



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

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On behalf of:

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www.portal.p-grade.hu
www.cpc.wmin.ac.uk/gemlca



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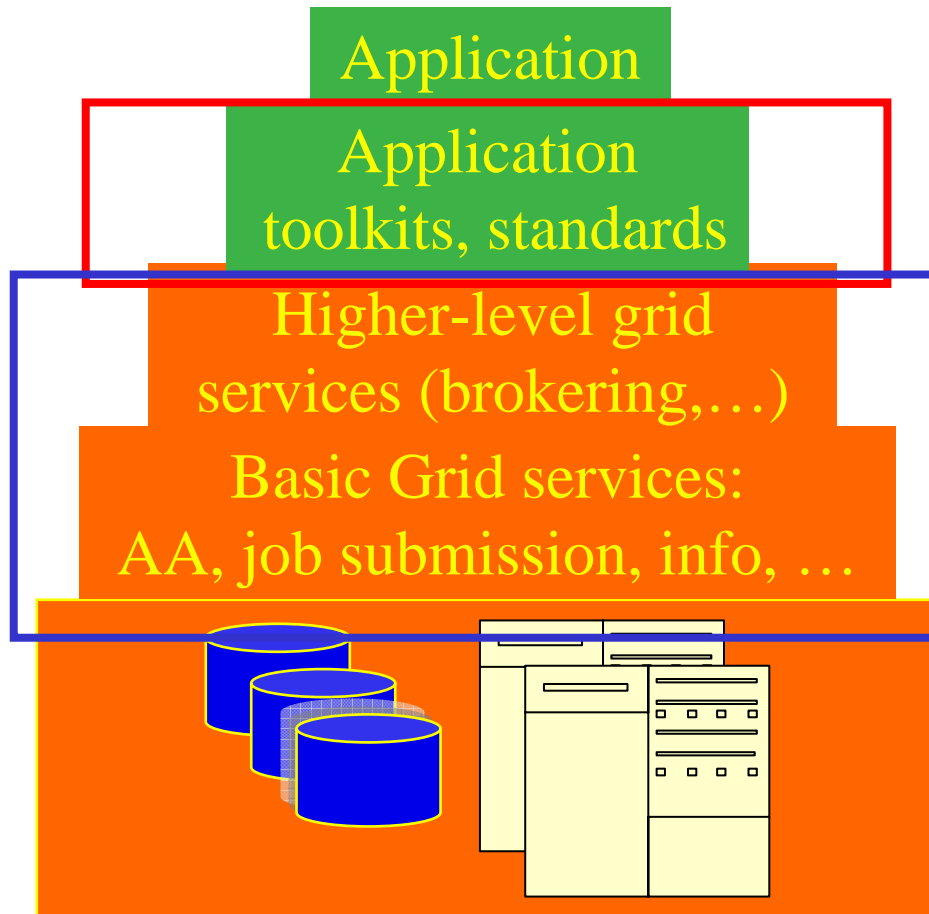
- Motivation of creating the tools portal
- P-GRADE Portal and GEMMLCA in a nutshell
- Multi-grid capabilities
- Lifecycle of GEMMLCA / P-GRADE applications
- Services for application developers

- Introduction of the hands-on
- Hands-on

- Roadmap of the NGS GEMMLCA portal
- Further steps



Context



- ← Graphical interface
- ← Middleware independent services of P-GRADE Portal and GEMMLCA
- ← Middleware specific clients
- ← Grid middleware services



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)



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 tool for Grid orchestration**
- Based on **GridSphere-2**
 - Easy to expand with new portlets (e.g. application-specific portlets)
 - Easy to tailor to end-user needs
- Developed by SZTAKI
- **Grid services** supported by the portal:

Service	EGEE grids (LCG/gLite)	Globus 2 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	

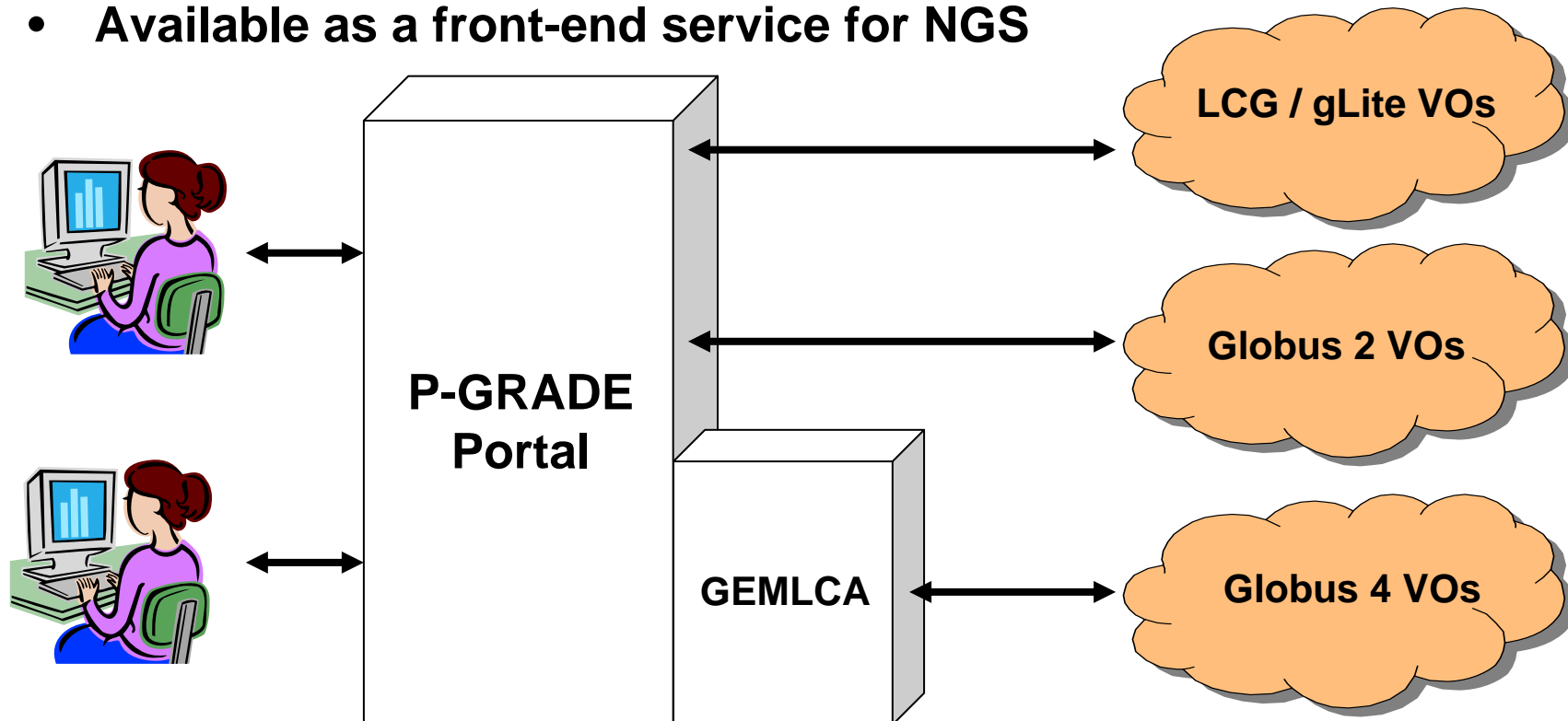
Solves Grid interoperability problem at the workflow level



GEMMLCA / P-GRADE Portal in a nutshell



- **P-GRADE Portal extended with GEMMLCA back-end**
 - Sharing jobs and legacy codes as workflow components
 - GEMMLCA is a grid service implemented by UoW
- **A step towards collaborative e-Science**
- **Support for Globus 4 grids (besides GT2 and EGEE)**
- **Available as a front-end service for NGS**





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
Development, application support



- **Coregrid** www.coregrid.net
Research, development



- **EGEE** www.eu-egee.org
LCG and gLite training, application development



- **ICEAGE** www.iceage-eu.org
Grid training and education





What is a GEMLCA / P-GRADE Portal workflow?

