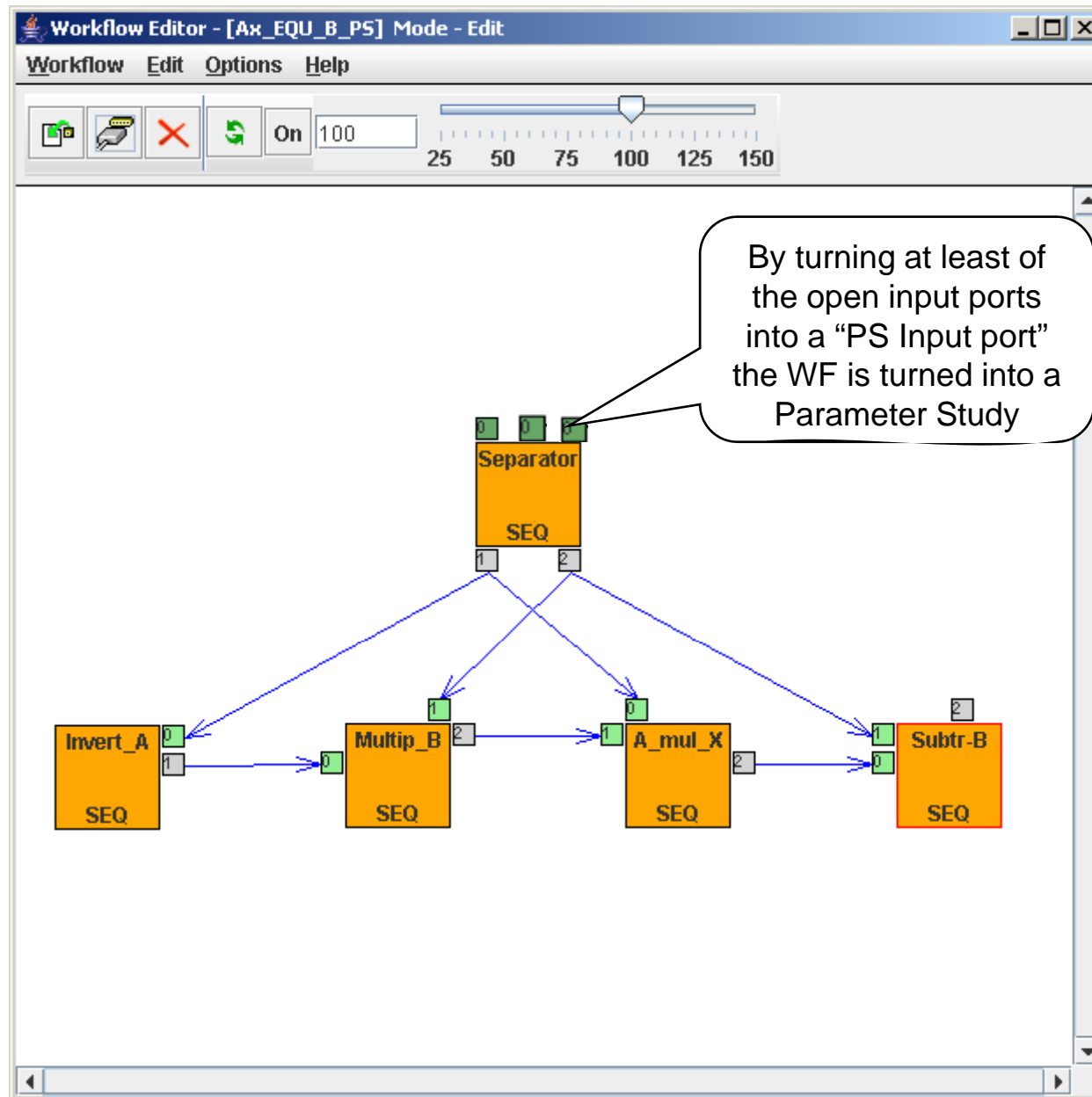
Multiple instances of the same workflow process different data files



- Parallel execution inside a workflow node (SIMD/MIMD/MISD)
- Parallel execution among workflow nodes (SIMD/MIMD/MISD)
- Parameter study execution of the workflow (SIMD)

