gLite Job Management

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Job Submission

Egee submission

Resembles very closely the batch submission in a cluster.

- Can select resources automatically ("Grid like" submission).

- Resources can be selected manually (more "cluster oriented" submission)

Job Submission

After obtaining a digital certifcate from a trusted Certifcation Authority, registering in a VO and obtaining an account on a User Interface, the user is ready to use the Grid.

Certification Authority
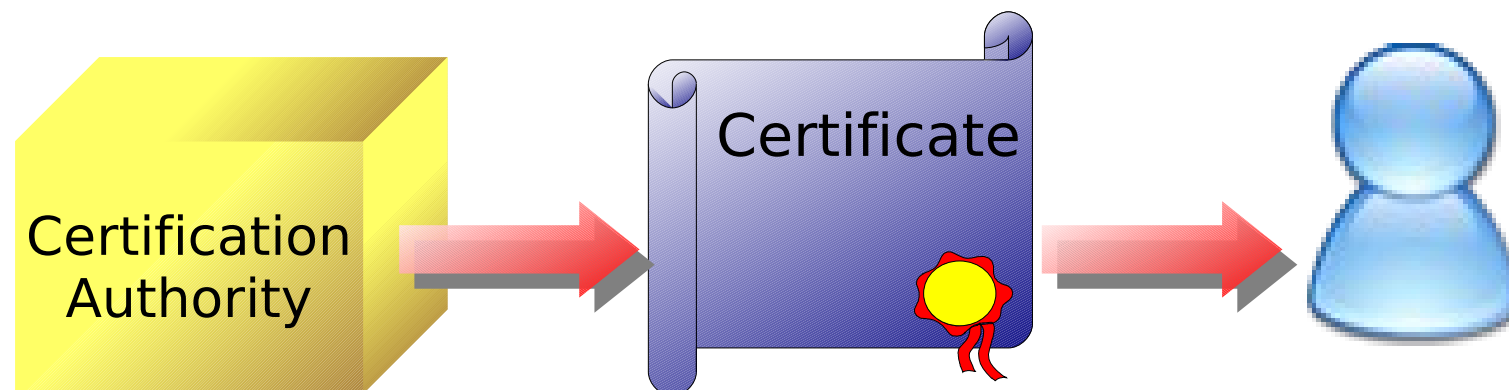
Certificate

Job Submission

The user logs in to the UI and creates a proxy certifcate to authenticate himself in subsequent secure interactions.

User workstation
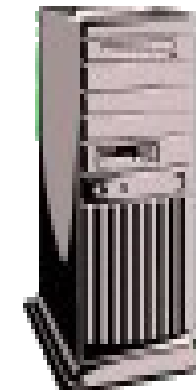
UI
Login: ricardo
passwd: ****

remote login

User Interface (UI)

Job Submission

- *edg-job-submit* [**–r** *<res_id>*] [**–n** *<user_e-mail address>*] [**-c** *<config_file>*] [**-o** *<output_file>*] **<job.jdl>**

  - -r the job is submitted by the RB directly to the computing element identified by *<res_id>*
  - -n an e-mail message containing basic information regarding the job (status and identifier) is sent to the specified *<e-mail address>* when the job enters one of the following status: READY, RUNNING, DONE or ABORTED

Job Submission

- *edg-job-submit* [**–r** *<res_id>]* [**–n** *<user_e-mail address>]* [**-c** *<config_file>]* [**-o** *<output_file>]* **<job.jdl>**

  - -c the configuration file *<config_file>* is pointed by the UI instead of the standard configuration file
  - -o the generated *dg_jobId* is written in the *<output_file> Useful for other commands like dg-job-status* which display the status information about dg_jobId contained in the *<input file>*

Job Submission

- *JDL* a file that specifies the resources needed in order to execute the job

- *Job ID* an unique string that identify the job in the grid

- JDLs are written once per job type.

- A single JDL specify all jobs that use the same resources.

Job Submission

- *Job IDs are provided by the grid (spec. the RB)*

- A Job ID identify a single job and is the only reference the user has about it, once submitted.

- The job ID is the only reference the user has for the job.

- Losing the ID is the same as losing the job.

- The job will keep running on the grid, however you will be unable to retrieve data from the output sandbox at the end, or to stop it.

Job Submission
JDL example file:

Executable = "gridTest";

StdInput = "event1.dat";

StdError = "stderr.log";

StdOutput = "stdout.log";

InputSandbox = {"/home/test/gridTest", /tmp/event1.dat"};

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

InputData = {"LF:testbed0-00019","PF:se1.pd.infn.it/data/filex"};

ReplicaCatalog = "ldap://sunlab2g.cnaf.infn.it:2010/
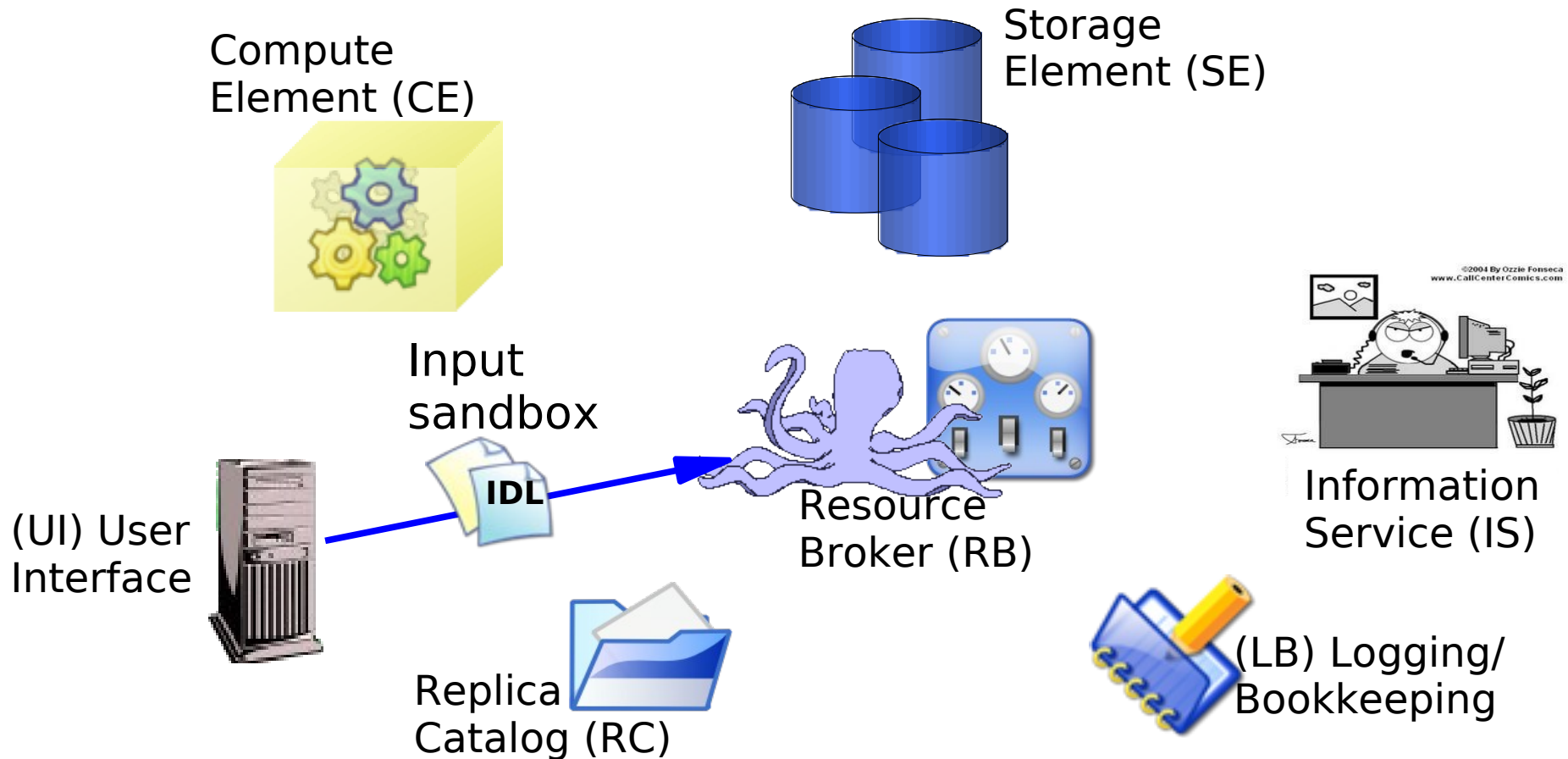**lc=test, rc=WP2 INFN Test, dc=infn, dc=it";**

DataAccessProtocol = {"gridftp", "file"};

**Requirements = other.Architecture=="INTEL" && **
other.OpSys=="LINUX" && other.TotalCpus >= 4;

Rank = other.MaxCpuTime;