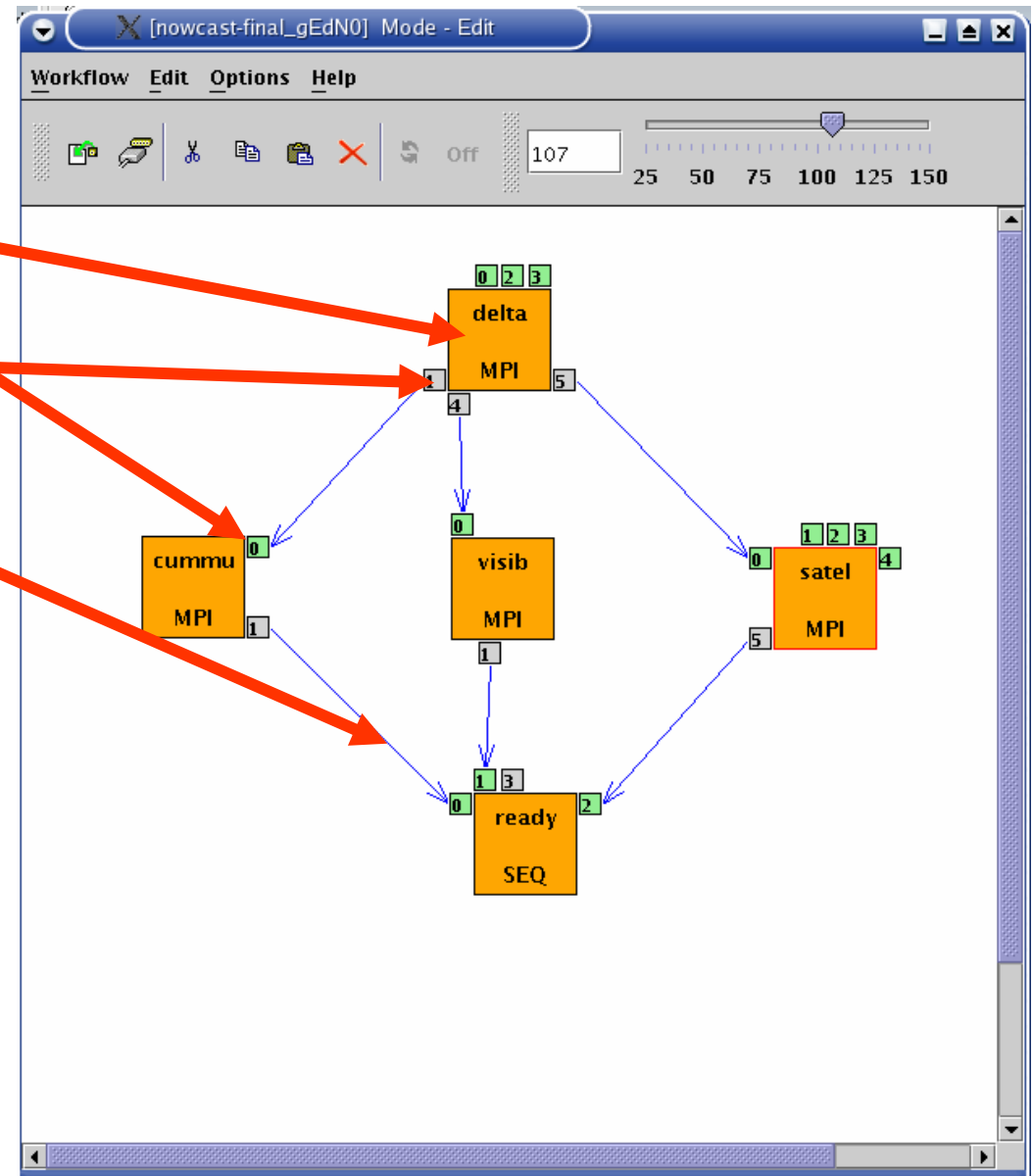


- **A directed acyclic graph where**

- 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

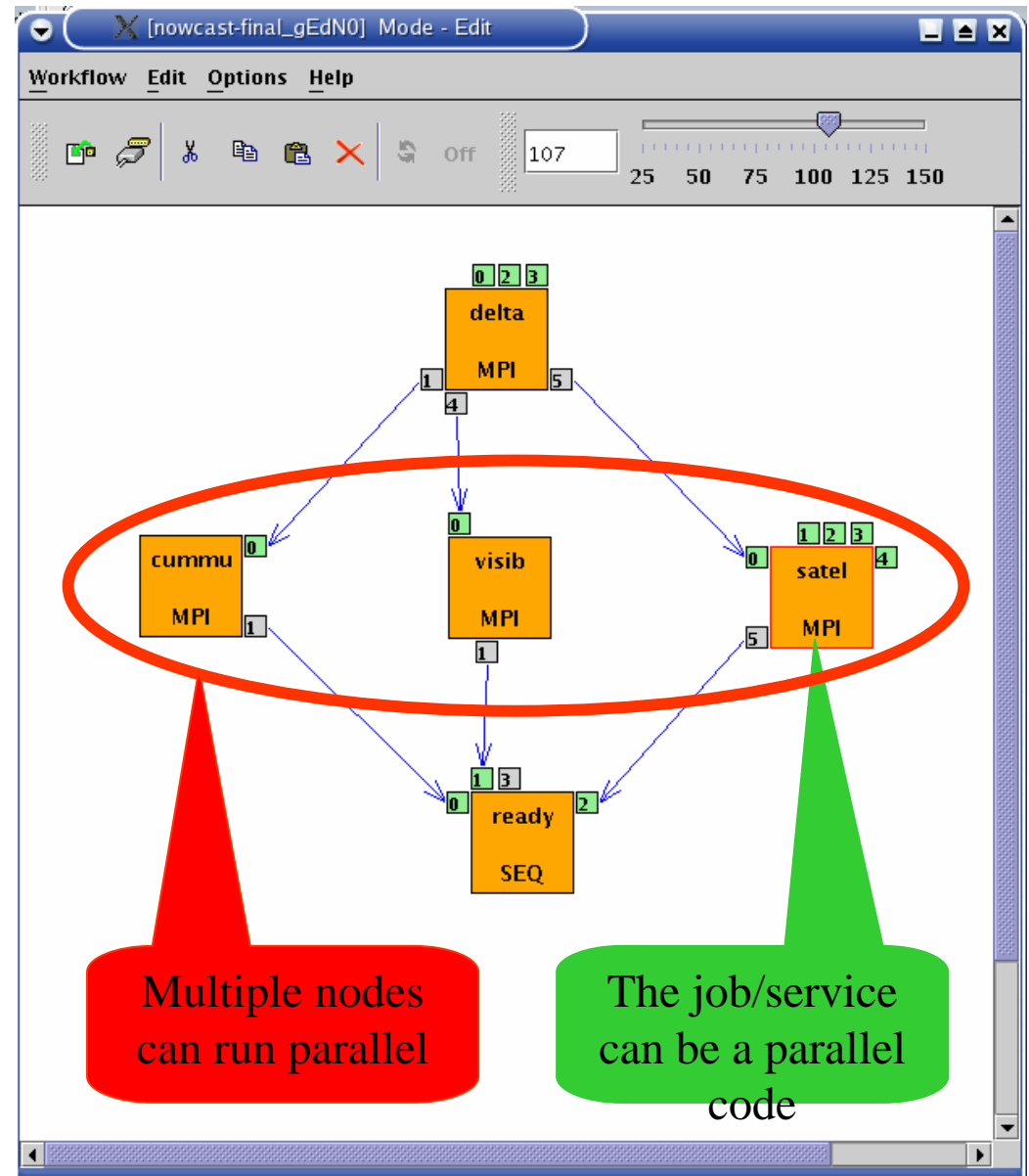




Two levels of parallelism within a workflow

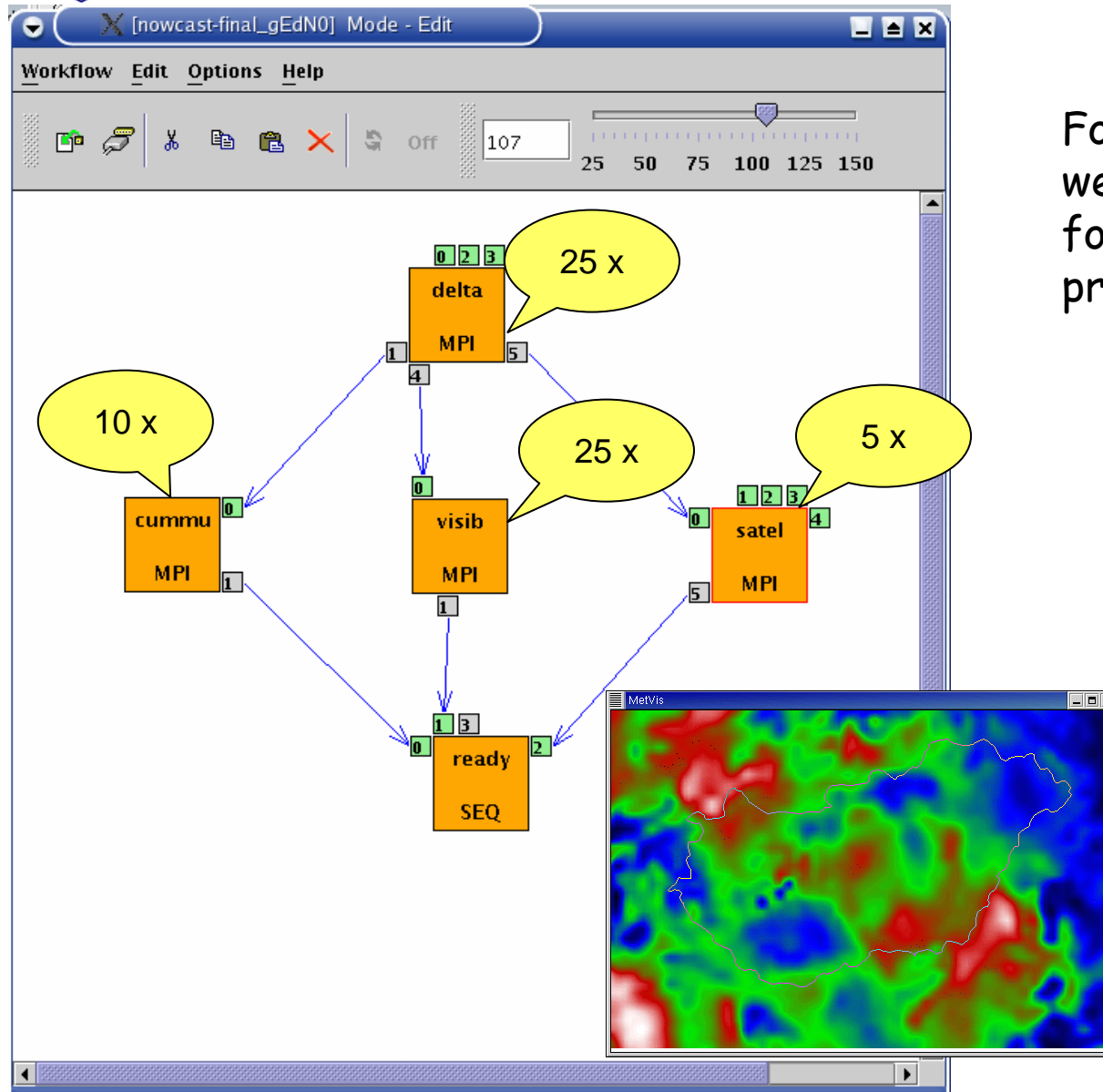


- The workflow concept of the GEMMLCA/ P-Grade Portal enables the efficient parallelization of complex problems
