



Enabling Grids for  
E-science in Europe

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# Input from Generic and Testing

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(Thanks to E. Fede for the Testing part)  
(Thanks to A. Calanducci, A. Costa, and U. Becciani for the IBM-SP part)



# Contents

- Input from Generic Applications after the First EGAAP meeting (<http://agenda.cern.ch/fullAgenda.php?ida=a042351>):
  - Requirements
- MPI jobs on LCG2
- Integration on non-Linux machines on Grid.It and GILDA (thanks to A. Calanducci, A. Costa and U. Becciani)
- Input from the Testing Group (thanks to Eric Fede)



# EO Applications Requirements

- Improvement on metadata handling (RMC, Spitfire)
- Improvement on security (restricted access, groups and roles within a VO)
- Improvement on scalability (e.g. number of files, file sizes).
- Improvement of the performance of most of the functionalities.
- Support for parallel programs (e.g. MPI, PVM)

# Geophysics Applications Requirements

- MPI with Mirinet, SCI or other fast network and Fortran 90: The simulation proposed requires the possibility to submit a script and not only the executable. Modelling and imaging are also intrinsically parallel applications using large memory, medium to large exchanges between computing nodes with MPI, local scratch disc space and are heavy cpu intensive. Another requirement, not encountered in DataGrid, is the consistency between the compiler and libraries available on the UI and the ones needed by the cluster at the working node where the job is executed.
- Definition of the role and permission for each partner of a VO to access metadata and data
- Operational databases: update, mirroring, integrity, secure access and metadata handling.
- Secure access to external database such as the GPS and seismological databases

# Earth Sciences Requirements (long form with priorities)

[external document](#)

# Astro-particle Physics Requirements (MAGIC Telescope)

- The security of all distributed system is an important topic. But the astroparticle physics community is purely scientific and therefore the security problems will not be as great as in field like medicine, pharmacy or genomic applications. This offers the use of already existing security mechanisms like the Globus Security infrastructure, etc. without any longer time lag due to not available stricter Security and Privacy mechanisms.

# “MPI problem” on LCG2

- MPI: Message Passing Interface
  - the same executable on all nodes participating to the parallel computation
  - remote (secure) shell commands to start the executable on all nodes and exchange messages among them
- Using PBS as LRM, all nodes involved in a parallel computation are listed in the file **\$PBS\_NODEFILE**
  - with shared homes there is no problem but this is NOT the default LCG2 configuration of a site
  - with non-shared homes, all MPI jobs fail because the InputSandbox is copied on one node only