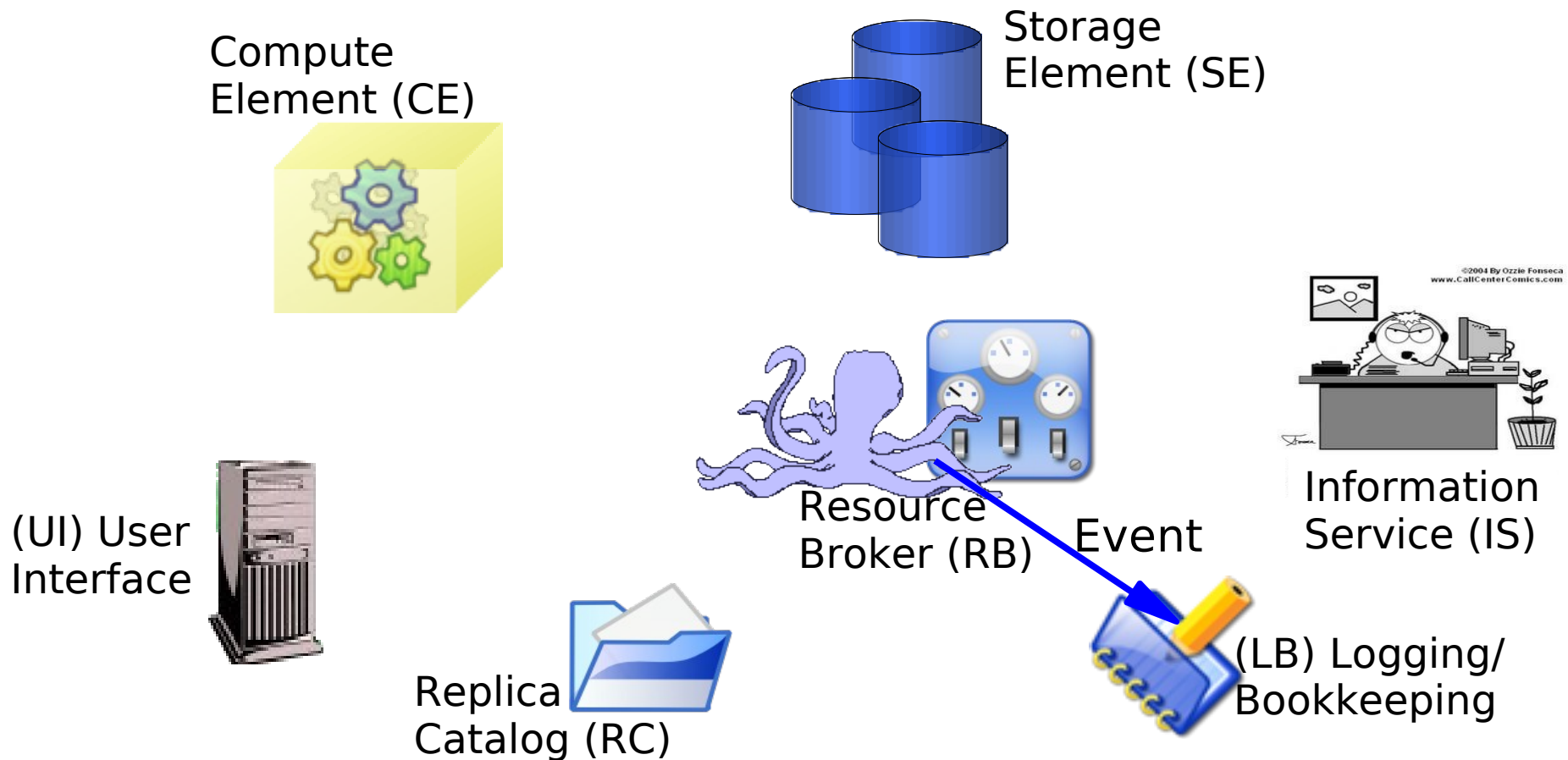# Job Submission: Data flow

Once the user has open a remote session in the UI, he can submits jobs to the Resource Broker (RB). Job Description Language format files

Compute
Element (CE)

Storage
Element (SE)

Input
sandbox

IDL

(UI) User
Interface

Resource
Broker (RB)

Information
Service (IS)

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Replica
Catalog (RC)

(LB) Logging/
Bookkeeping

Job Submission: Data flow

An event is loggen in LB and the state of the job is
SUBMITTED

Compute
Element (CE)

Storage
Element (SE)

Resource
Broker (RB)

Event

Information
Service (IS)

(UI) User
Interface

Replica
Catalog (RC)

(LB) Logging/
Bookkeeping

Job Submission: Data flow

The RB looks for the best available CE
interrogating to IS. Job state is *WAITING*

Compute
Element (CE)

Storage
Element (SE)

?

Information
Service (IS)

Resource
Broker (RB)

Event

(UI) User
Interface

Replica
Catalog (RC)

(LB) Logging/
Bookkeeping
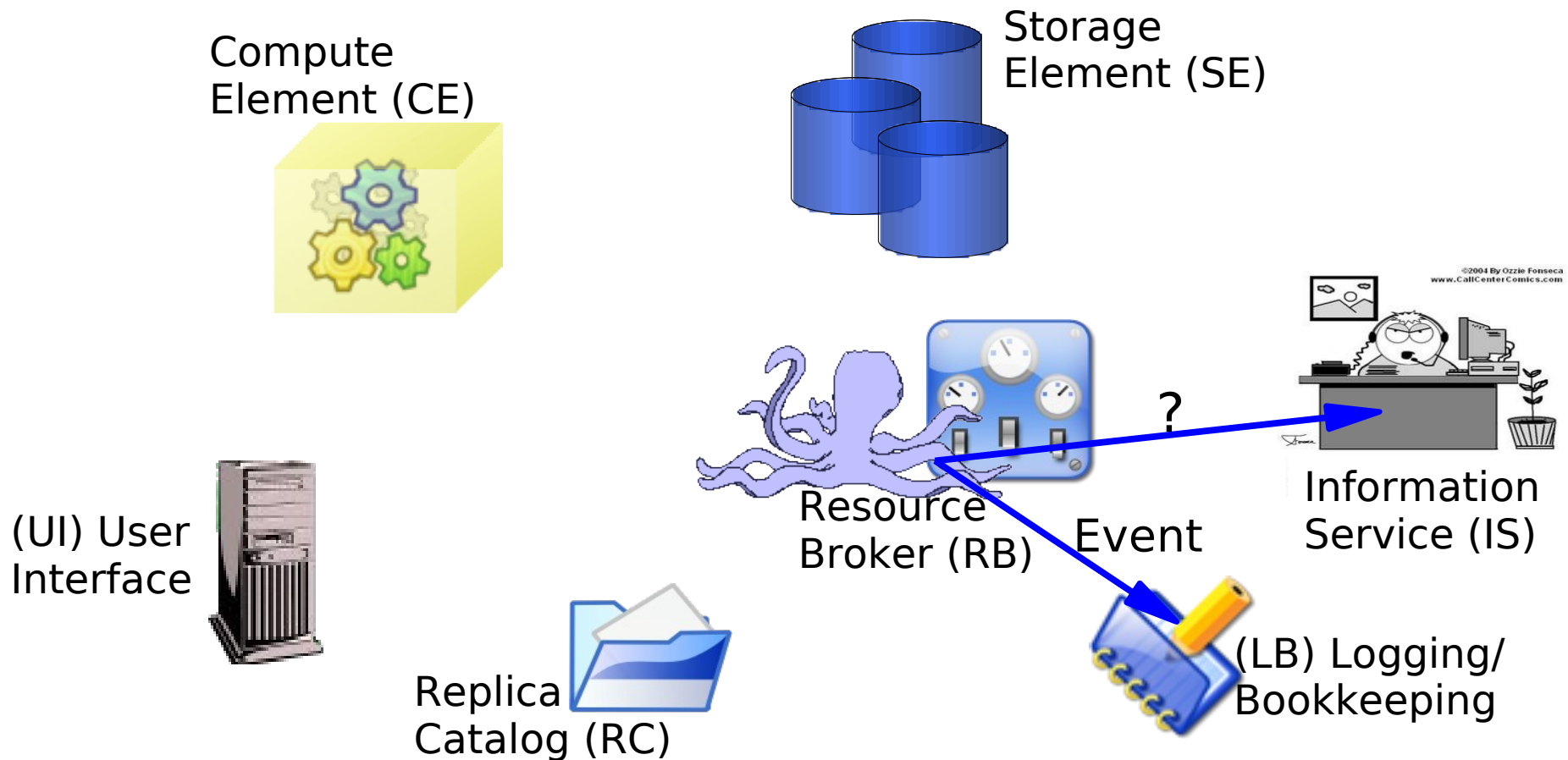
Job Submission: Data flow
IS obtain information about the CE and SE status

Compute
Element (CE)

Storage
Element (SE)

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www.CallCenterComics.com

Information
Service (IS)

(UI) User
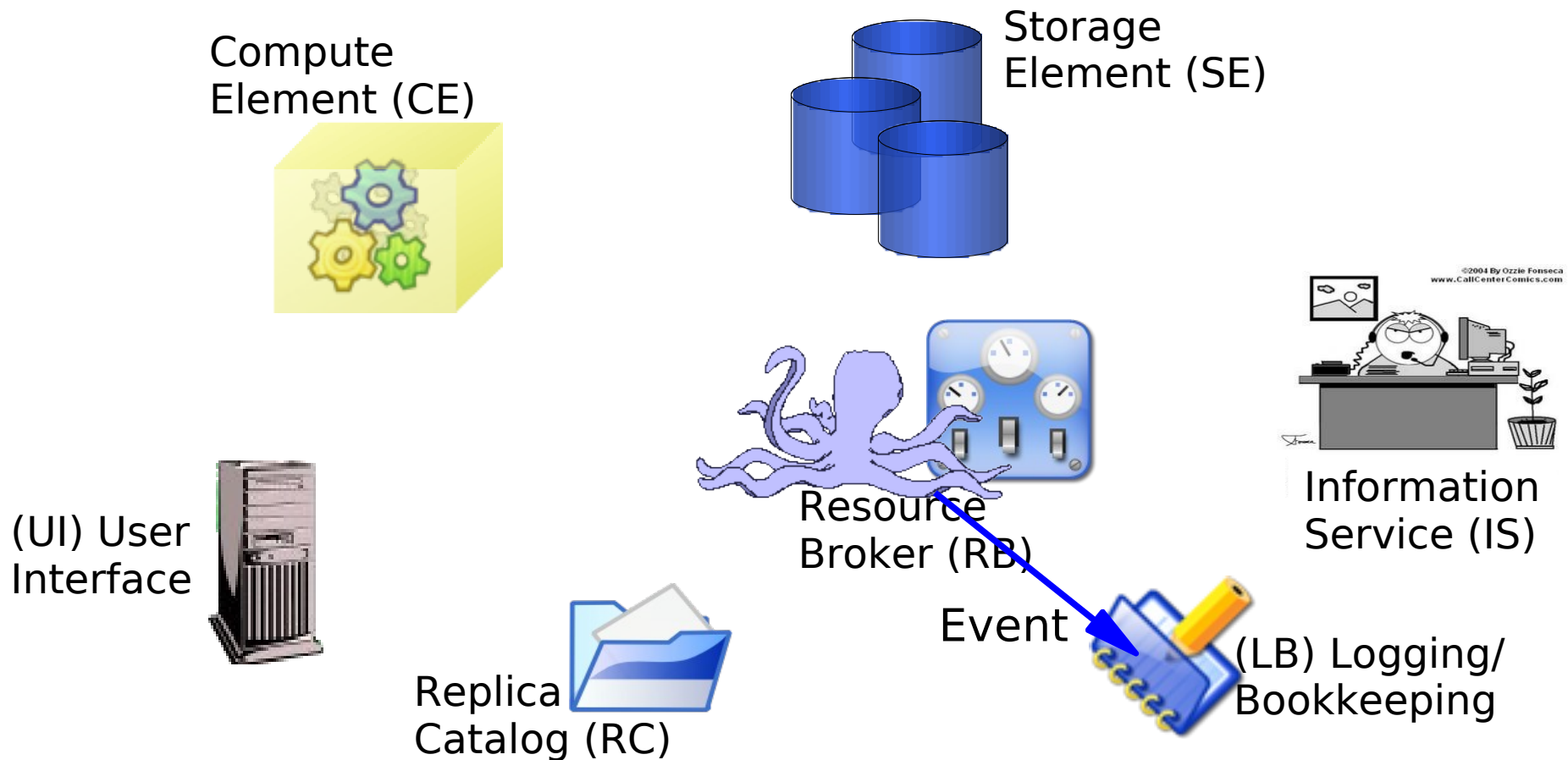Interface

Resource
Broker (RB)