- Semantics of the workflow enables two levels of parallelism:
 - Parallel execution inside a workflow node
 - Parallel execution among workflow nodes





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

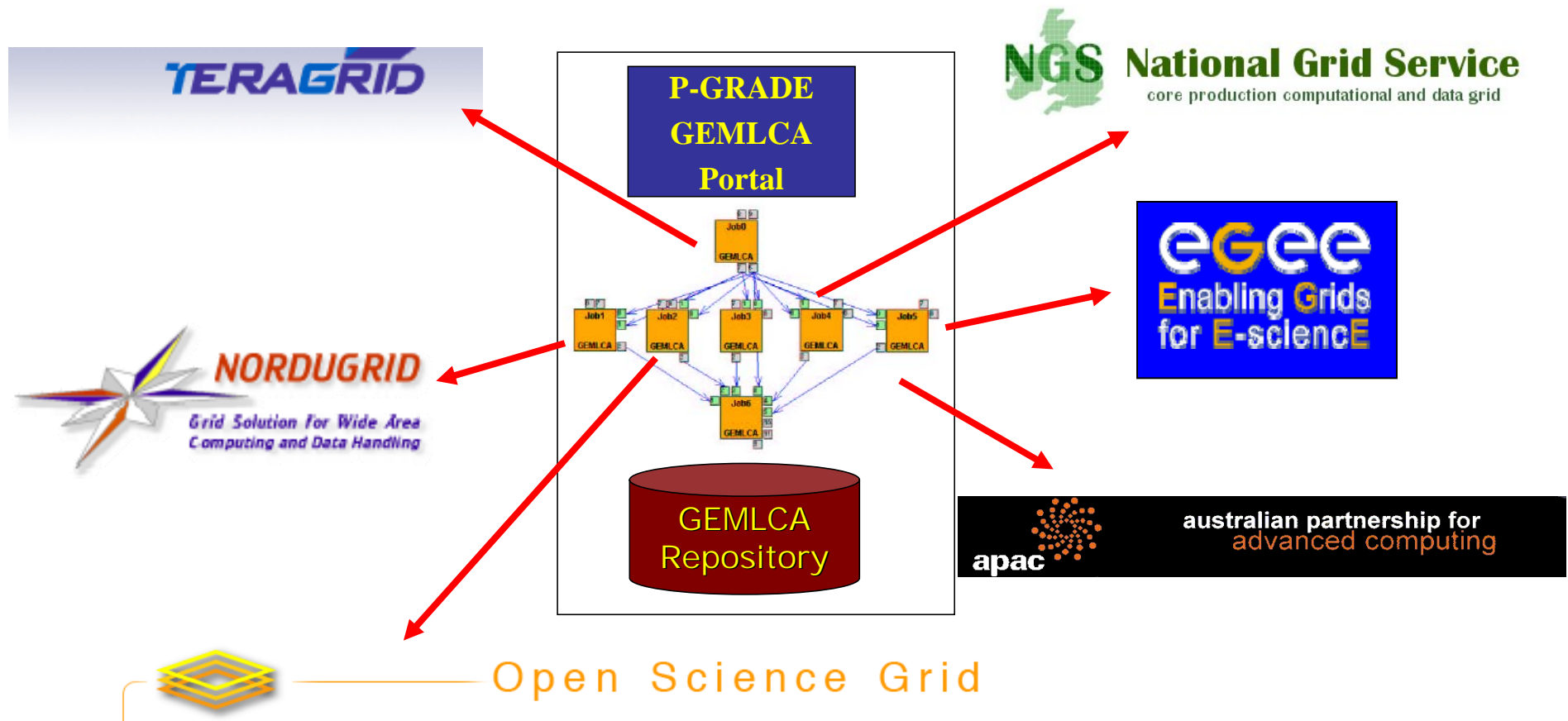
- Requirements:
- Execution time < 10 min
 - High resolution (1km)