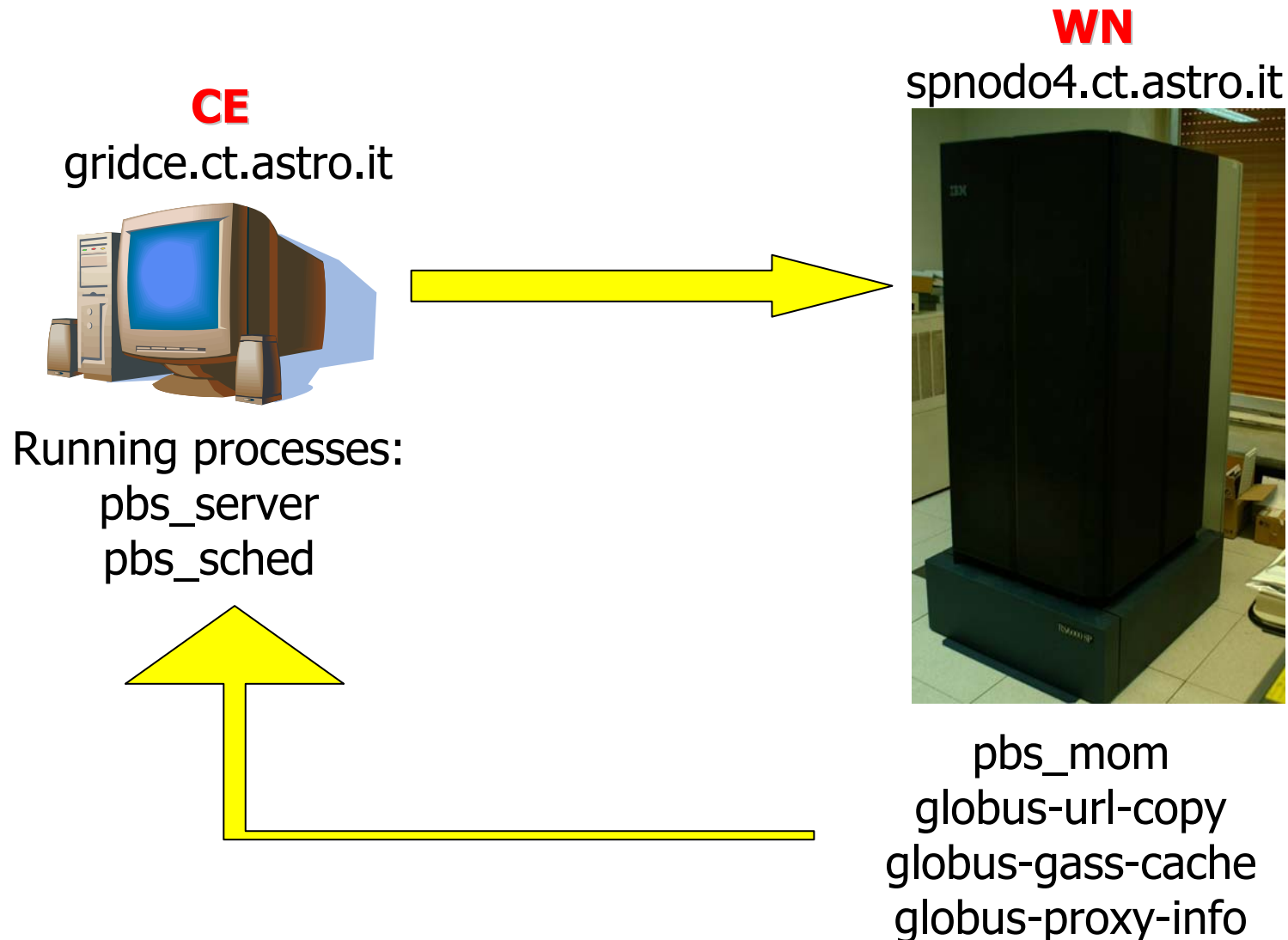
# Solution for MPI jobs on LCG2

(thanks to G. Andronico and G. Donvito, INFN)

- Configure SSH **HostbasedAuthentication** among all WN's
- Submit a script which:
  - reads \$PBS\_NODEFILE
  - copies (with rsync/scp) all needed file(s) on all WN's allocated by PBS for the parallel computation
  - starts **mpirun** with all the relevant information
- No change in the middleware and its configuration needed !
- Preliminary [help document](#) ready and available
- JDL+script successfully tested both on Grid.it and GILDA (a working example is already part of the application suite of the Grid Tutor and available for testing through the Grid Demonstrator)
- Solution for LSF as LRM under investigation



# Integration on non-Linux machines on the Grid (developments done at INAF Catania)



# Tweaking the Computing Element

- PBS server configuration
  - add `sp4.ct.astro.it` to `/var/spool/pbs/server_priv/nodes`
- Replace 'source' with '.' in  
`/opt/globus/lib/perl/Globus/GRAM/submit-helper.pl`  
belonging to the package:  
`lcg-extra-jobmanagers-1.1.6-1`
- These changes have no effects on the other Linux worker nodes



# Tweaking the IBM SP

- Users creation
  - Ex: inaf001 is the username used by gridce.ct.astro.it to map the following certificate:  
/C=IT/O=INFN/OU=Personal Certificate/L=INAF Catania/CN=Alessandro Costa/Email=acosta@ct.astro.it
- OpenPBS compilation and installation (pbs\_mom)
- Globus Toolkit V3.0 installation on sp4.ct.astro.it :  
*Globus Toolbox V3 for multiplatform*
- Copy certificates from /etc/grid-security/certificates/ on the worker node to sp4.ct.astro.it
- Minor changes (mktemp install, ssh key) on AIX 5.2