(LB) Logging/
Bookkeeping

Replica
Catalog (RC)
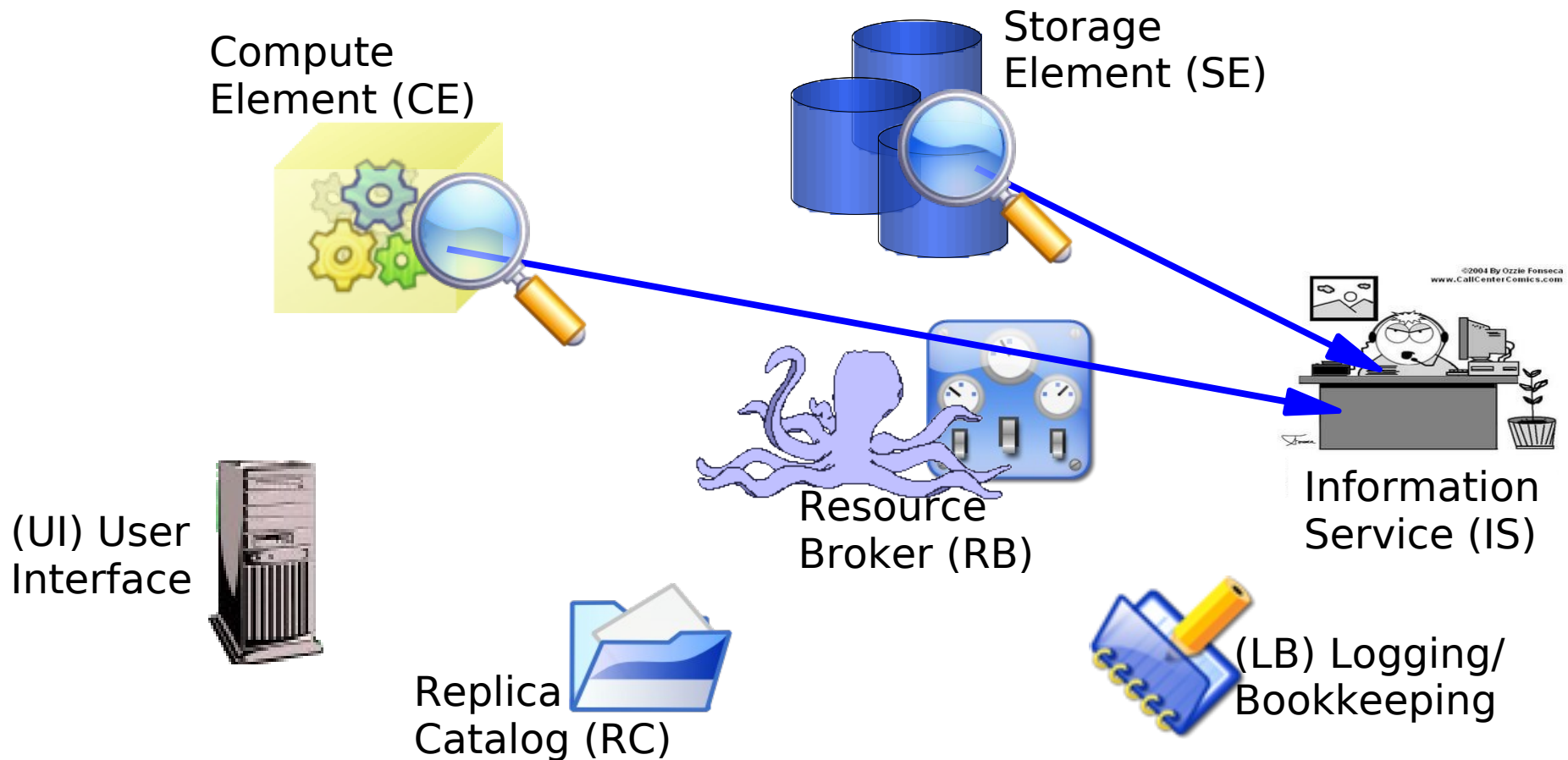
Job Submission: Data flow

RC looks for any input file required. IS send the response and another event is logged in LB

Compute
Element (CE)

Storage
Element (SE)

Information
Service (IS)

(UI) User
Interface

Resource
Broker (RB)

Event

Replica
Catalog (RC)

(LB) Logging/
Bookkeeping
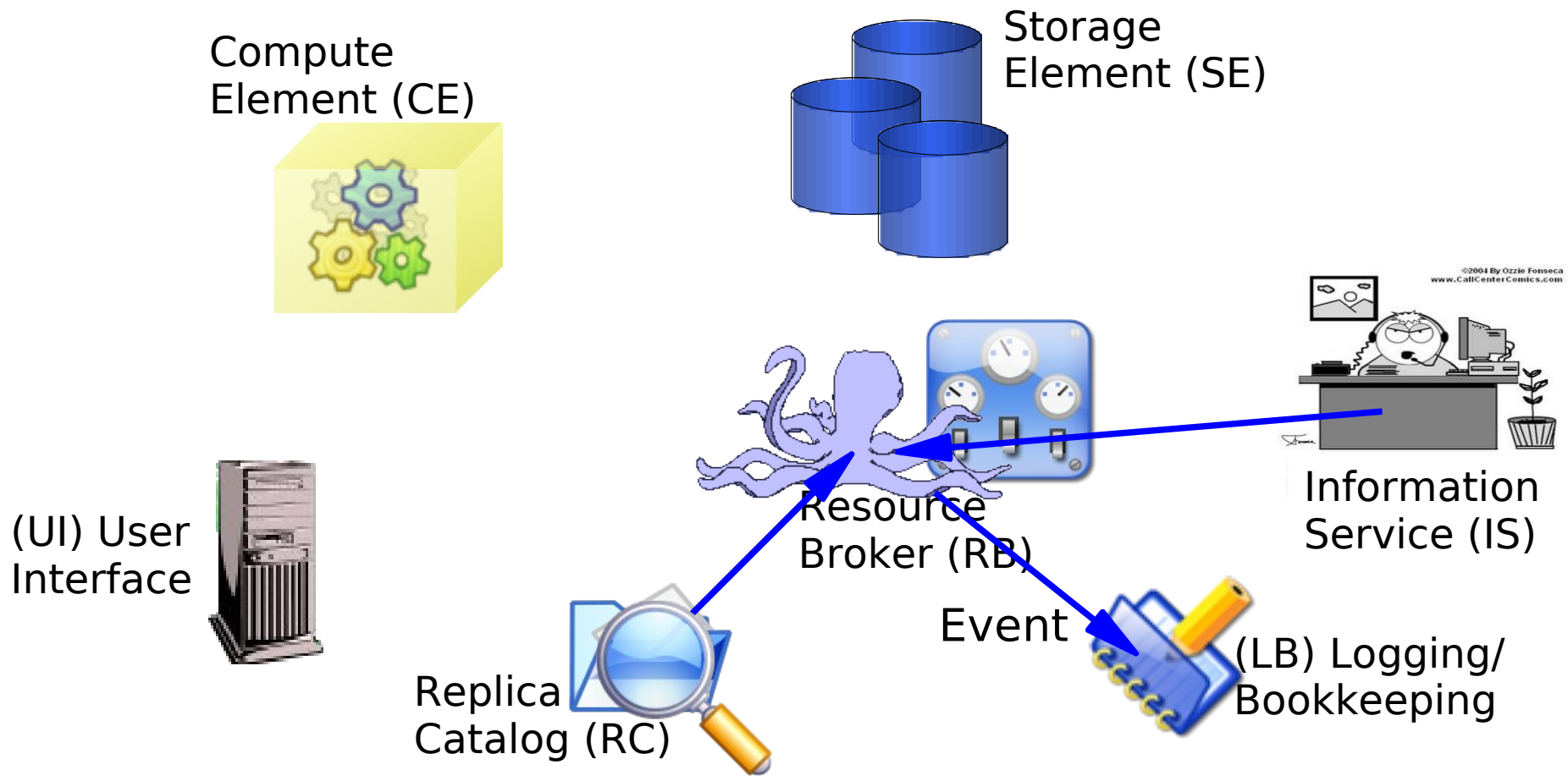
Job Submission: Data flow

RB prepares the job for submission. Another event is logged. Job state is *READY*

Compute
Element (CE)

Storage
Element (SE)

(UI) User
Interface

Resource
Broker (RB)

Information
Service (IS)

Event

Replica
Catalog (RC)

(LB) Logging/
Bookkeeping

Job Submission: Data flow
CE receives the job

Compute
Element (CE)

Storage
Element (SE)

(UI) User
Interface

Resource
Broker (RB)

Information
Service (IS)

Replica
Catalog (RC)