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



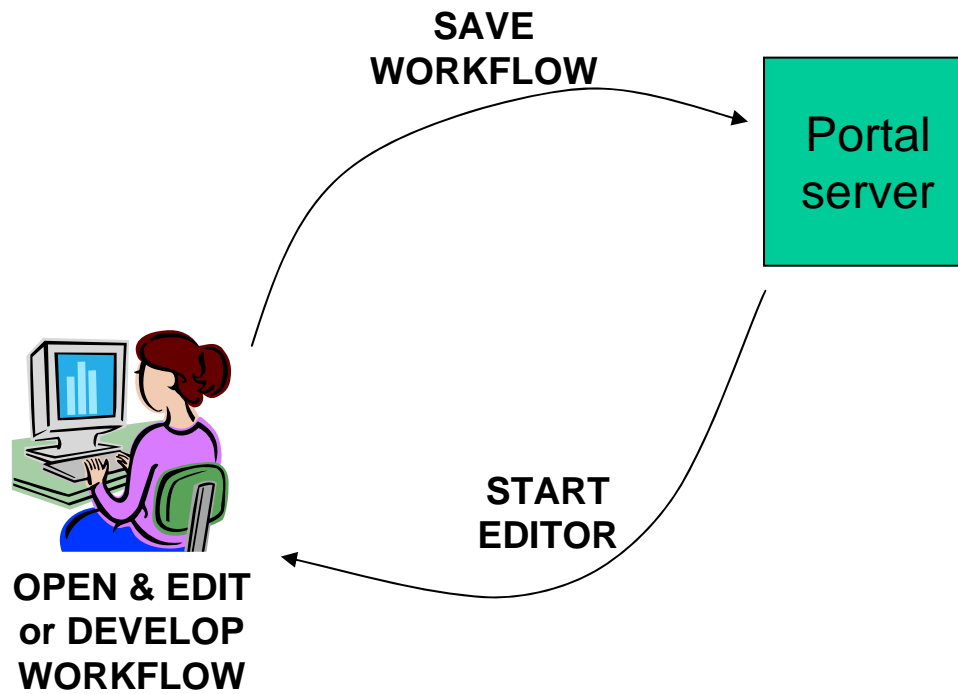


The typical user scenario

Part 1 - development phase



Certificate servers

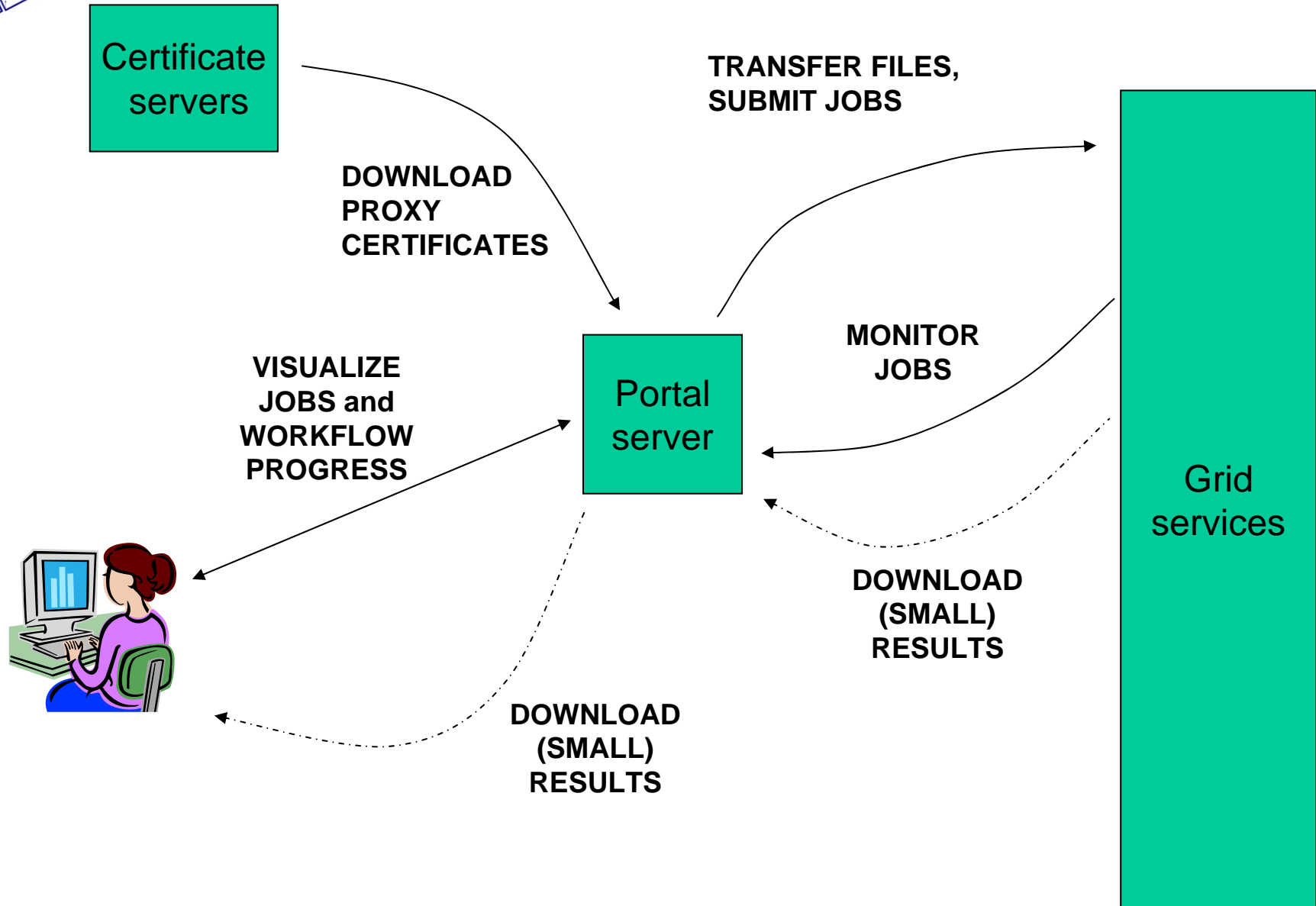


Grid services



The typical user scenario

Part 2 - execution phase



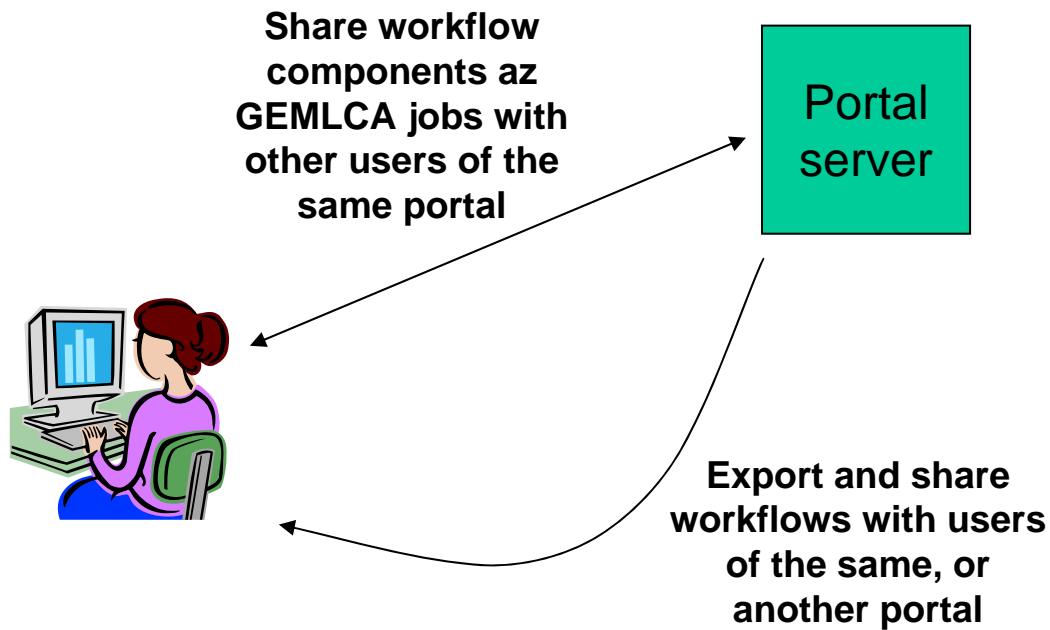


The typical user scenario

Part 3 - collaborative phase



Certificate servers



Grid services



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 a 'portal' link. Below this, there are logos for the European Union, SEE-GRID, and VLA. The 'Workflow Manager' application is open, showing a 'Workflow Editor' tab and a 'Refresh' button. A table lists the workflow details:

Workflow list						
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%			

A message at the bottom of the window reads: *Message: Workflow successfully submitted.*



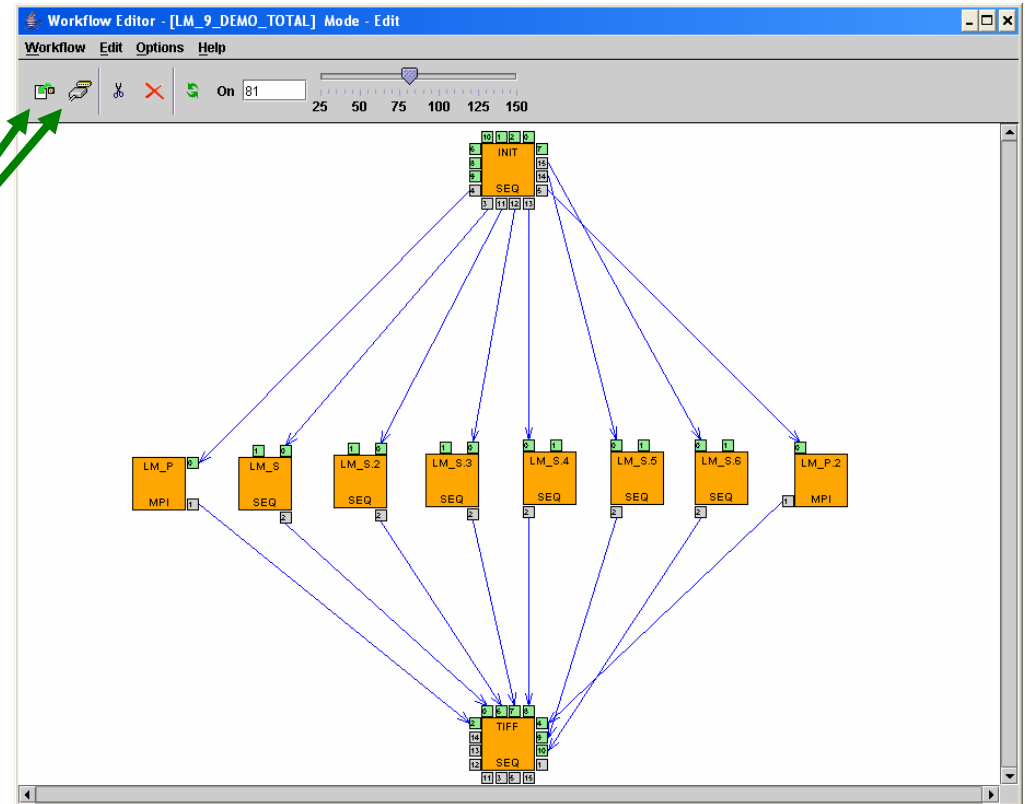
Workflow Editor

Defining the graph



- The aim is to define a DAG of jobs and services (GEMMLCA jobs):