# Job running on the IBM SP

- `edg-job-submit -r gridce.ct.astro.it:2119/jobmanager-lcgpbs-short -o JID mpi.jdl`

- `mpi.jdl`

```
[aco@gridui MPI]$ cat mpi.jdl
Executable = "/bin/sh";
Arguments = "script.sh";
StdOutput = "std.out";
StdError = "std.err";
InputSandbox = {"script.sh","parallelIO.C","host.list"};
OutputSandbox = {"std.out", "std.err","testFile"};
```

- `script.sh`

```
[aco@gridui MPI]$ cat script.sh
#!/bin/sh
mpCC_r -cpp -o out parallelIO.C
poe ./out -procs 8 -nodes 1 -hostfile host.list
```



# Screenshots (1/3)

- Execution of globus-job-run

```
[aco@gridui aco]$  
[aco@gridui aco]$  
[aco@gridui aco]$ globus-job-run gridce.ct.astro.it:2119/jobmanager-lcgpbs /bin/hostname  
spnodo4  
[aco@gridui aco]$ globus-job-run gridce.ct.astro.it:2119/jobmanager-lcgpbs /bin/uname -a  
AIX spnodo4 2 5 00510CAA4C00  
[aco@gridui aco]$
```

Connected to gridui.ct.astro.it SSH2 - aes128-cbc - hmac-md5 - none

- pbs\_mom logfile (/usr/spool/PBS/mom\_logs/) on sp4.ct.astro.it

```
07/12/2004 13:34:04;0008; pbs_mom;Job;322.gridce.ct.astro.it;Started, pid = 540744  
07/12/2004 13:34:59;0080; pbs_mom;Job;322.gridce.ct.astro.it;task 1 terminated  
07/12/2004 13:34:59;0008; pbs_mom;Job;322.gridce.ct.astro.it;Terminated  
07/12/2004 13:34:59;0008; pbs_mom;Job;322.gridce.ct.astro.it;kill_job  
07/12/2004 13:34:59;0080; pbs_mom;Job;322.gridce.ct.astro.it;Obit sent  
07/12/2004 13:35:00;0008; pbs_mom;Req;del_files;cannot stat globus-cache-export.AxN  
Foi.gpg  
[aco@gridui aco]$
```