(LB) Logging/
Bookkeeping
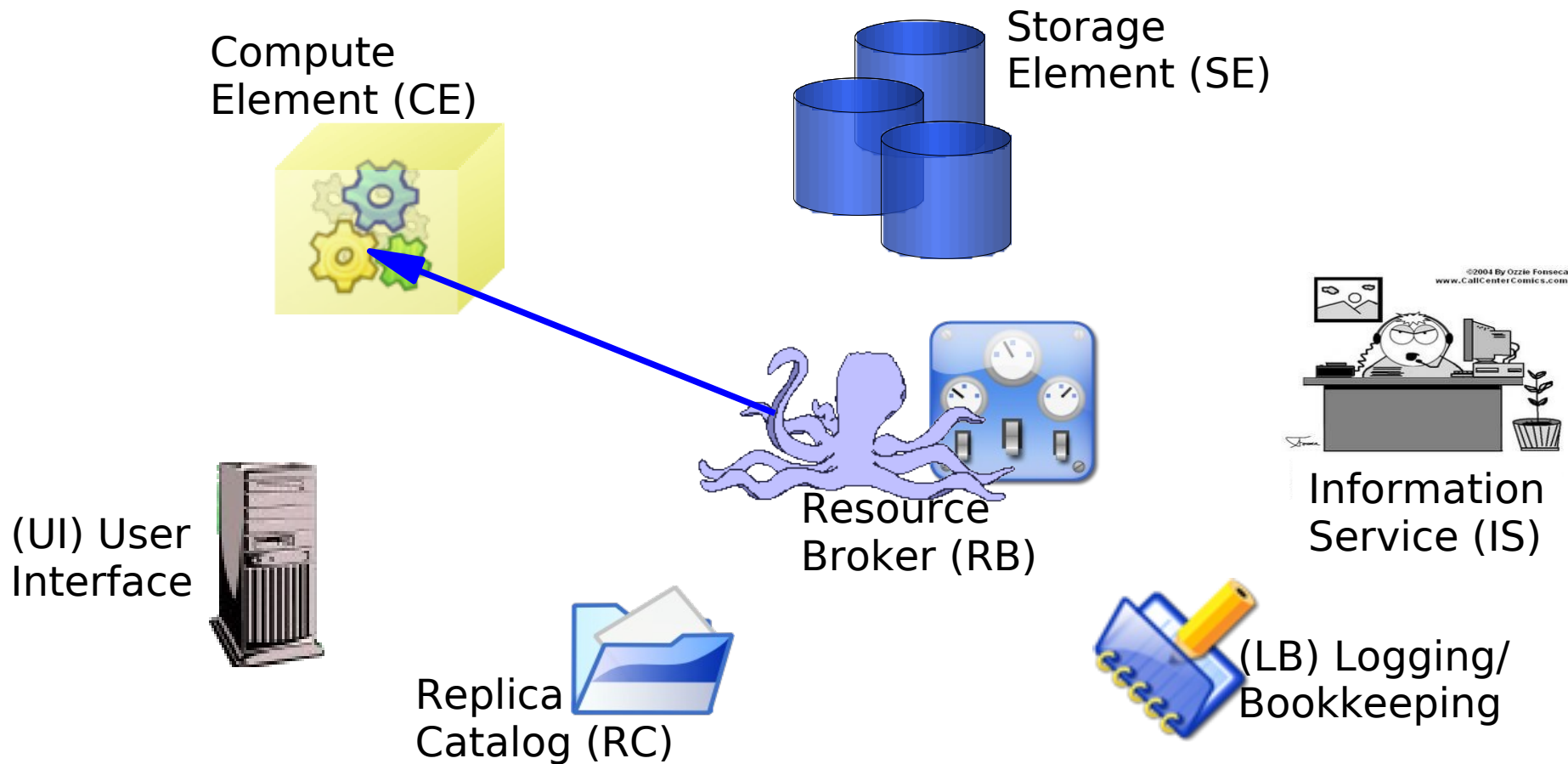
Job Submission: Data flow

CE send the job to the Local Resource Manager System (PBS,PBSpro,LSF,BQS,Condor,Maui/Torque)

Compute Element (CE)

Storage Element (SE)

LRMS

(UI) User Interface

Replica Catalog (RC)

Resource Broker (RB)

Event

Information Service (IS)

(LB) Logging/ Bookkeeping

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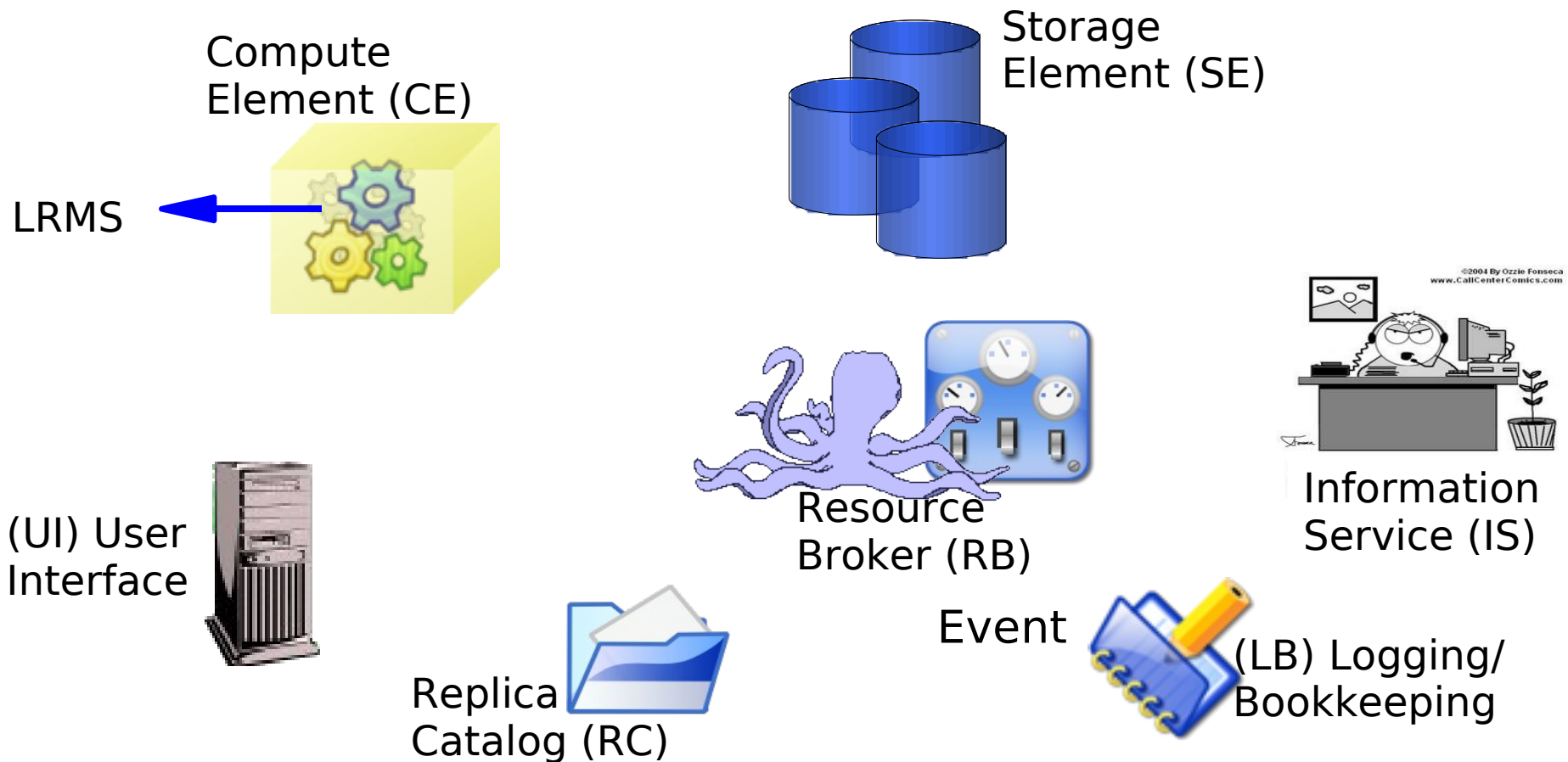
Job Submission: Data flow
An event is sent to LB and the state is *SCHEDULED*

Compute
Element (CE)

Storage
Element (SE)

LRMS

Event

Information
Service (IS)

(UI) User
Interface

Resource
Broker (RB)