- Drag & drop components:** nodes and ports
- Define their properties**
- 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 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 GEMMLCA service component



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/wsrf/service

Legacy Code: manhattan - Manhattan generator (Fork)

Parameters

Parameter ...	Mandatory	Type	Mode	Value	
rows	No	Command...	Input	10	
columns	No	Command...	Input	10	null
unit width	No	Command...	Input	150	null
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

Ok Cancel

LM_P
MPI

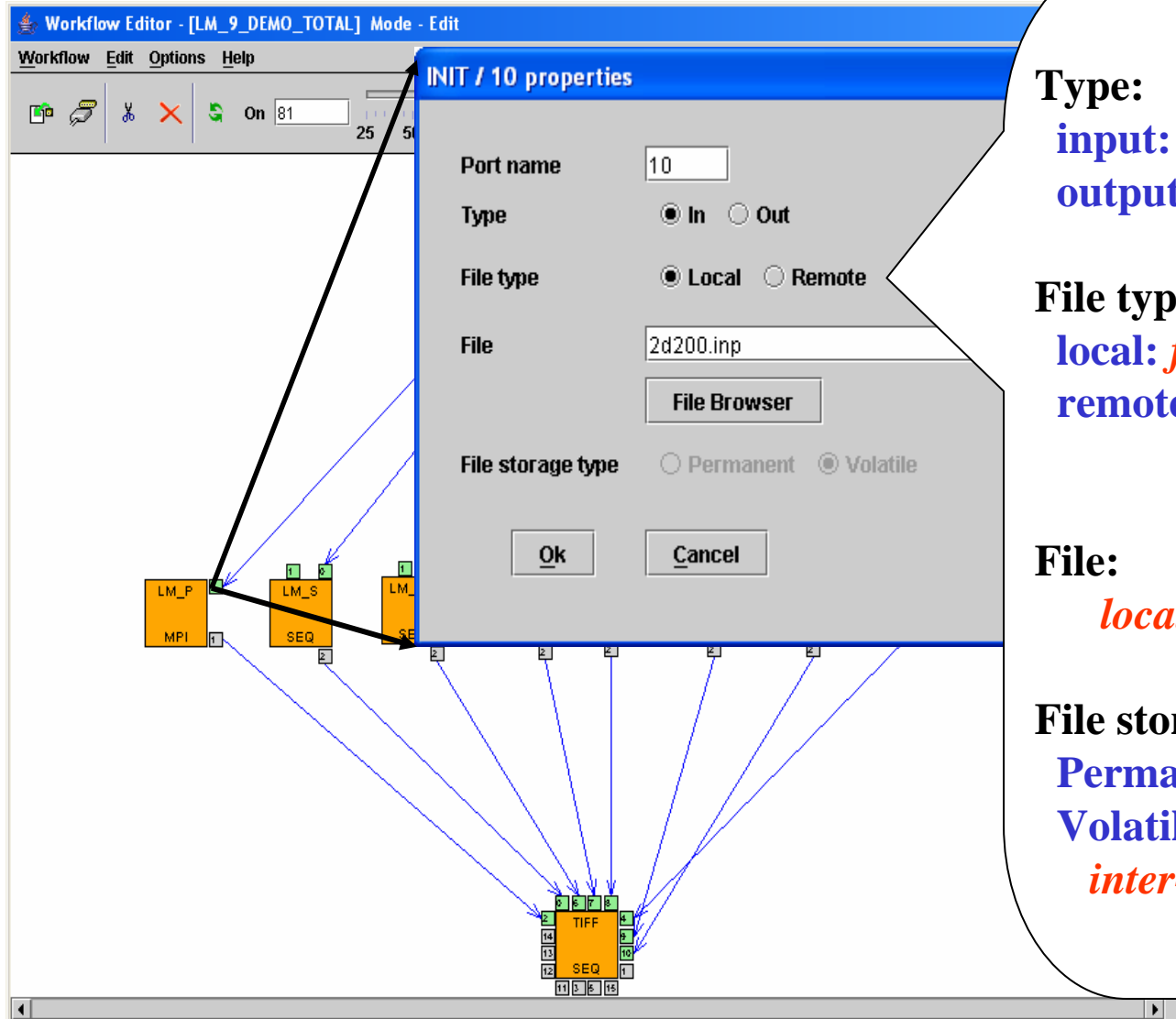
Properties of a GEMMLCA service:

- The location of the service:
 - Grid (VO)
 - Resource / broker
- Code available for that resource
- Actual parameter values



Workflow Editor

Defining job / service input-output data



File properties

Type:

input: *the component requires*
output: *the component produces*

File type:

local: *from/to my desktop*
remote: *from/to a storage resource*

File:

location of the file

File storage type (for outputs only):

Permanent: *final result*
Volatile: *used only for inter-component data transfer*



Possible file references



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/egrid/sipos/11-04.dat`

- LFC logical file name
(LFC file catalog is required – EGEE VOs)
`lfn:/grid/egrid/sipos/11-04_-_result.dat`

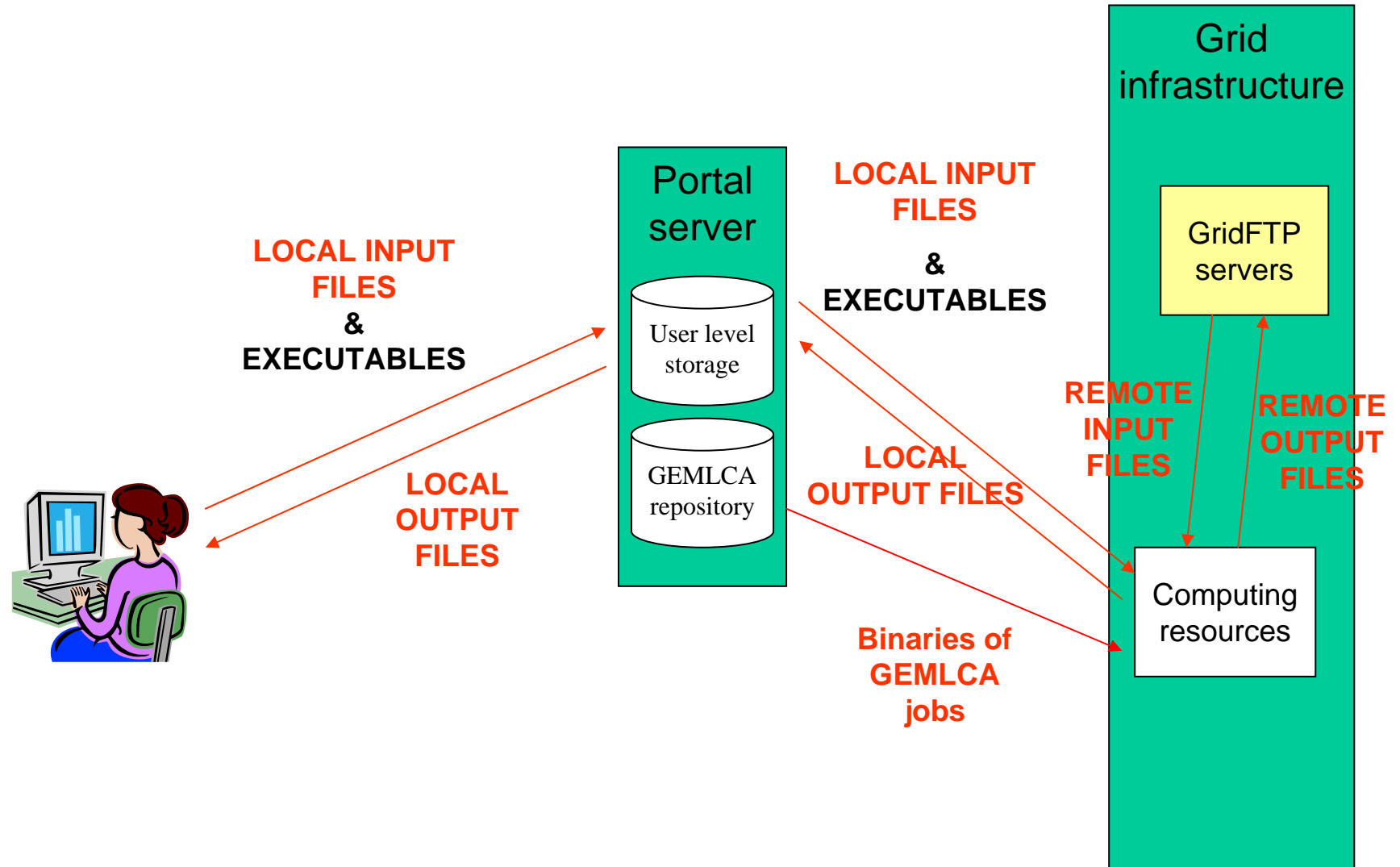
- GridFTP address (in Globus Grids):
`gsiftp://somengshost.ac.uk/mydir/11-04.dat`