Connected to sp4.ct.astro.it SSH2 - aes128-cbc - hmac-md5 - none 85x18



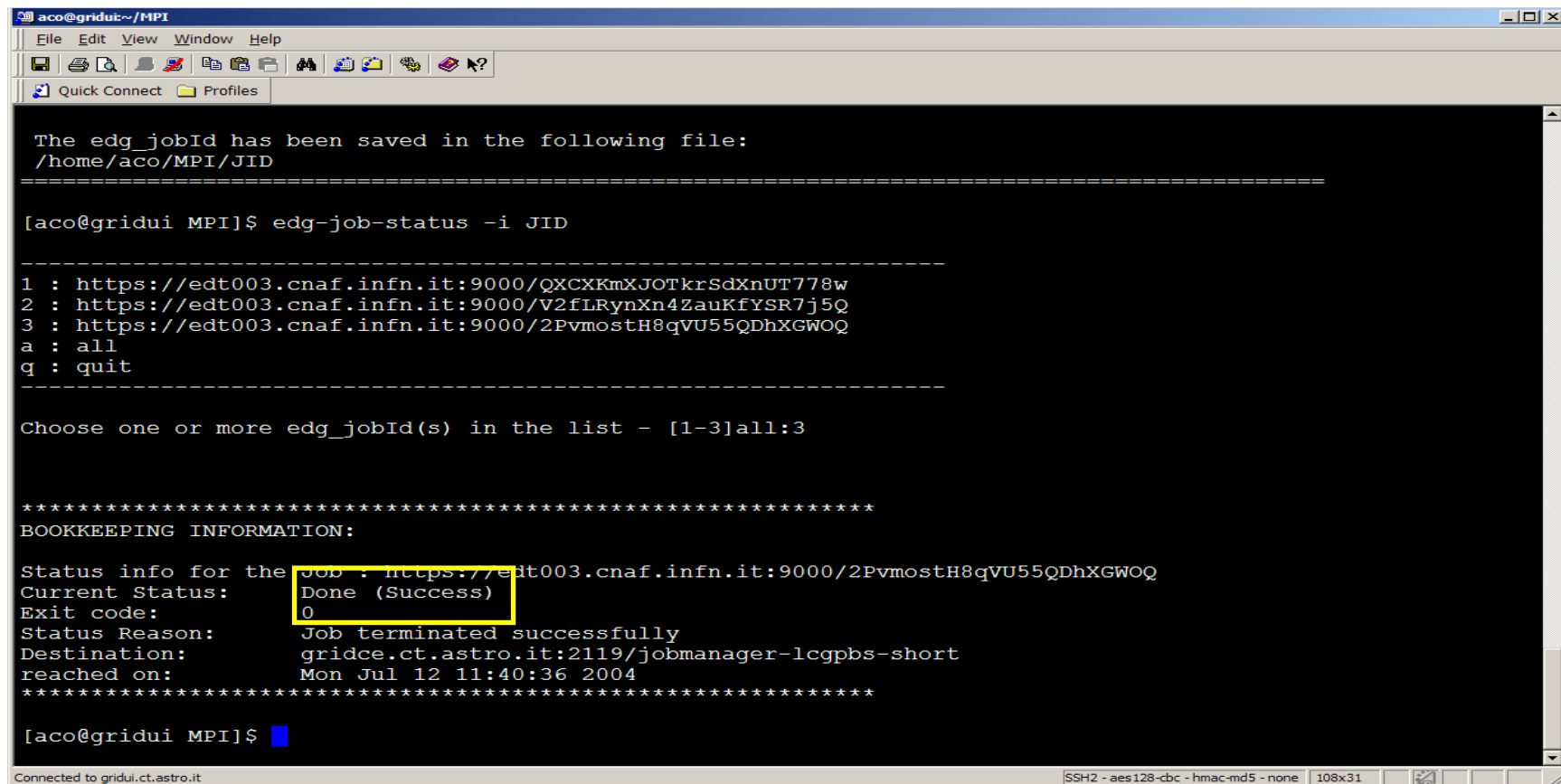
# Screenshots (2/3)

- pbs\_server logfile on gridce.ct.astro.it

```
gridce.ct.astro.it - gridce - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 5 request received from inaf001@gridce.ct.astro.it, sock=9
07/12/2004 13:36:21;0100;PBS_Server;Job;322.gridce.ct.astro.it;enqueueing into short, state 1 hop 1
07/12/2004 13:36:21;0008;PBS_Server;Job;322.gridce.ct.astro.it;Job Queued at request of inaf001@gridce.ct.astro.it, owner =
  inaf001@gridce.ct.astro.it, job name = STDIN, queue = short
07/12/2004 13:36:21;0040;PBS_Server;Svr;gridce.ct.astro.it;Scheduler sent command 1
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 21 request received from Scheduler@gridce.ct.astro.it, sock=10
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 58 request received from Scheduler@gridce.ct.astro.it, sock=10
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 20 request received from Scheduler@gridce.ct.astro.it, sock=10
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 51 request received from Scheduler@gridce.ct.astro.it, sock=10
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 51 request received from Scheduler@gridce.ct.astro.it, sock=10
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 51 request received from Scheduler@gridce.ct.astro.it, sock=10
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 24 request received from Scheduler@gridce.ct.astro.it, sock=10
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 11 request received from Scheduler@gridce.ct.astro.it, sock=10
07/12/2004 13:36:21;0008;PBS_Server;Job;322.gridce.ct.astro.it;Job Modified at request of Scheduler@gridce.ct.astro.it
07/12/2004 13:36:21;0100;PBS_Server;Req;;Type 15 request received from Scheduler@gridce.ct.astro.it, sock=10
07/12/2004 13:36:21;0008;PBS_Server;Job;322.gridce.ct.astro.it;Job Run at request of Scheduler@gridce.ct.astro.it
07/12/2004 13:36:21;0040;PBS_Server;Svr;gridce.ct.astro.it;Scheduler sent command 4
07/12/2004 13:36:49;0100;PBS_Server;Req;;Type 49 request received from inaf001@gridce.ct.astro.it, sock=10
07/12/2004 13:36:49;0100;PBS_Server;Req;;Type 19 request received from inaf001@gridce.ct.astro.it, sock=9
07/12/2004 13:37:16;0100;PBS_Server;Req;;Type 56 request received from pbs_mom@snodo4.ct.astro.it, sock=9
07/12/2004 13:37:16;0010;PBS_Server;Job;322.gridce.ct.astro.it;Exit_status=0 resources_used.cput=00:00:06 resources_used.me
m=8872kb resources_used.vmem=9604kb resources_used.walltime=00:00:55
07/12/2004 13:37:17;0100;PBS_Server;Job;322.gridce.ct.astro.it;dequeuing from short, state 5
07/12/2004 13:37:17;0040;PBS_Server;Svr;gridce.ct.astro.it;Scheduler sent command 2
07/12/2004 13:37:17;0100;PBS_Server;Req;;Type 21 request received from Scheduler@gridce.ct.astro.it, sock=9
07/12/2004 13:37:17;0100;PBS_Server;Req;;Type 58 request received from Scheduler@gridce.ct.astro.it, sock=9
Connected to gridce.ct.astro.it SSH2 - aes128-cbc - hmac-md5 - none 123x26
```