(LB) Logging/
Bookkeeping

Replica
Catalog (RC)
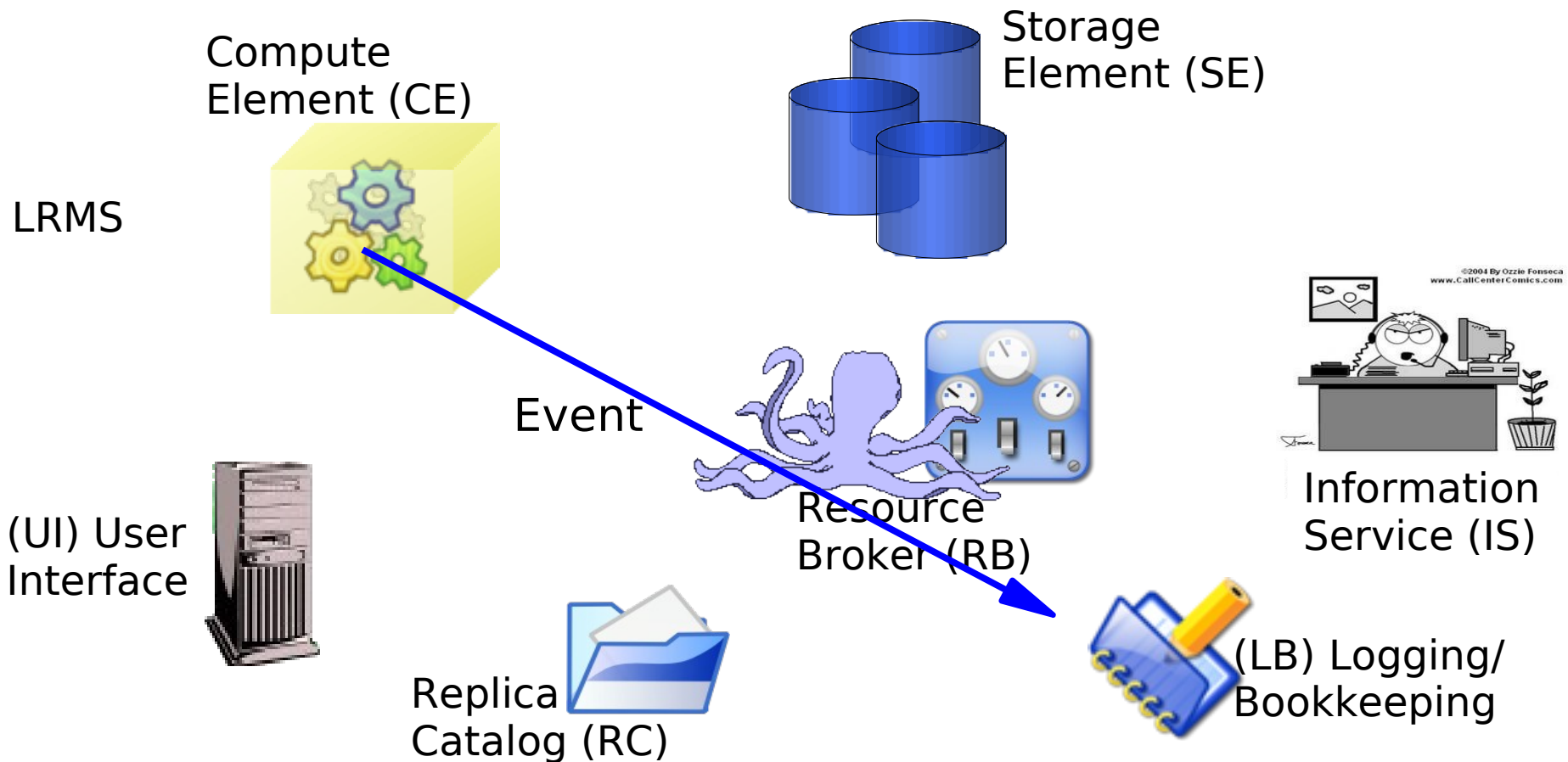
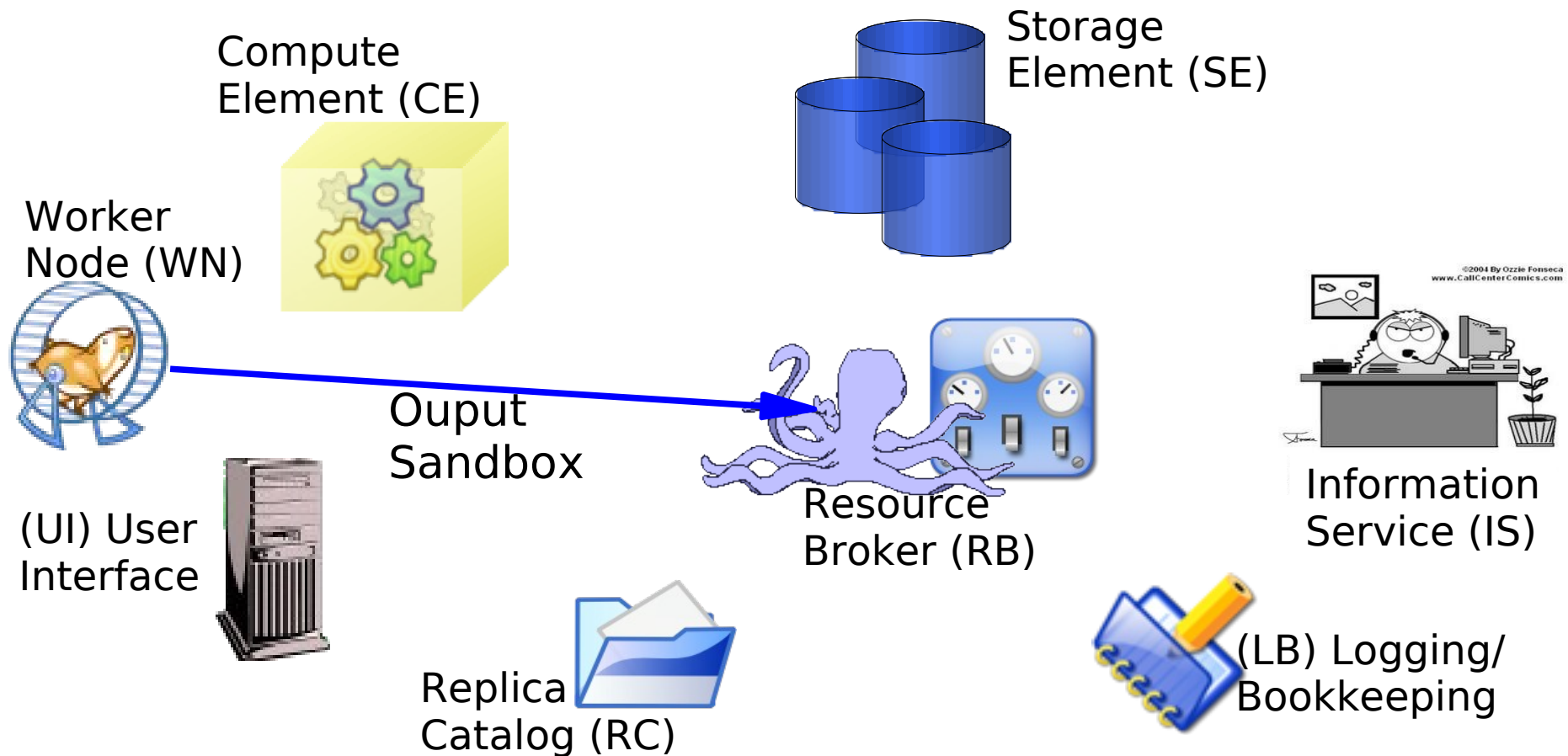# Job Submission: Data flow

When the LRMS send the job to WN, RB send the Input Sandbox to that WN. Now the job is *RUNNING*

Storage Element (SE)

Compute Element (CE)

gsidcap, gsirfio

Worker Node (WN)

Input Sandbox

(UI) User Interface

Resource Broker (RB)

Event

Information Service (IS)

Replica Catalog (RC)

(LB) Logging/ Bookkeeping
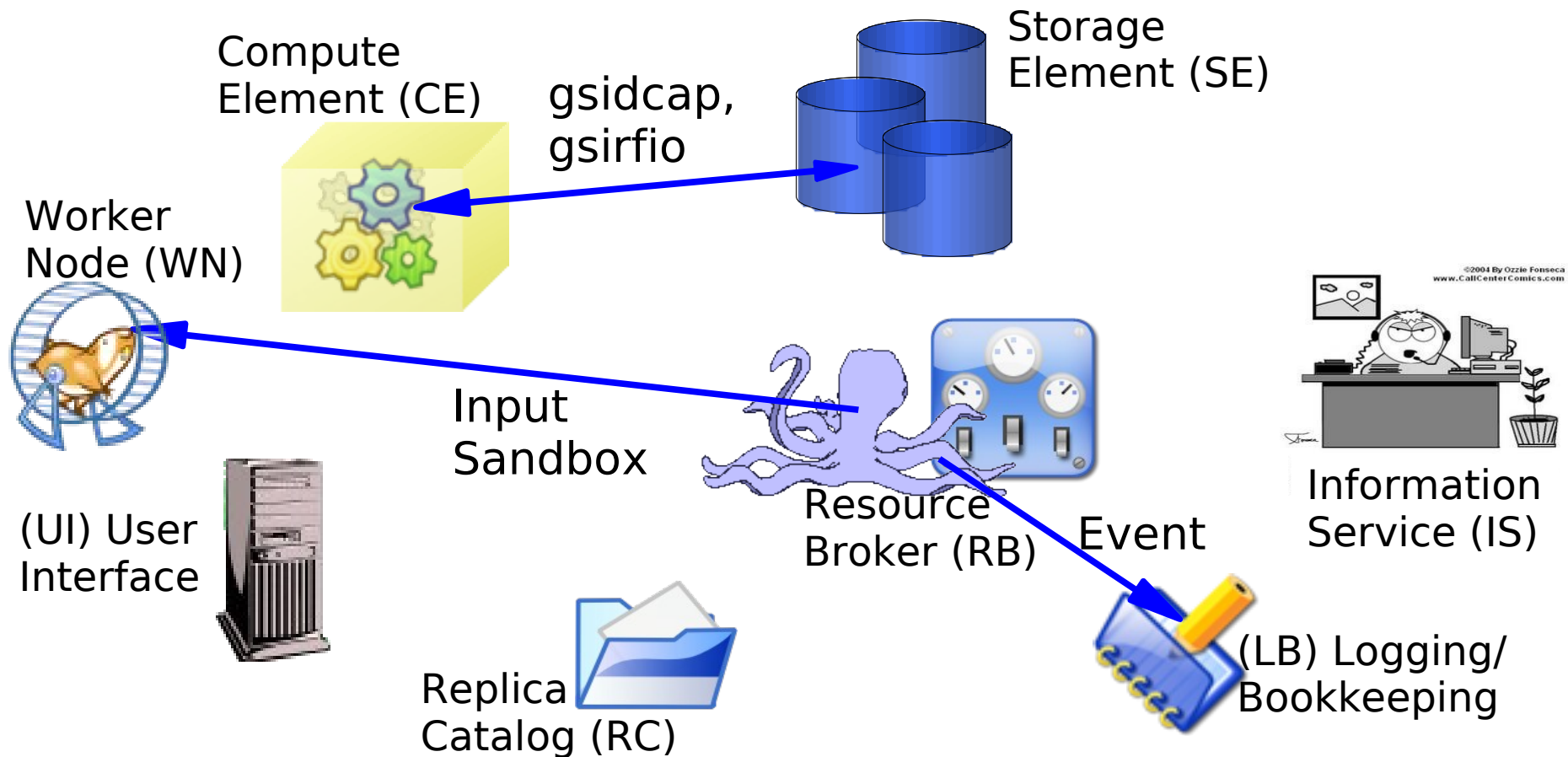
Job Submission: Data flow

If the job finish without errors the output files are sent to RB

Compute
Element (CE)

Storage
Element (SE)

Worker
Node (WN)

Ouput
Sandbox

Resource
Broker (RB)

Information
Service (IS)

(UI) User
Interface

Replica
Catalog (RC)

(LB) Logging/
Bookkeeping

Job Submission: Data flow
An event is logged and the state is *DONE*

Compute Element (CE)

Storage Element (SE)

Information Service (IS)

(UI) User Interface

Resource Broker (RB)