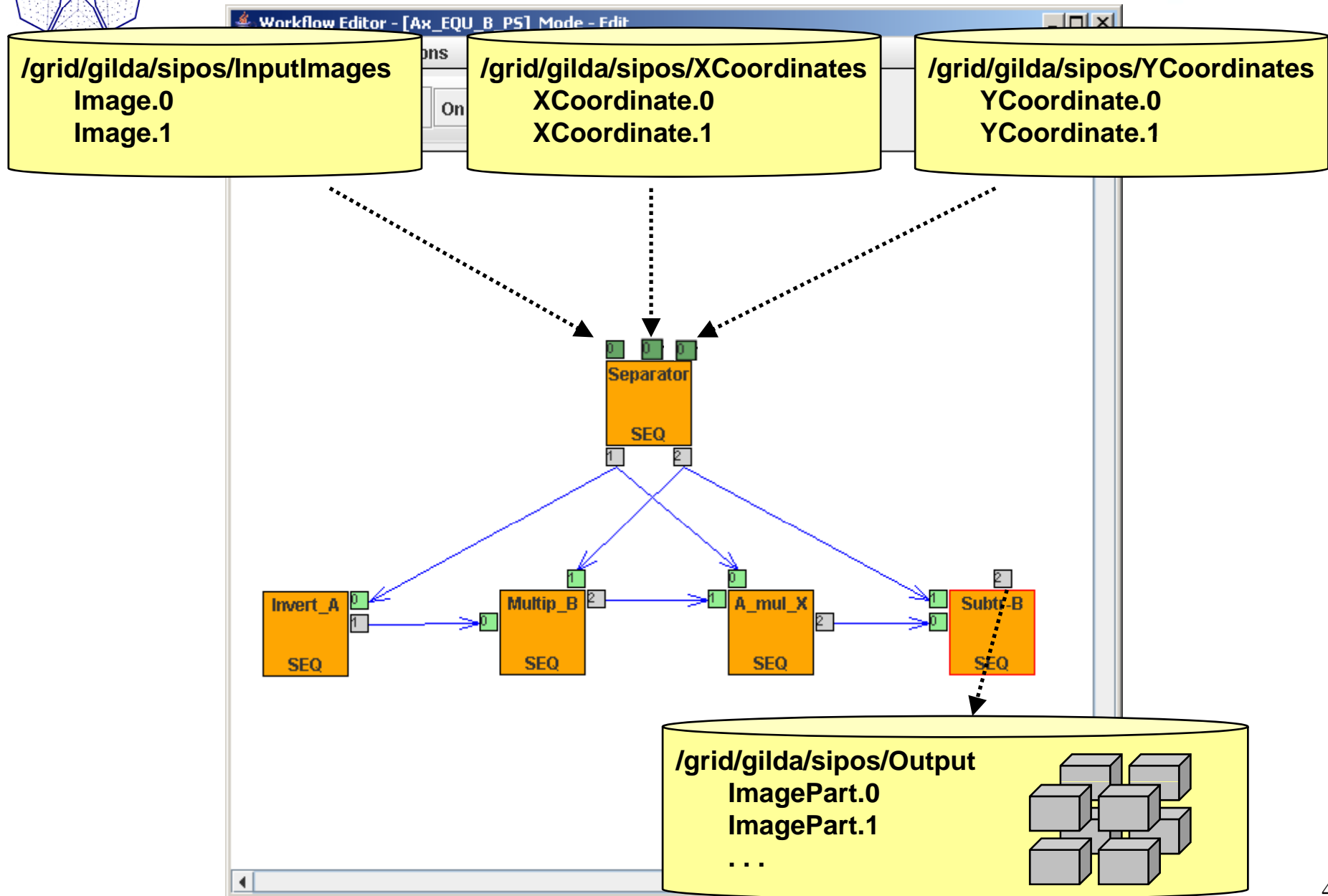


# Turning a WF into a parameter study





# Turning a WF into a parameter study



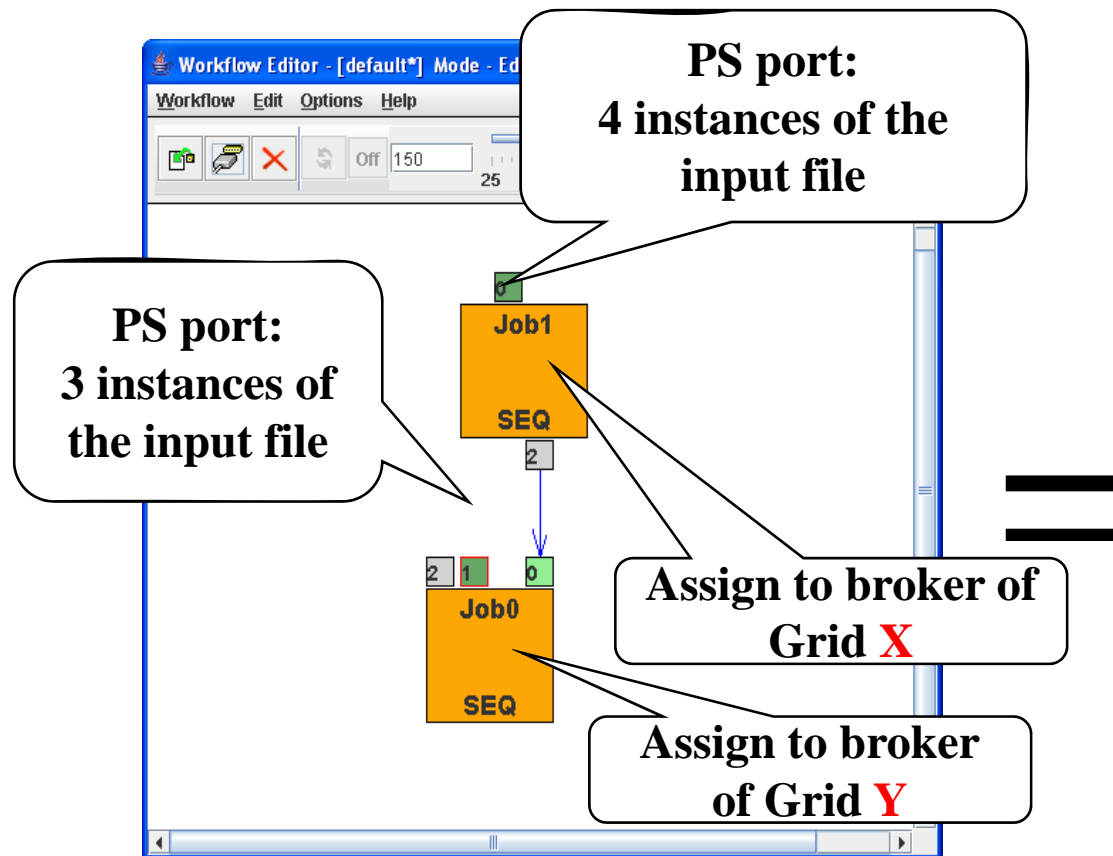




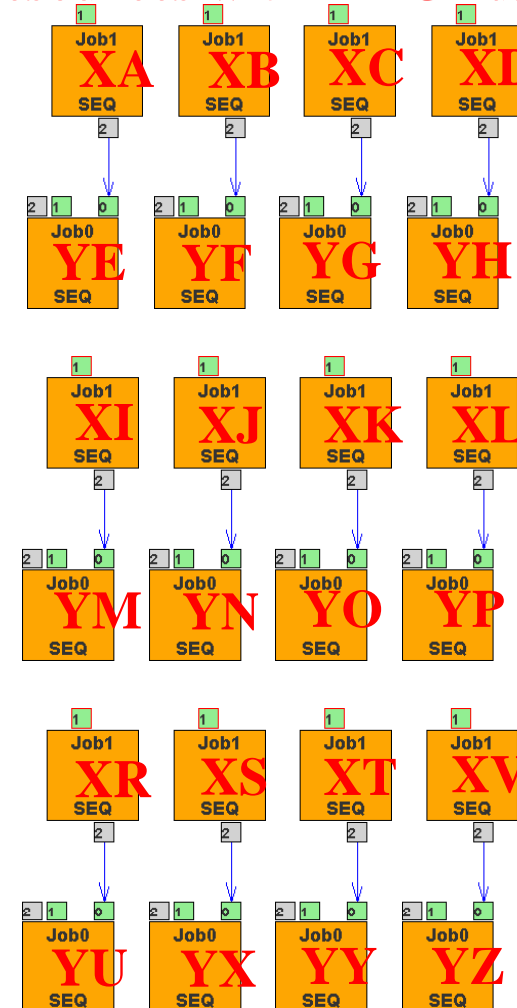
# Generating multi-grid eWFs



## 1 PS workflow execution



## Assigns the 24 jobs to 24 Grid Resources within 2 Grids





# Generators



- Generate input files for parameter study workflows
- Saves these files into LFC catalogs
- Two types:

## Auto generator

- Pre defined program logic
- To generate text files
- User controls file content by templates and parameters

## Custom generator

- User provides program logic
- To generate binary file content (e.g. image, audio, ...)