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

Remote file

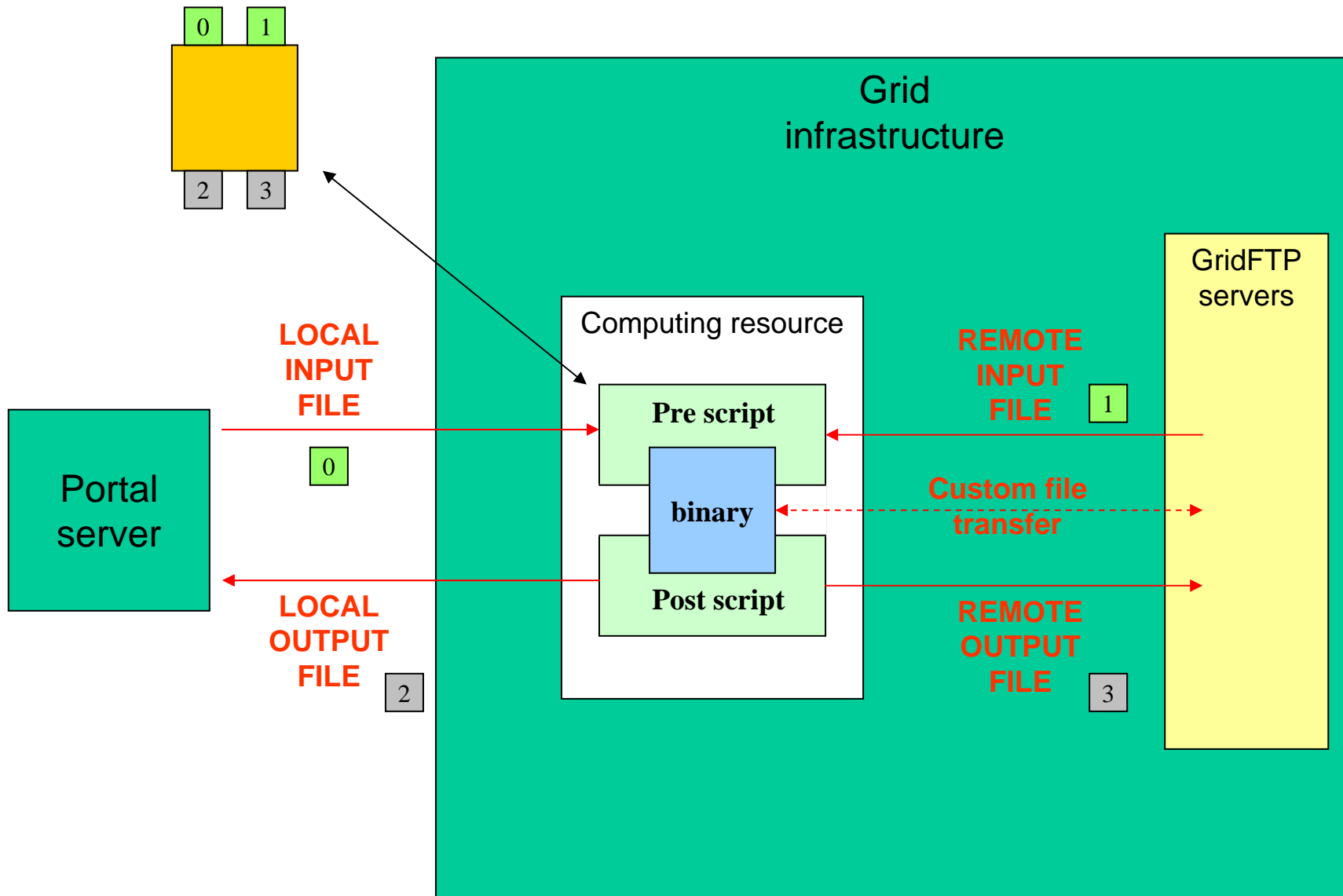


Workflow level file transfer





Job / service level file transfer





Browsing computing resources by the information system portlet



PGrade Portal - Microsoft Internet Explorer

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%

**Graphical
interface for
GIIS and
BDII servers**



Executing workflows

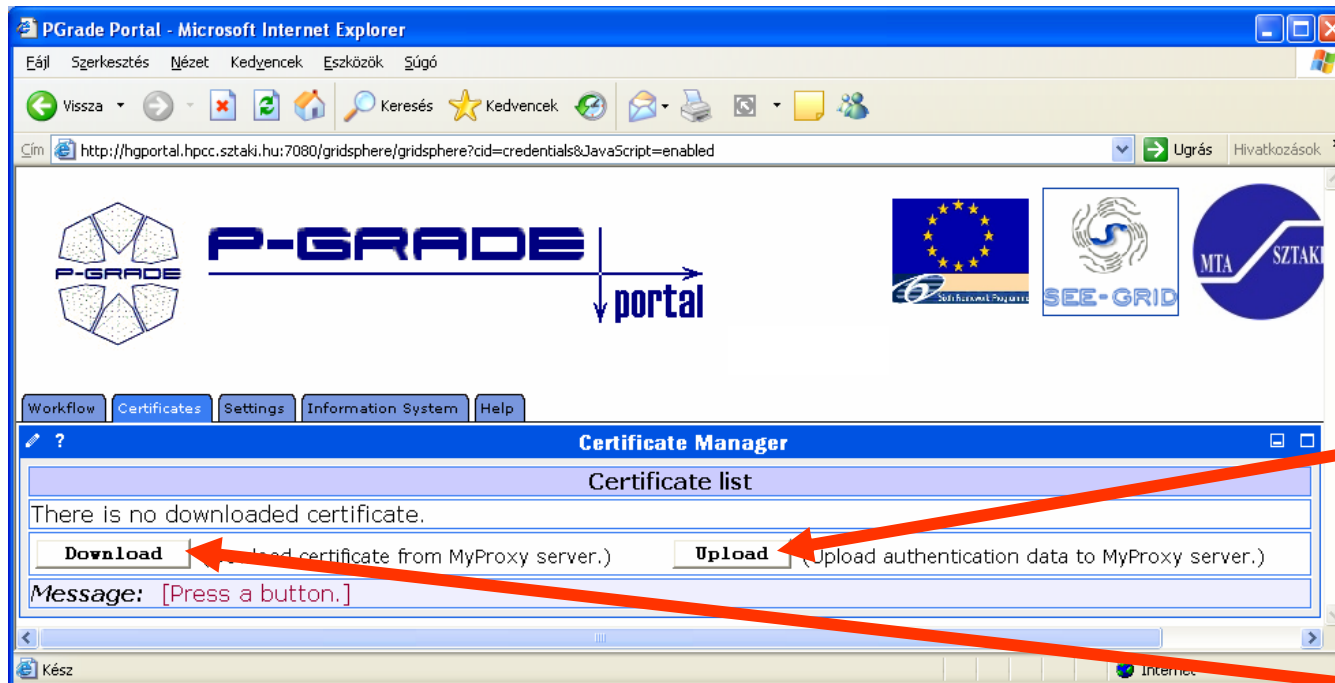
Main steps

- 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 access GSI-based Grids the portal server application needs proxy certificates
- “Certificates” portlet:
 - to upload X.509 certificates into MyProxy servers
 - to download short-term proxy credentials into the portal server application



Certificate Manager

Downloading a proxy



1. MyProxy server access details:

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

2. Proxy parameters:

- Lifetime
- Comment

3. Grid association

PGrade Portal - Microsoft Internet Explorer

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	cvs.lpds.sztaki.hu *	port	7512 *
login	seecert *	password	***** *
lifetime (hours)	100 *	description	

*: Cannot be left empty.

Download Cancel

Message: Fill in the fields for download!



Certificate Manager

Multi-grid → Multi-proxy



The screenshot shows the P-Grade Portal interface in Microsoft Internet Explorer. The main content area is titled "Certificate Manager" and displays a "Certificate list" table. The table has columns for "Issuer", "Set for Grids", "Time left", and "[Actions]".

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

Below the table are buttons for "Download" (Download certificate from MyProxy server.) and "Upload" (Upload authentication data to MyProxy server.). A message at the bottom states: "Message: Certificate successfully set for HUNGRID." A "Refresh" button is also present.

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

SEE-GRID CEs and SEs

HUNGRID CEs and SEs



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	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%			

Delete all

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 displays 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". The main content area is titled "Workflow Manager" and includes a "Refresh" and "Back" button. Below this is a "Job list" table with columns for Workflow, Job, Gridname, Hostname, Status, Logs, Output, and Visualization. The table lists several jobs, including "LM_9_DEMO_TOTAL" which is in a "submitted" state. A message at the bottom of the page states: "Message: Workflow details successfully displayed."