Event

(LB) Logging/ Bookkeeping

Replica Catalog (RC)
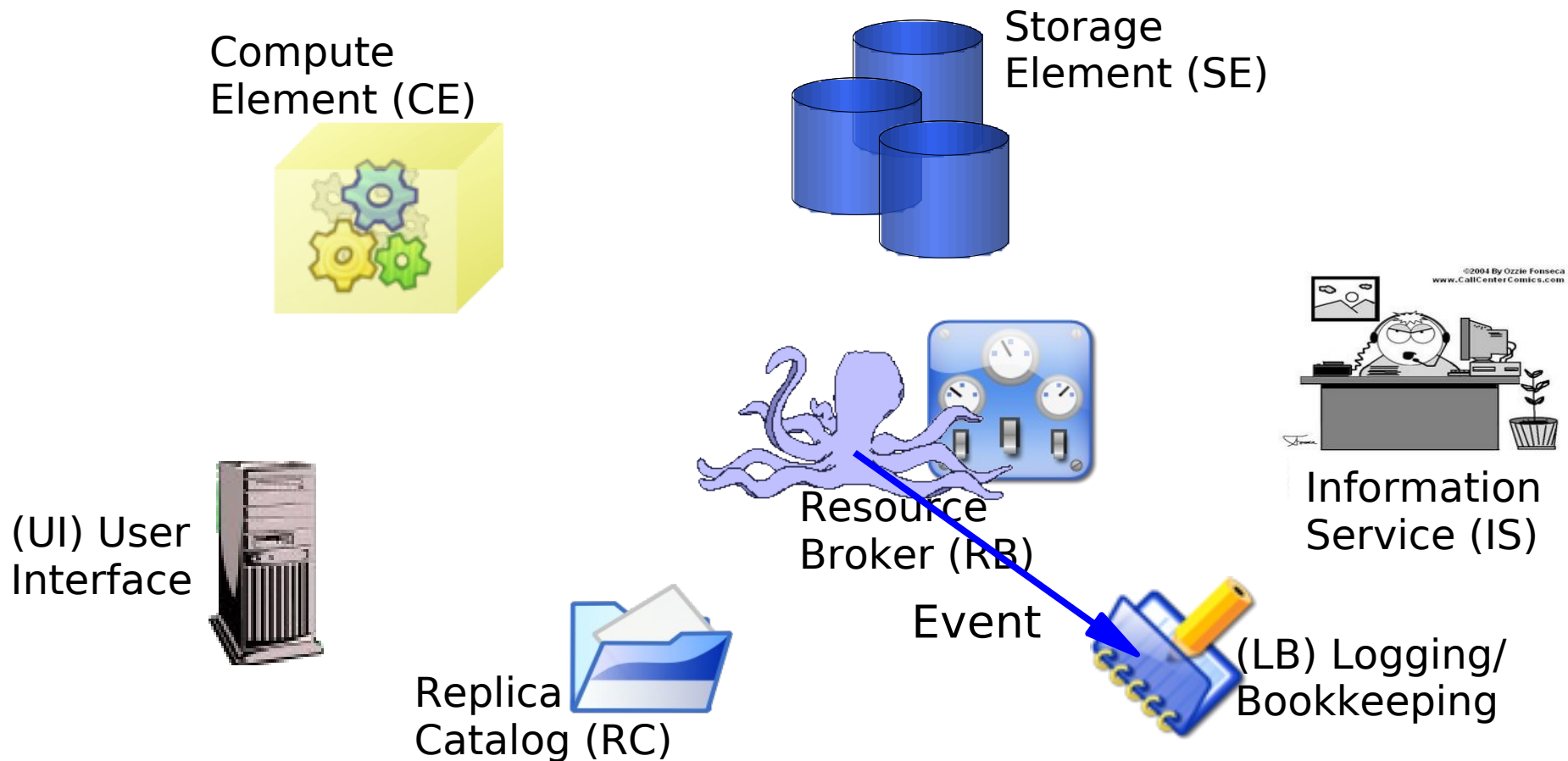
Job Submission: Data flow
The output sandbox is sent to UI

Compute Element (CE)

Storage Element (SE)

Output Sandbox

Resource Broker (RB)

Information Service (IS)

(UI) User Interface

Replica Catalog (RC)

(LB) Logging/ Bookkeeping
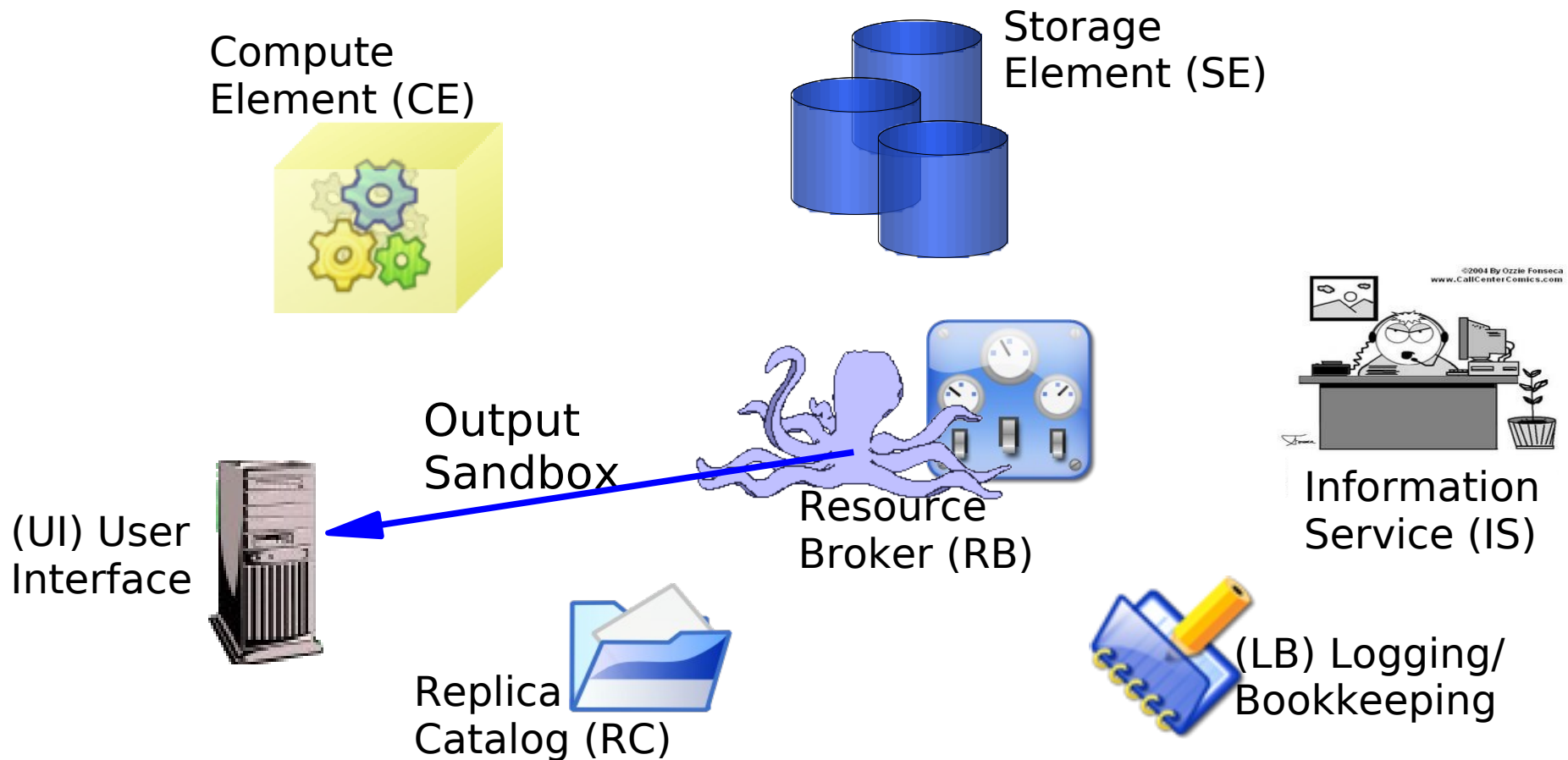
Job Submission: Data flow

At this point the user can retrieve the results. An event is sent and the state is *CLEARED*

Compute
Element (CE)

Storage
Element (SE)

(UI) User
Interface

Event

Resource
Broker (RB)

Information
Service (IS)

Replica
Catalog (RC)

(LB) Logging/
Bookkeeping
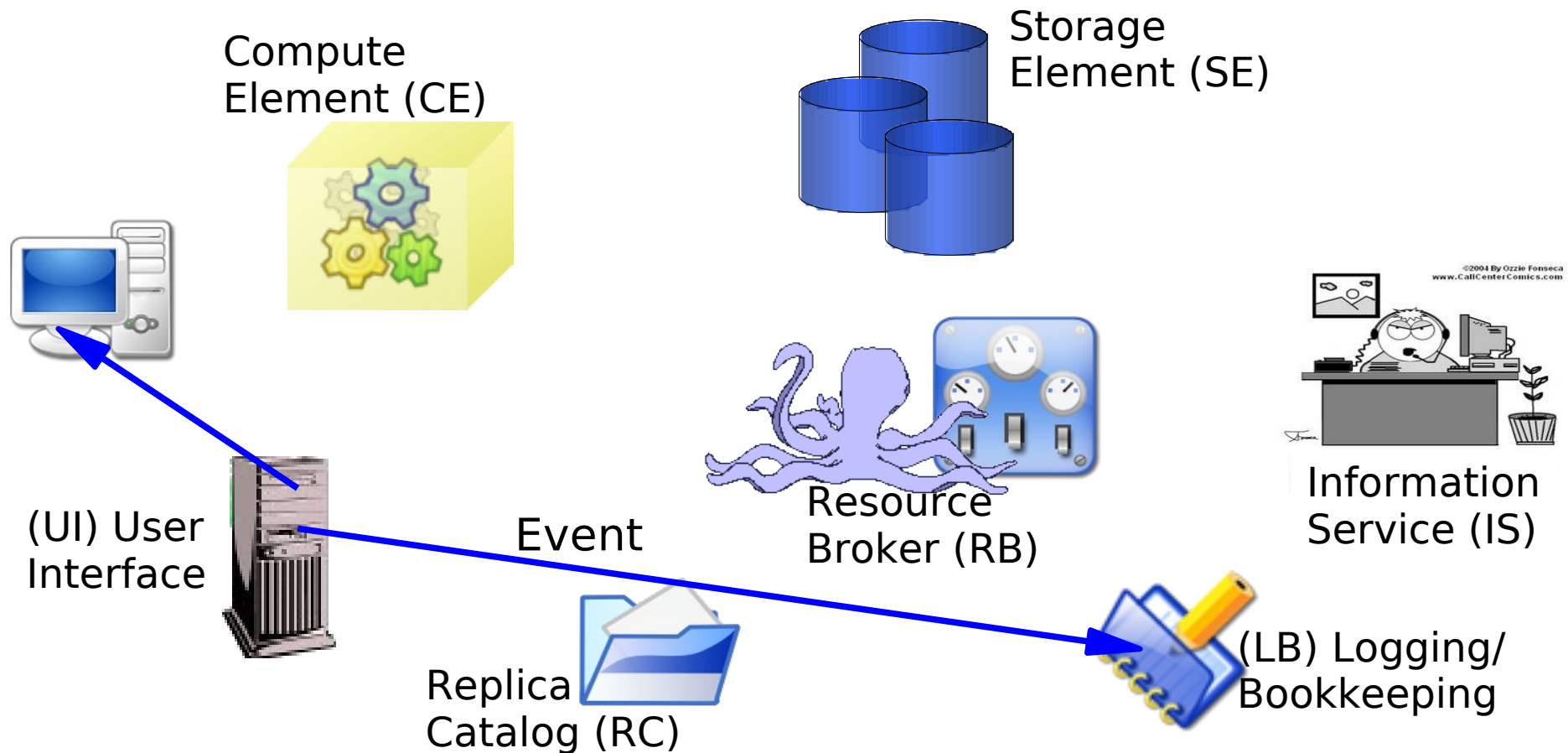
Job Management