# Collectors



- Collect output units and perform a collective operation on them. E.g.
  - Standard deviation
  - Average
  - Statistics
  - Evaluation
  - Selecting the “best” point of the parameter space
  - ...
- User provides the program logic
- Portal provides data transfer
  - No need to use any Grid API in your code
  - Open and write I/O files as local files



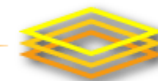
# References



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



[portal.p-grade.hu/index.php?m=5&s=0](http://portal.p-grade.hu/index.php?m=5&s=0)





# Summary and conclusion



- P-GRADE Portal hides the complexity of Grid systems
  - Globus 2, Globus 4, LCG, gLite
- Various components can be integrated into workflows
  - Sequential codes
  - MPI codes
  - Legacy code services (with the GEMMLCA-specific version)
- Workflows can be executed as parameter studies
  - Storage management
  - Generators
  - Collectors
- Your code does not have to contain grid specific calls
- Graphical interfaces for
  - grid application development
  - certificate management
  - application execution and monitoring
- Support for collaborative work
  - Share workflow components
  - Share workflows
- Built by standard portlet API → customizable to specific needs



**Learn once, use everywhere**  
**Develop once, execute anywhere**

***Questions, hands-on***

[www.portal.p-grade.hu](http://www.portal.p-grade.hu)  
[pgportal@lpds.sztaki.hu](mailto:pgportal@lpds.sztaki.hu)



***Additional slides***



# Rescuing a failed workflow 1.



**A job failed during workflow execution**

**Read the error log to know why**

Workflow	Job	Gridname	Hostname	Status	Log	Output	View	Action
demo-RESCUE	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	-	-	Err
	Count4	SZTAKI-GRID	n0 .hpcc.sztaki.hu	submitted	--	-	-	--

Message: Workflow details successfully displayed.

July 29, 2005

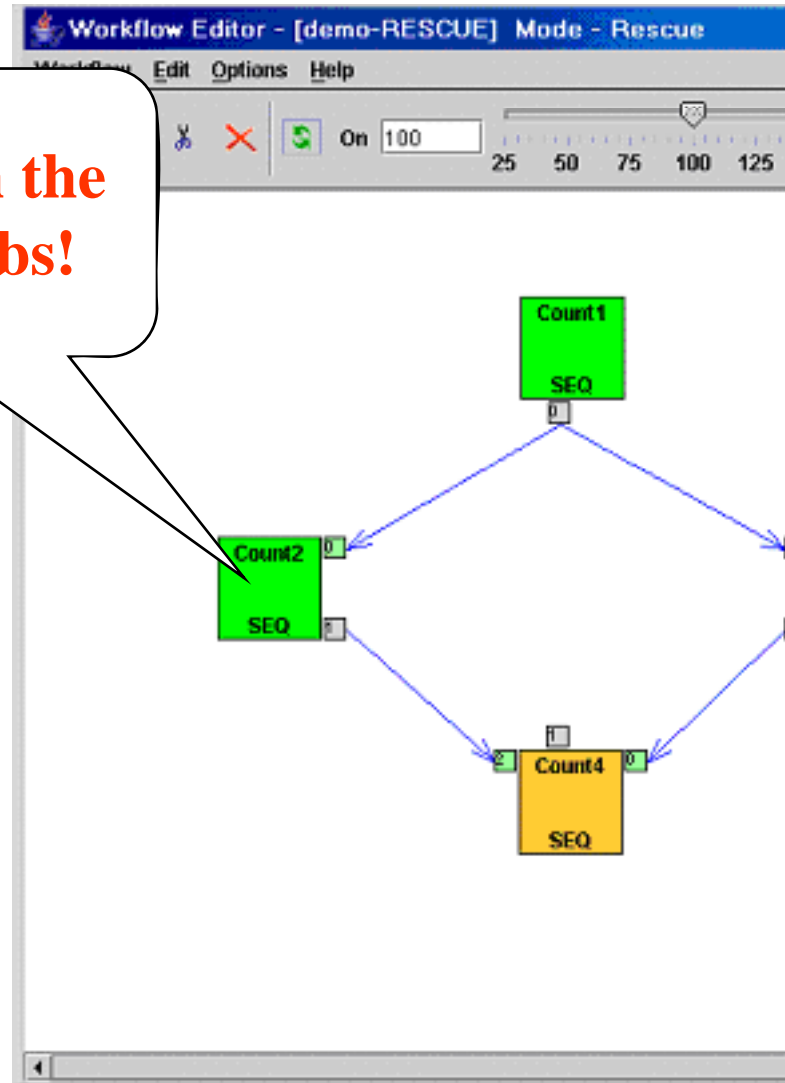




# Rescuing a failed workflow 2.



**Don't touch the finished jobs!**



**Map the failed job onto a different resource or download a new proxy for it**

**The execution can continue from the point of failure**