



Job Management

DIRAC Project



Overview

- ▶ DIRAC JDL
- ▶ DIRAC Commands
- ▶ Tutorial Exercises
- ▶ What do you have learned?





Job Description Language (JDL)

- ▶ JDL is the language used to specify the characteristics and resources required by the job.
- ▶ For example:
 - ▶ Executable to run and its parameters.
 - ▶ Files to be moved to and from the Worker Node
 - ▶ Input files
 - ▶ Grid files
 - ▶ and any requirements.



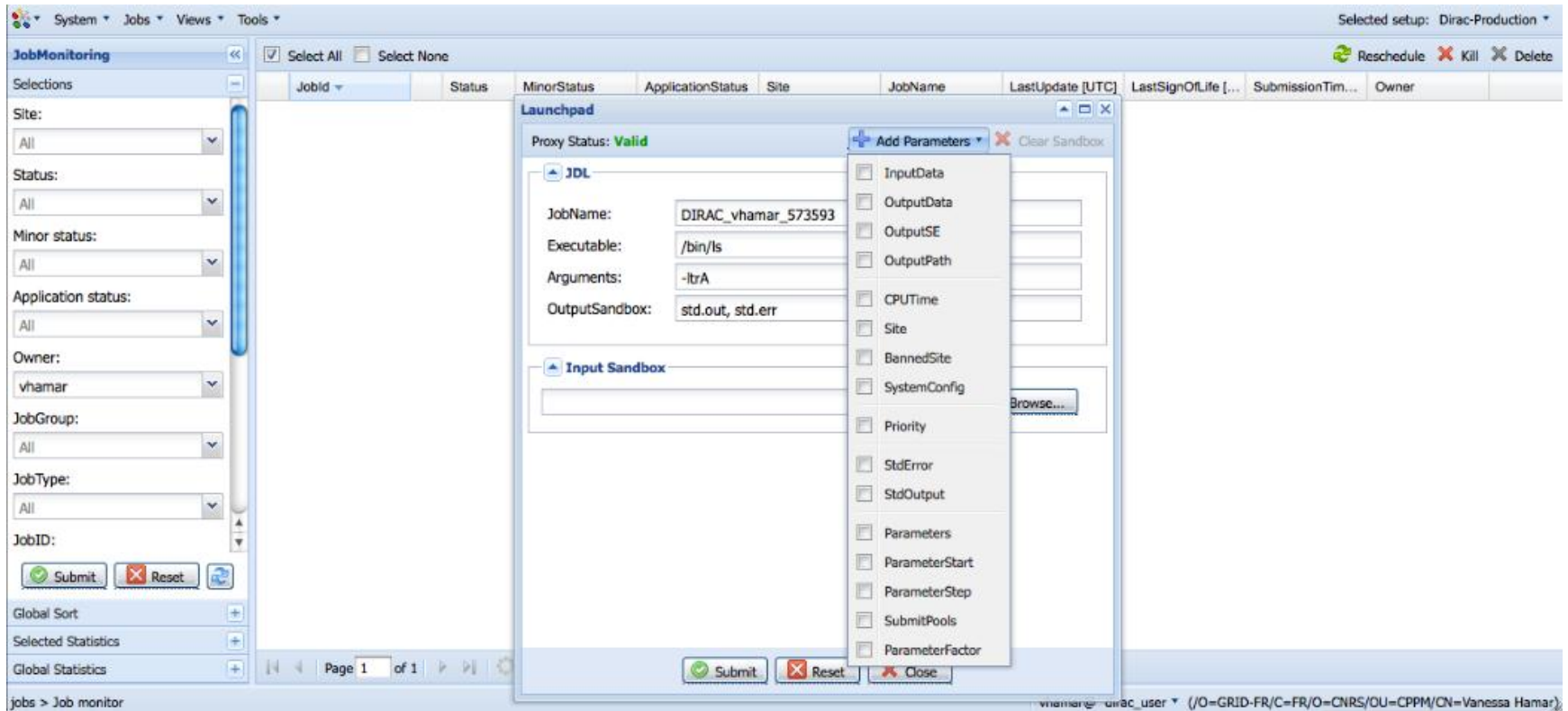
- ▶ **DIRAC is not using JDLs internally, DIRAC transforms the user JDL to DIRAC internal conventions.**
 - ▶ Using DIRAC specific matching mechanism for job to resources mapping
- ▶ **Not all the JDLs attributes are allowed in DIRAC.**
 - ▶ In particular, there is no Requirements JDL attribute.
- ▶ **Some attributes are interpreted as requirements**
 - ▶ E.g. Site, CPUTime

- ▶ The JDL syntax consists of statements ended by a semicolon, like:

`attribute = value;`

- ▶ Literal strings (for values) are enclosed in double quotes.