Others job operations

- *edg-job-list-match* Lists resources matching a job description ordered by rank. Performs the matchmaking without submitting the job

- *edg-job-cancel* Cancels a specific job

- *edg-job-status* Displays the status of the job plus some additional information
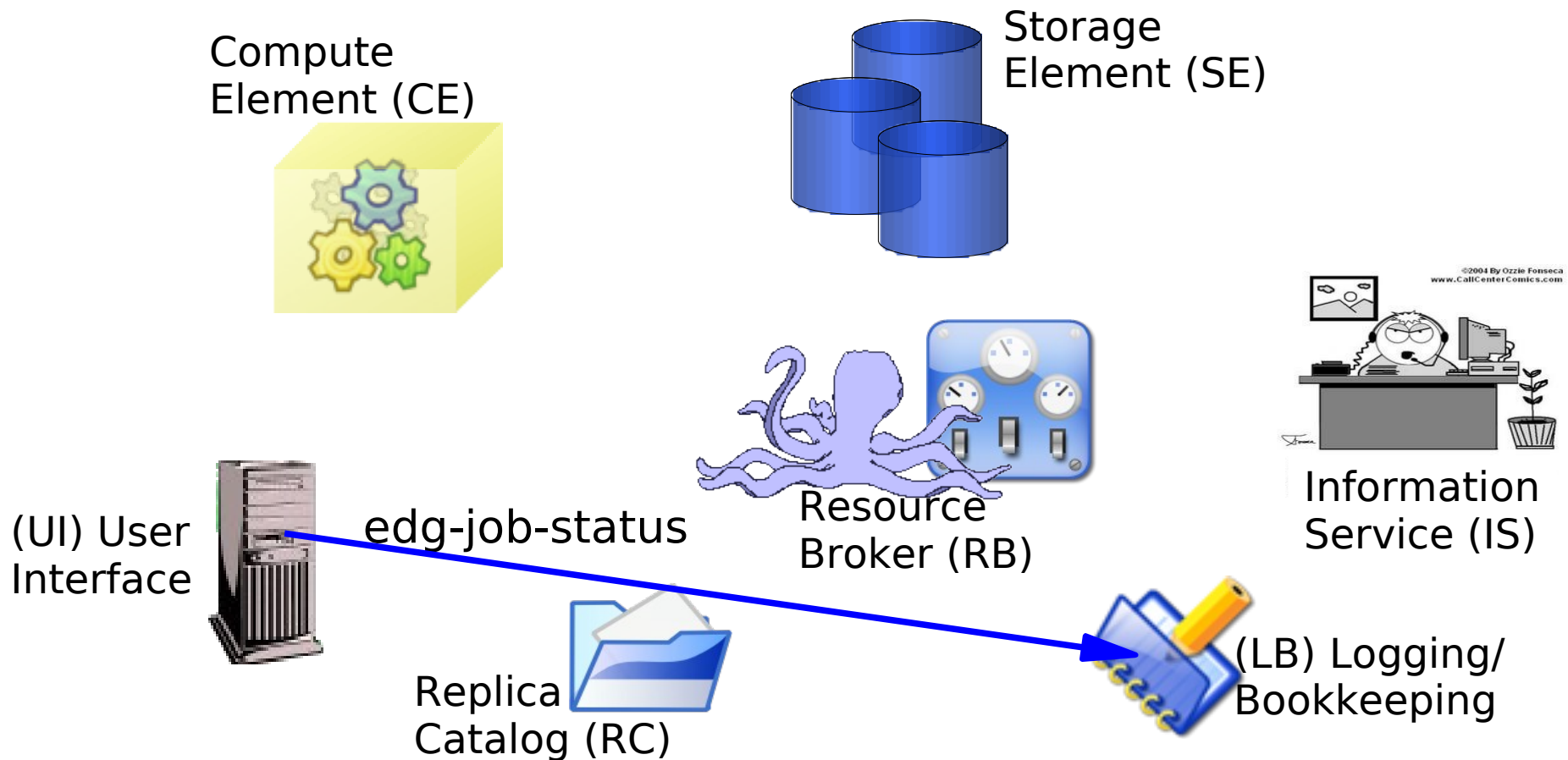
Job Management

Others job operations:

- *edg-job-get-output* Returns the job-output (the OutputSandbox files) to the user

- *edg-job-get-logging-info* Displays logging information about submitted jobs (all the events "pushed" by the various components of the WMS to the LB) Very useful for debug purposes

- *edg-job-id-info* A utility for the user to display job info in a formatted style

Job Management

At any time the user can get information about his/her jobs

Compute
Element (CE)

Storage
Element (SE)

(UI) User
Interface

edg-job-status

Resource
Broker (RB)

Information
Service (IS)

Replica
Catalog (RC)

(LB) Logging/
Bookkeeping

```
#################################################################
# Author:  Giuseppe La Rocca (giuseppe.larocca@ct.infn.it)  #
#               -----------------------------               #
#  Istituto Nazionale di Fisica Nucleare - Sez. di CATANIA  #
#              Via Santa Sofia,64 - 95100 ITALY             #
#               -----------------------------               #
#        +39.095.378.54.46        +39.095.378.54.69         #
#################################################################

Type = "Job";
JobType = "MPICH";

Executable = "start_helloworldmpi.sh";
Arguments = "helloworld 2";
NodeNumber = 2;

StdOutput = "test.out";
StdError = "test.err";

InputSandbox = {"start_helloworldmpi.sh","helloworld"};
OutputSandbox = {"test.err","test.out","executable.out"};

Requirements   = ((other.GlueCEInfoLRMSType == "PBS") || (other.GlueCEInfoLRMSType == "LSF"));
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                                                              1,1           All
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```
| else by yourself.                    |
| In case of any problems, please send an email |
| to grid-prod@ct.infn.it              |
+---------------------------------------+
|              ATTENTION!               |
|                                       |
| Since the 1st of January 2006 GILDA supports |
| VOMS authentication only! In order to login on |
| the grid, please use the command:     |
|                                       |
| voms-proxy-init --voms gilda          |
|                                       |
| instead of:                           |
|                                       |
| grid-proxy-init                       |
+---------------------------------------+
[glite-tutor] /home/amuoio > ls
gLite  MessageToSpheres  openfoam_examples  plot.C   trailers
[glite-tutor] /home/amuoio > cd gLite
[glite-tutor] /home/amuoio/gLite > ls
CODESA-3D   edglog.log   geant   Other    Raster   vlc
DAG         EGEODE       mmcs    pathsearch   scilab
[glite-tutor] /home/amuoio/gLite > cd Other/
[glite-tutor] /home/amuoio/gLite/Other > voms-proxy-init --voms gilda
Cannot find file or dir: /home/amuoio/.glite/vomses
Your identity: /C=IT/O=GILDA/OU=Personal Certificate/L=INFN/CN=annamaria muoio/E
mail=amuoio@yahoo.it
Enter GRID pass phrase:
Your proxy is valid until Wed Jan 25 23:53:39 2006

Creating temporary proxy ............................................. Done
Contacting  voms.ct.infn.it:15001 [/C=IT/O=GILDA/OU=Host/L=INFN Catania/CN=voms.
ct.infn.it/Email=emidio.giorgio@ct.infn.it] "gilda"

Warning: Cannot find file or dir: /home/amuoio/.glite/vomses Done
Creating proxy ..............................................................
.. Done
Your proxy is valid until Wed Jan 25 23:53:40 2006

[glite-tutor] /home/amuoio/gLite/Other > █
```
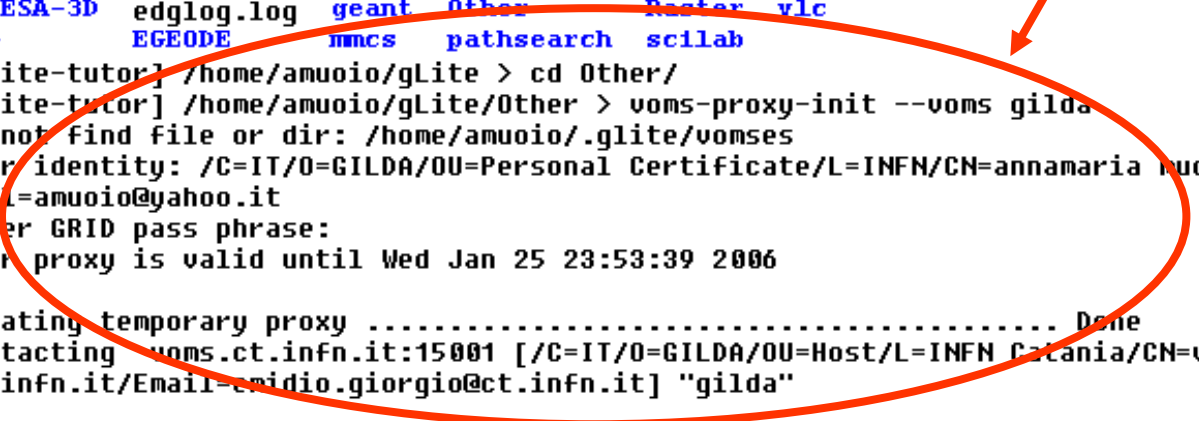
Voms-proxy-init