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	-	-	-

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



Workflow Execution

(observation by the workflow portlet)



The screenshot shows the PGrade Portal interface in Microsoft Internet Explorer. The browser title is "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	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 Certificates Settings Information System Help

Workflow Manager

Refresh Back

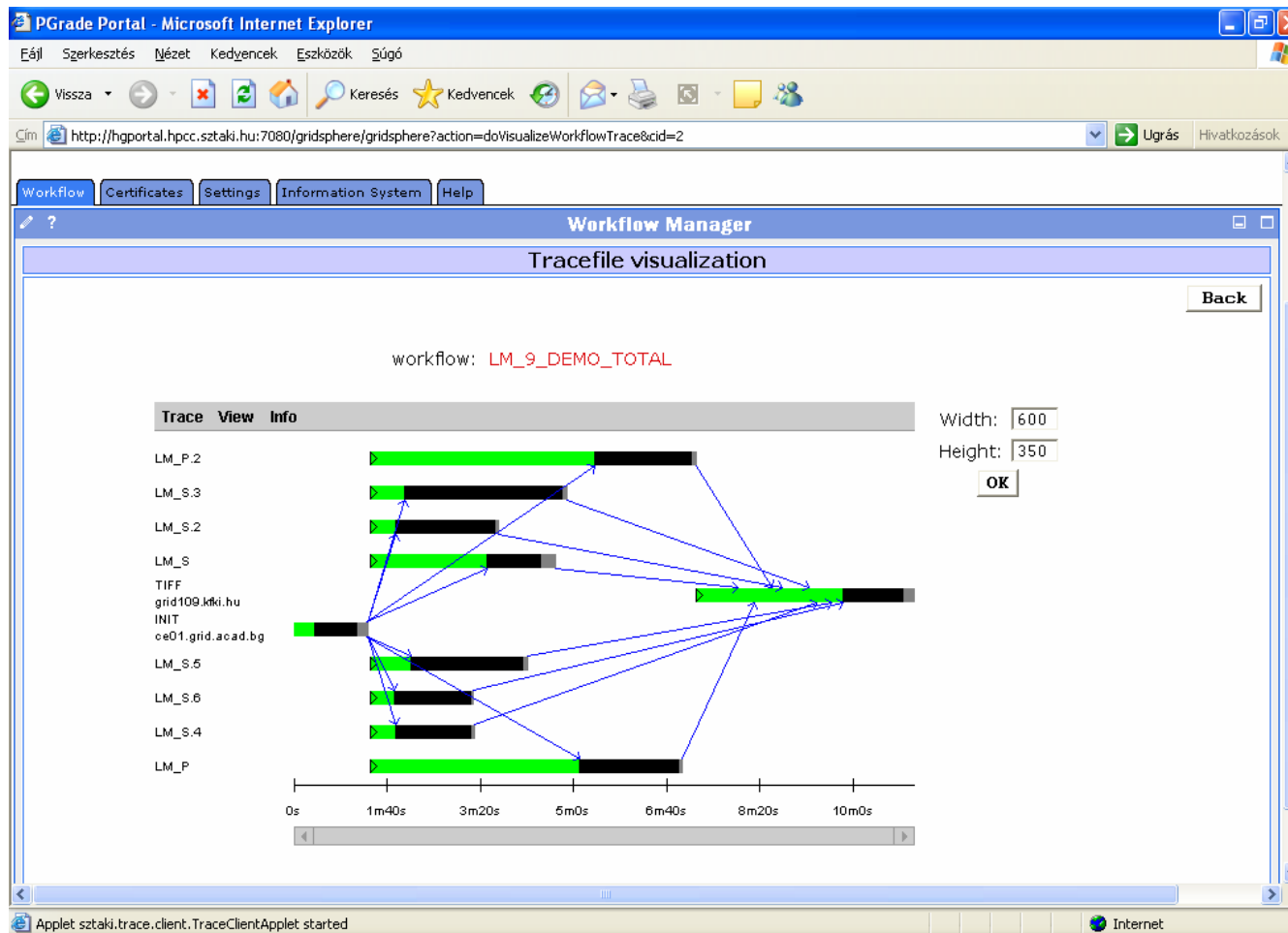
Workflow	Job	Gridname	Hostname	Status	Job list			S
					[Logs]	[Output]	[Visualization]	
LM_9_DEMO_TOTAL				finished	Err	Being zipped..	Visualize All	
	INIT	SEE-GRID	ce01.grid.acad.bg	finished	-	-	-	
	LM_P	SEE-GRID	n40.hpcc.sztaki.hu	finished	Out	-	Visualize	
	LM_P.2	SEE-GRID	n40.hpcc.sztaki.hu	finished	Out	-	Visualize	
	LM_S	SEE-GRID	grid-ce.il.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



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



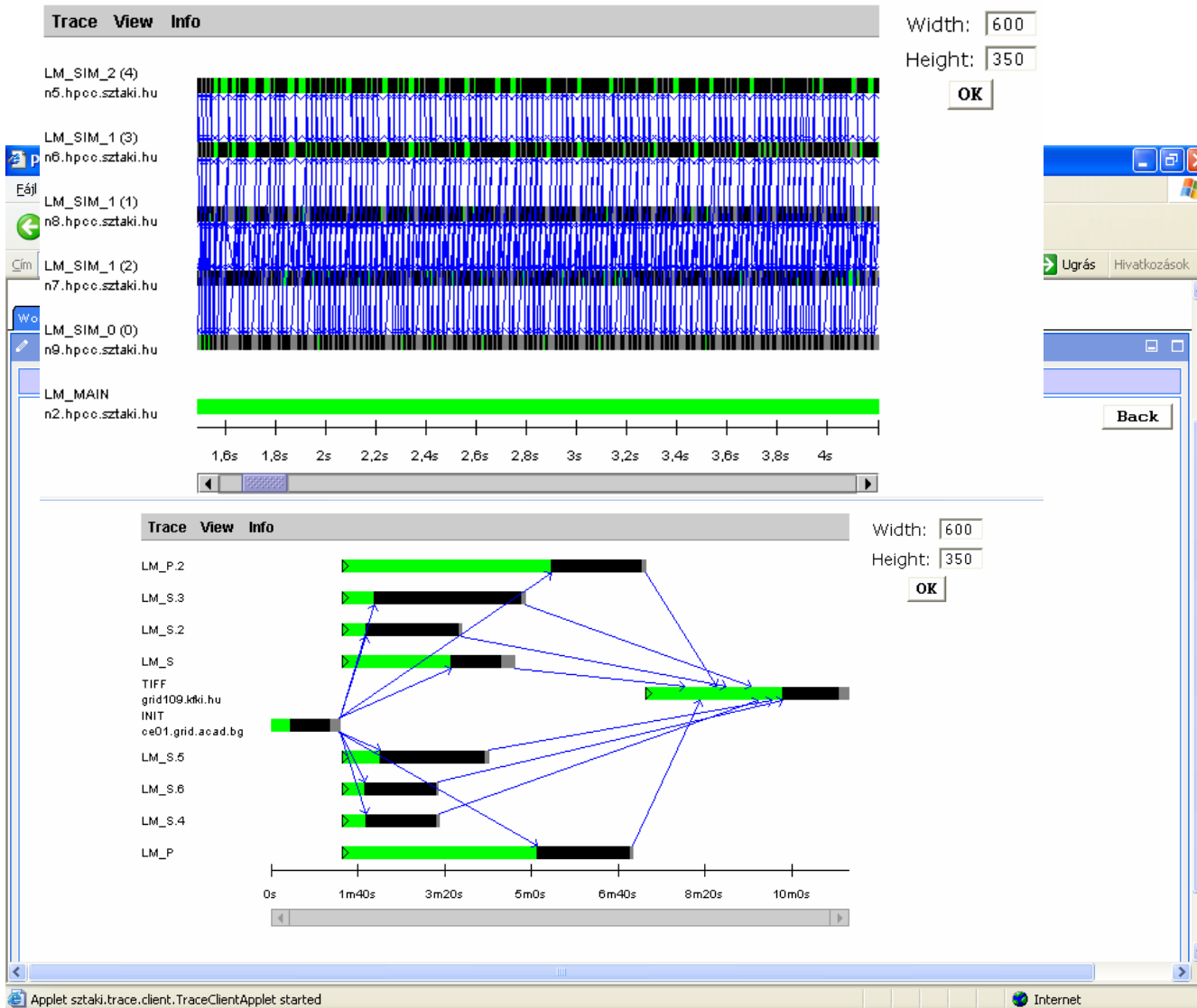
- The portal monitors and visualizes workflow progress



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 parallel jobs (if they are prepared for Mercury monitor)



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 .hpc.sztaki.hu	finished	Out	-	-	-
	Count2	SZTAKI-GRID	n0 .hpc.sztaki.hu	finished	Out	-	-	-
	Count3	HUNGRID	chemgrid3 .chemres.hu	error	- Err	-	-	-
	Count4	SZTAKI-GRID	n0 .hpc.sztaki.hu	submitted	--	-	-	-

Message: Workflow details successfully displayed.