# Screenshots (3/3)

- Job status of the previous submitted job



```
aco@gridui:~/MPI
File Edit View Window Help
Quick Connect Profiles

The edg_jobId has been saved in the following file:
/home/aco/MPI/JID

-----

[aco@gridui MPI]$ edg-job-status -i JID

-----

1 : https://edt003.cnaf.infn.it:9000/QXCXKmXJOTkrSdXnUT778w
2 : https://edt003.cnaf.infn.it:9000/V2fLRynXn4ZauKFYSR7j5Q
3 : https://edt003.cnaf.infn.it:9000/2PvmostH8qVU55QDhXGWOQ
a : all
q : quit

-----

Choose one or more edg_jobId(s) in the list - [1-3]all:3

*****
BOOKKEEPING INFORMATION:
*****
Status info for the job : https://edt003.cnaf.infn.it:9000/2PvmostH8qVU55QDhXGWOQ
Current Status: Done (Success)
Exit code: 0
Status Reason: Job terminated successfully
Destination: gridce.ct.astro.it:2119/jobmanager-lcgpbs-short
reached on: Mon Jul 12 11:40:36 2004
*****

[aco@gridui MPI]$
```

Connected to gridui.ct.astro.it | SSH2 - aes128-cbc - hmac-md5 - none | 108x31

# NA4 Test Plan

- Production of a Test Plan document
- Definition of Test Cases according to Use Cases and Requirements.
- Implementation of tests : A part of this job is the modification of existing tests, other part is a implementation from scratch.
- Debugging and modification of the suite to follow the EGEE software evolution ( new services, new requirements,...).



# NA4 Test Currents Status

- Draft version of the Test Plan available:  
<https://edms.cern.ch/document/477168/>
  - Template for tests case
  - Template for tests results
  - Definition of tests acceptance
  - Metrics
- Evaluation of tools
  - Database for tests case, tests results
  - Developing tools
  - Code repository
  - ....

# NA4 Test tasks linked to JRA1

- Production of Test Cases
  - Need to know as soon as possible the design / architecture following by JRA1 in order to define the appropriate test sequence.
- Tests implementation
  - Require the middleware APIs.
  - Require to know the errors and exceptions send by the middleware services.
  - Require more practical documentation.

# NA4 Test tasks linked to JRA1

- Modification of the suite
  - Need to have a high level view of the services introduction during the project lifetime.
  - Need to know the API evolution.
  - Need to know the services evolution
- Need to have access to the pre-production services as soon as possible (more a request to SA1 than JRA1)