Connected to glite-tutor.ct.infn.it   SSH2 - aes128-cbc - hmac-md5 - none   124x40

Start   INFN - Catani...   AltaVista - Ba...   Backup di W...   presentazione...   glite-tutor...   Istituto Music...   desk_2   12:02 PM

File   Edit   View   Window   Help

Quick Connect   Profiles

```
dgt01.ui.savba.sk:2119/jobmanager-lcgpbs-long
dgt01.ui.savba.sk:2119/jobmanager-lcgpbs-short
gilda-ce-01.pd.infn.it:2119/jobmanager-lcgpbs-infinite
gilda-ce-01.pd.infn.it:2119/jobmanager-lcgpbs-long
gilda-ce-01.pd.infn.it:2119/jobmanager-lcgpbs-short
grid004.iucc.ac.il:2119/jobmanager-lcgpbs-infinite
grid004.iucc.ac.il:2119/jobmanager-lcgpbs-long
grid004.iucc.ac.il:2119/jobmanager-lcgpbs-short
gildace.oact.inaf.it:2119/jobmanager-lcgpbs-infinite
gildace.oact.inaf.it:2119/jobmanager-lcgpbs-long
gildace.oact.inaf.it:2119/jobmanager-lcgpbs-short
egee008.cnaf.infn.it:2119/blah-pbs-infinite
egee008.cnaf.infn.it:2119/blah-pbs-long
egee008.cnaf.infn.it:2119/blah-pbs-short
glite-ce.ct.infn.it:2119/blah-pbs-infinite
glite-ce.ct.infn.it:2119/blah-pbs-long
glite-ce.ct.infn.it:2119/blah-pbs-short
lxcde01.pd.infn.it:2119/blah-pbs-infinite
lxcde01.pd.infn.it:2119/blah-pbs-long
lxcde01.pd.infn.it:2119/blah-pbs-short
******************************************************************

[glite-tutor] /home/amuoio/gLite/Other > glite-job-submit helloworld.jdl

Selected Virtual Organisation name (from proxy certificate extension): gilda
Connecting to host glite-rb.ct.infn.it, port 7772
Logging to host glite-rb.ct.infn.it, port 9002


******************************************************************
                    JOB SUBMIT OUTCOME
 The job has been successfully submitted to the Network Server.
 Use glite-job-status command to check job current status. Your job identifier is:

- https://glite-rb.ct.infn.it:9000/oq13raDQn79U2U4IwUFI-g


******************************************************************

[glite-tutor] /home/amuoio/gLite/Other > ~
```

glite-job-submit helloworld.jdl

It assigneds one id to job

Start | INFN - Catania - M... | AltaVista - Babel Fi... | Backup di WMS-g... | presentazionegrid... | glite-tutor.ct.in... | desk_2   12:15 PM

File   Edit   View   Window   Help

Quick Connect   Profiles

```
Copyright (C) 2003 by DATAMAT SpA

Usage: glite-job-status  [options]  <job Id(s)>
Options:
   --help
   --version

   --all
   --input, -i       <input file>
   --verbosity       [0|1|2|3]
   --from            [MM:DD:]hh:mm[:[CC]YY]
   --to              [MM:DD:]hh:mm[:[CC]YY]
   --config, -c      <config file>
   --user-tag        <tag name>=<tag value>
   --status, -s      <status value>
   --exclude, -e     <exclude value>
   --config-vo       <config-vo file>
   --vo              <vo value>
   --output, -o      <output file>
   --noint
   --debug
   --logfile         <logfile file>

 Please report any bug at:
    egee@datamat.it
[glite-tutor] /home/amuoio/gLite/Other > glite-job-status https://glite-rb.ct.infn.it:9000/oq13raDQn79U2U4IwUFI-g


******************************************************************
BOOKKEEPING INFORMATION:

Status info for the Job : https://glite-rb.ct.infn.it:9000/oq13raDQn79U2U4IwUFI-g
Current Status:     Done (Success)
Exit code:          0
Status Reason:      Job terminated successfully
Destination:        gilda-ce-01.pd.infn.it:2119/jobmanager-lcgpbs-long
Submitted:          Wed Jan 25 12:06:35 2006 CET
******************************************************************


[glite-tutor] /home/amuoio/gLite/Other >
```
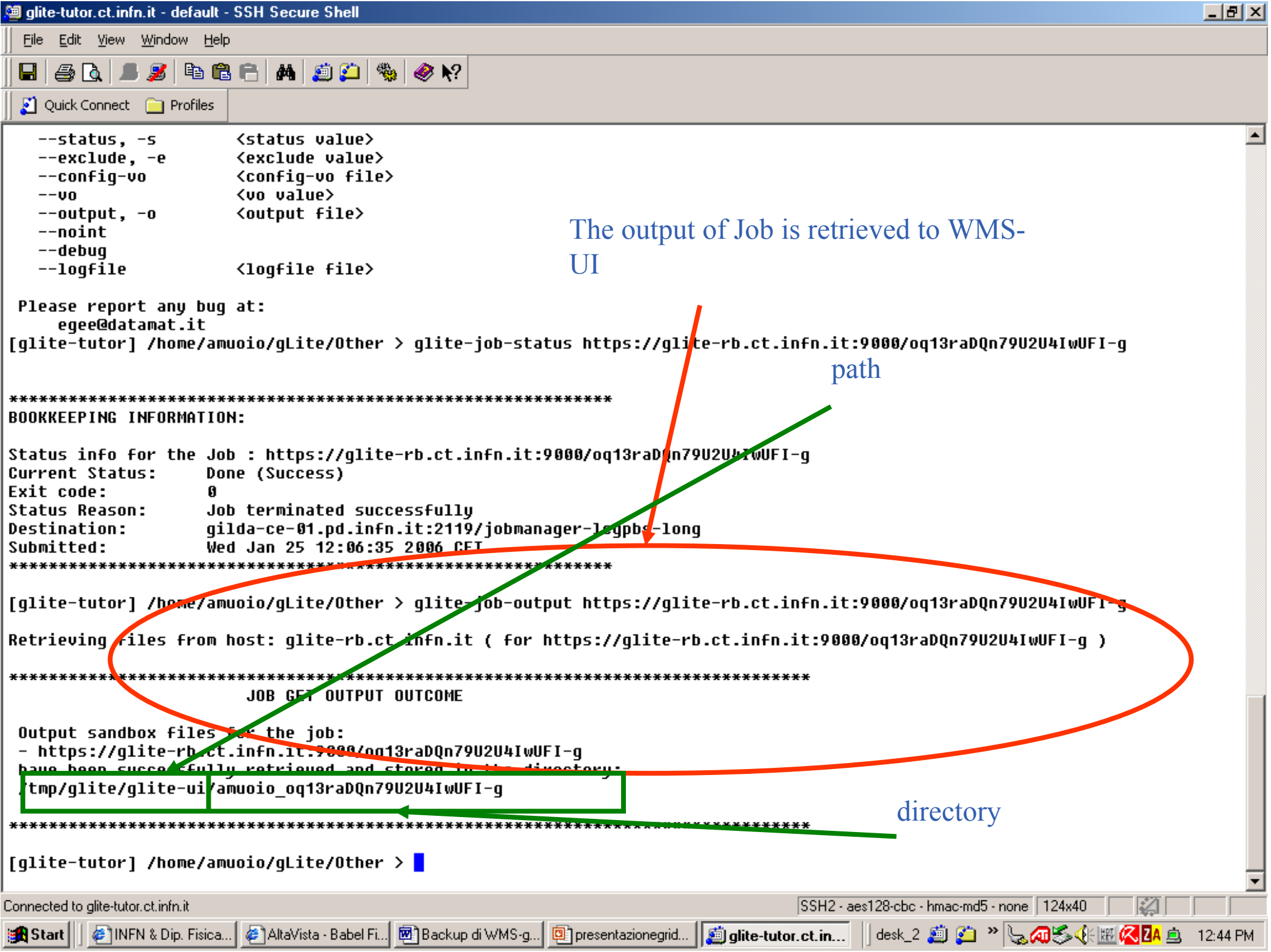
Job has terminated its execution

Start | Impossibile trovare... | AltaVista - Babel Fi... | Backup di WMS-g... | presentazionegrid... | glite-tutor.ct.in... | desk_2   12:25 PM

File   Edit   View   Window   Help

Quick Connect   Profiles

```
--status, -s        <status value>
--exclude, -e       <exclude value>
--config-vo         <config-vo file>
--vo                <vo value>
--output, -o        <output file>
--noint
--debug
--logfile           <logfile file>
```

The output of Job is retrieved to WMS-UI

```
 Please report any bug at:
     egee@datamat.it
[glite-tutor] /home/amuoio/gLite/Other > glite-job-status https://glite-rb.ct.infn.it:9000/oq13raDQn79U2U4IwUFI-g
```

path

```
*********************************************************
BOOKKEEPING INFORMATION:

Status info for the Job : https://glite-rb.ct.infn.it:9000/oq13raDQn79U2U4IwUFI-g
Current Status:     Done (Success)
Exit code:          0
Status Reason:      Job terminated successfully
Destination:        gilda-ce-01.pd.infn.it:2119/jobmanager-lcgpbs-long
Submitted:          Wed Jan 25 12:06:35 2006 CET
*********************************************************

[glite-tutor] /home/amuoio/gLite/Other > glite-job-output https://glite-rb.ct.infn.it:9000/oq13raDQn79U2U4IwUFI-g

Retrieving files from host: glite-rb.ct.infn.it ( for https://glite-rb.ct.infn.it:9000/oq13raDQn79U2U4IwUFI-g )

*********************************************************
                   JOB GET OUTPUT OUTCOME

 Output sandbox files for the job:
 - https://glite-rb.ct.infn.it:9000/oq13raDQn79U2U4IwUFI-g
 have been successfully retrieved and stored in the directory:
 /tmp/glite/glite-ui/amuoio_oq13raDQn79U2U4IwUFI-g
```

directory

```
*********************************************************

[glite-tutor] /home/amuoio/gLite/Other >
```

Connected to glite-tutor.ct.infn.it   SSH2 - aes128-cbc - hmac-md5 - none   124x40

Start | INFN & Dip. Fisica... | AltaVista - Babel Fi... | Backup di WMS-g... | presentazionegrid... | glite-tutor.ct.in... | desk_2   12:44 PM

Thank you!