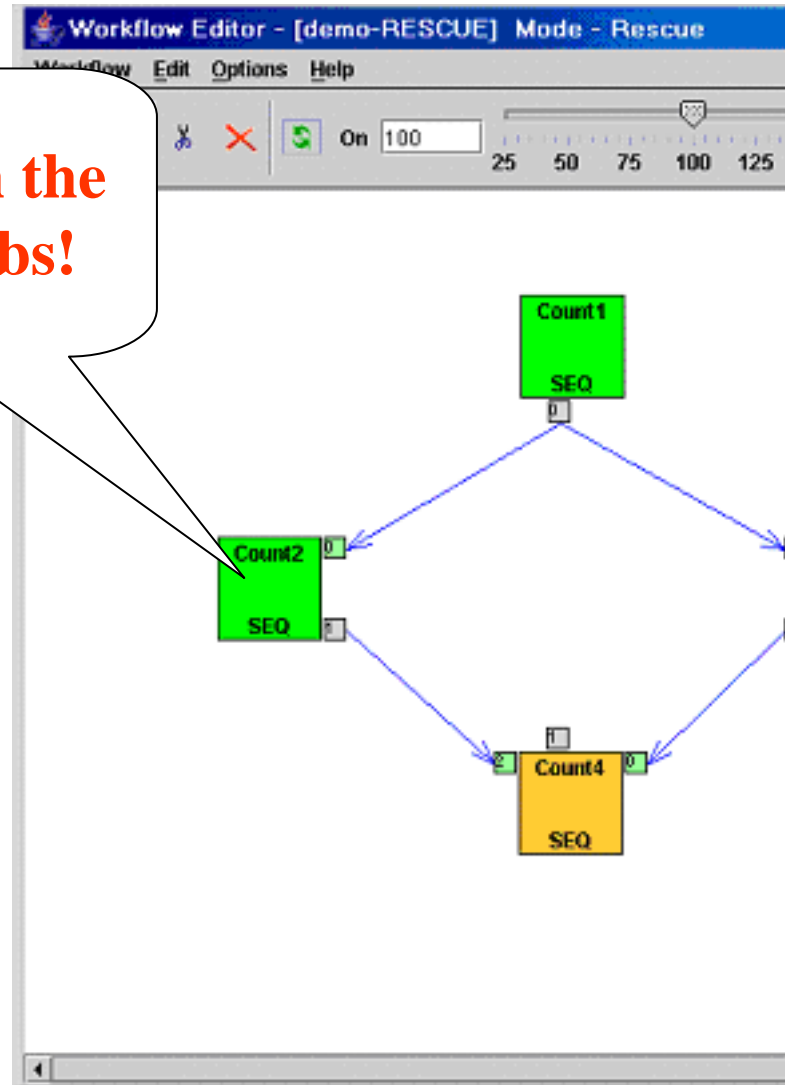
July 29, 2005



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



Downloading the results...



Workflow Manager

Refresh Back

Workflow	Job	Hostname	Status	[Logs]	[Output]	[Visualization]	[Action]
nowcast-final-g_SGE			finished		✓	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	--			
	visib	n0.hpcc.sztaki.hu	finished	--			

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



Putting a successfully finished job into the GEMMLCA repository



Legacy code Environment Parameters:

maximumProcessors	1
executable	LINUX/mkdir
minimumProcessors	1
maximumJob	11
jobManager	Fork
id	mkdir
description	Unix mkdir program

List of legacy code Arguments:

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

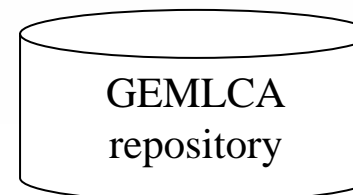
Mkdir Legacy Code exposed as a Grid Service

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>
```

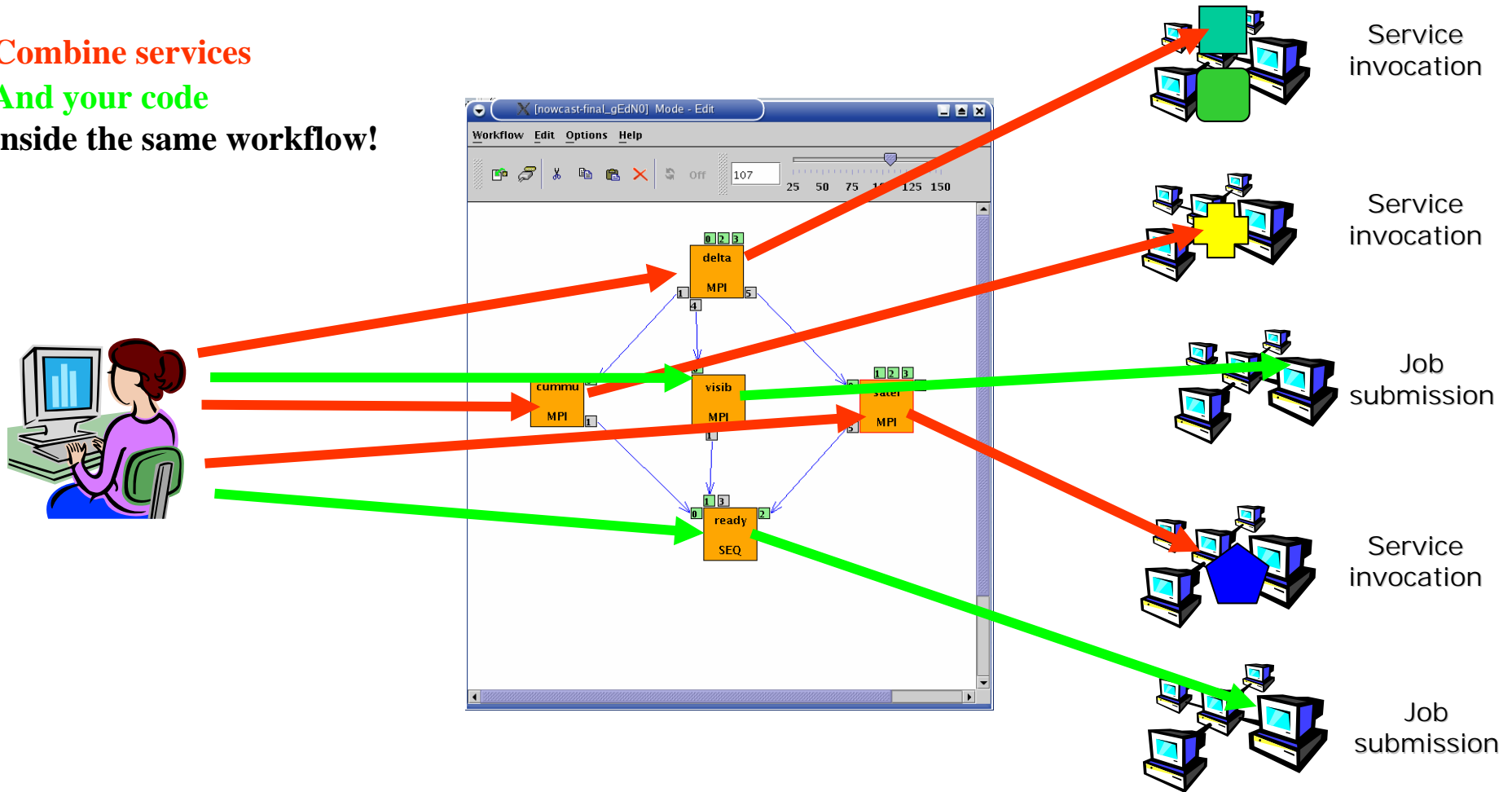




Collaborative applications



Combine services
And your code
inside the same workflow!





GEMMLCA / P-GRADE on the UK NGS: P-GRADE NGS GEMMLCA Portal



- **Information website:**
<http://www.cpc.wmin.ac.uk/ngsportal/>
- Interface for NGS GT2 sites
- Interface for GT4 Westminster site
- Interface for EGEE GILDA sites
- Open for the NGS and EGEE communities





Other P-GRADE Portal installations



- P-GRADE Portal service is available for
 - SEE-GRID infrastructure
 - Central European VO of EGEE
 - GILDA: Training VO of EGEE
 - US Open Science Grid, TeraGrid
 - Economy-Grid, Swiss BioGrid, Bio and Biomed EGEE VOs, BioInfoGrid, BalticGrid
 - **OGF GIN VO (also connected to NGS)**





Hands-on slides