`Site = "LCG.KEK.jp";`



The screenshot shows the DIRAC Job Monitoring interface. On the left, there is a 'JobMonitoring' sidebar with filters for Site, Status, Minor status, Application status, Owner, JobGroup, JobType, and JobID. The main area displays a table of jobs with columns for JobID, Status, MinorStatus, ApplicationStatus, Site, JobName, LastUpdate [UTC], LastSignOfLife [...], SubmissionTim..., and Owner. A 'Launchpad' window is open, showing the configuration for a job named 'DIRAC_vhamar_573593'. The configuration includes:

- Proxy Status: Valid
- JobName: DIRAC_vhamar_573593
- Executable: /bin/lis
- Arguments: -ltrA
- OutputSandbox: std.out, std.err

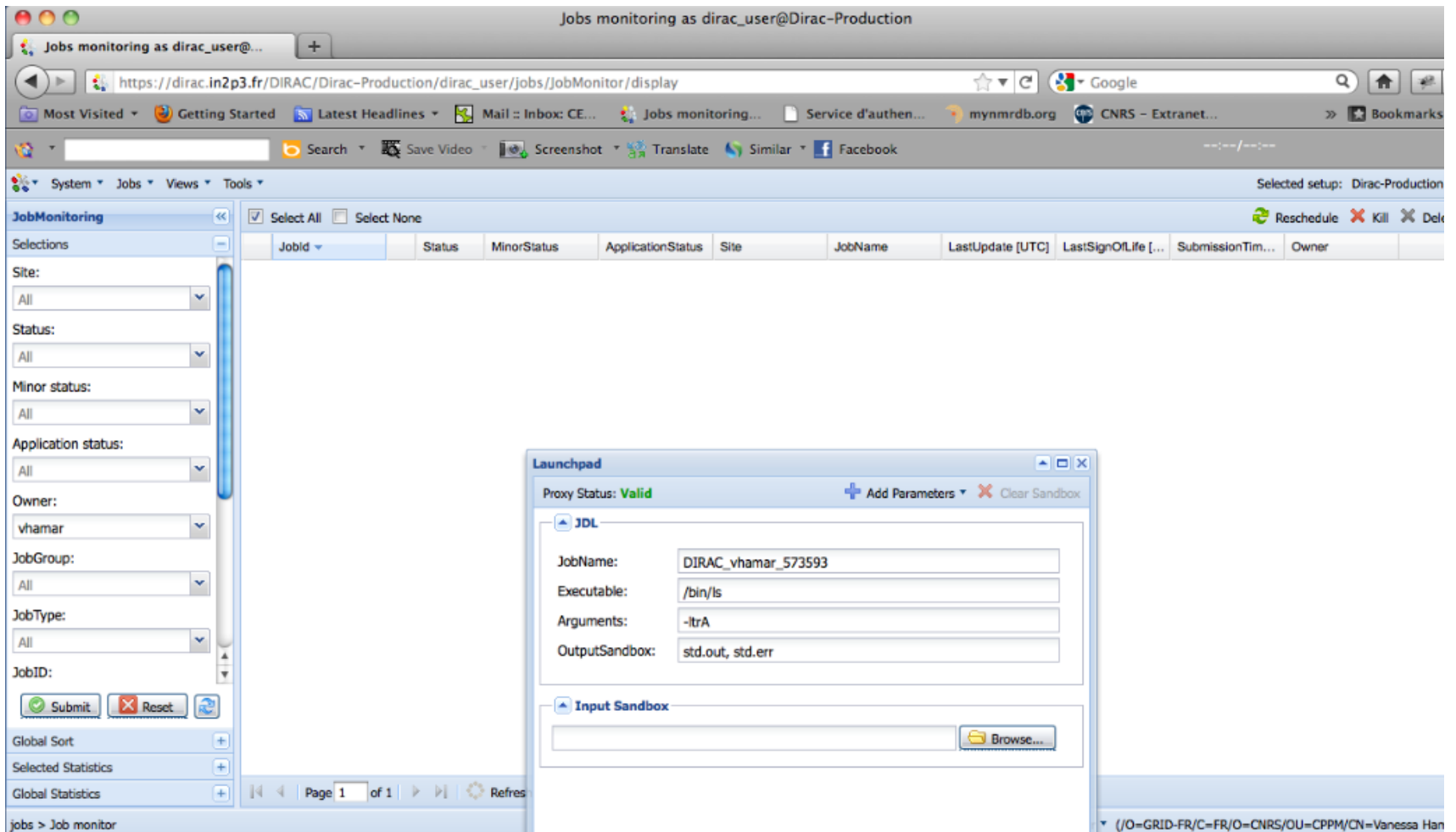
An 'Add Parameters' menu is open, listing various parameters that can be added to the job configuration:

- InputData
- OutputData
- OutputSE
- OutputPath
- CPUTime
- Site
- BannedSite
- SystemConfig
- Priority
- StdError
- StdOutput
- Parameters
- ParameterStart
- ParameterStep
- SubmitPools
- ParameterFactor

At the bottom of the Launchpad window, there are buttons for 'Submit', 'Reset', and 'Close'. The status bar at the bottom of the interface shows 'vhamar@dirac_user (/O=GRID-FR/C=FR/O=CNRS/OU=CPPM/CN=Vanessa Hamar)'.

```
JobName = "Simple_Job";  
Executable = "/bin/lis"; *  
Arguments = "-ltr";  
StdOutput = "StdOut"; *  
StdError = "StdErr"; *  
OutputSandbox = {"StdOut", "StdErr"}; *
```

* Mandatory attributes



The screenshot shows the DIRAC Job Monitoring interface in a web browser. The browser address bar displays the URL: `https://dirac.in2p3.fr/DIRAC/Dirac-Production/dirac_user/jobs/JobMonitor/display`. The interface includes a navigation menu with options like System, Jobs, Views, and Tools. A sidebar on the left contains filters for Site, Status, Minor status, Application status, Owner, JobGroup, JobType, and JobID. The main area features a table with columns: JobID, Status, MinorStatus, ApplicationStatus, Site, JobName, LastUpdate [UTC], LastSignOffLife [...], SubmissionTim..., and Owner. A 'Launchpad' window is open in the foreground, showing the configuration for a job. The 'Proxy Status' is 'Valid'. The 'JDL' section contains the following fields:

- JobName: DIRAC_vhamar_573593
- Executable: /bin/lis
- Arguments: -ltrA
- OutputSandbox: std.out, std.err

The 'Input Sandbox' section has a 'Browse...' button. The bottom of the interface shows 'Page 1 of 1' and a 'Refresh' button.

- ▶ Sandbox files are stored in the DIRAC Workload Management Service and are only available for the time of life of the corresponding job.
 - ▶ Volatile storage.
 - ▶ Some grace period, typically 1 week for keeping sandboxes to allow their retrieval.
- ▶ Data are stored in the Grid Storage
 - ▶ Permanent storage
- ▶ The size of the Sandboxes is limited to ~10MG per job
 - ▶ Submitting a job with a large sandbox will result as an error
 - ▶ Large output sandboxes are stored in the Grid Storage
 - ▶ This is the user responsibility to clean up this storage

▶ Simple.jdl

```
Executable = "testJob.sh";
```

```
StdOutput = "StdOut";
```

```
StdError = "StdErr";
```

```
InputSandbox = {"testJob.sh"};
```

```
OutputSandbox = {"StdOut", "StdErr"};
```

▶ testJob.sh

```
#!/bin/bash
```

```
/bin/hostname
```

```
/bin/date
```





Example

Input and Output Data

▶ `testJob.jdl`

```
Executable = "testJob.sh";
```

```
StdOutput = "StdOut";
```

```
StdError = "StdErr";
```

```
InputSandbox =
```

```
  {"testJob.sh", "LFN:/vo.formation.idgrilles.fr/user/v/vham  
  ar/test.txt"};
```

```
OutputSandbox = {"StdOut", "StdErr"};
```

```
OutputSE = "M3PEC-disk";
```

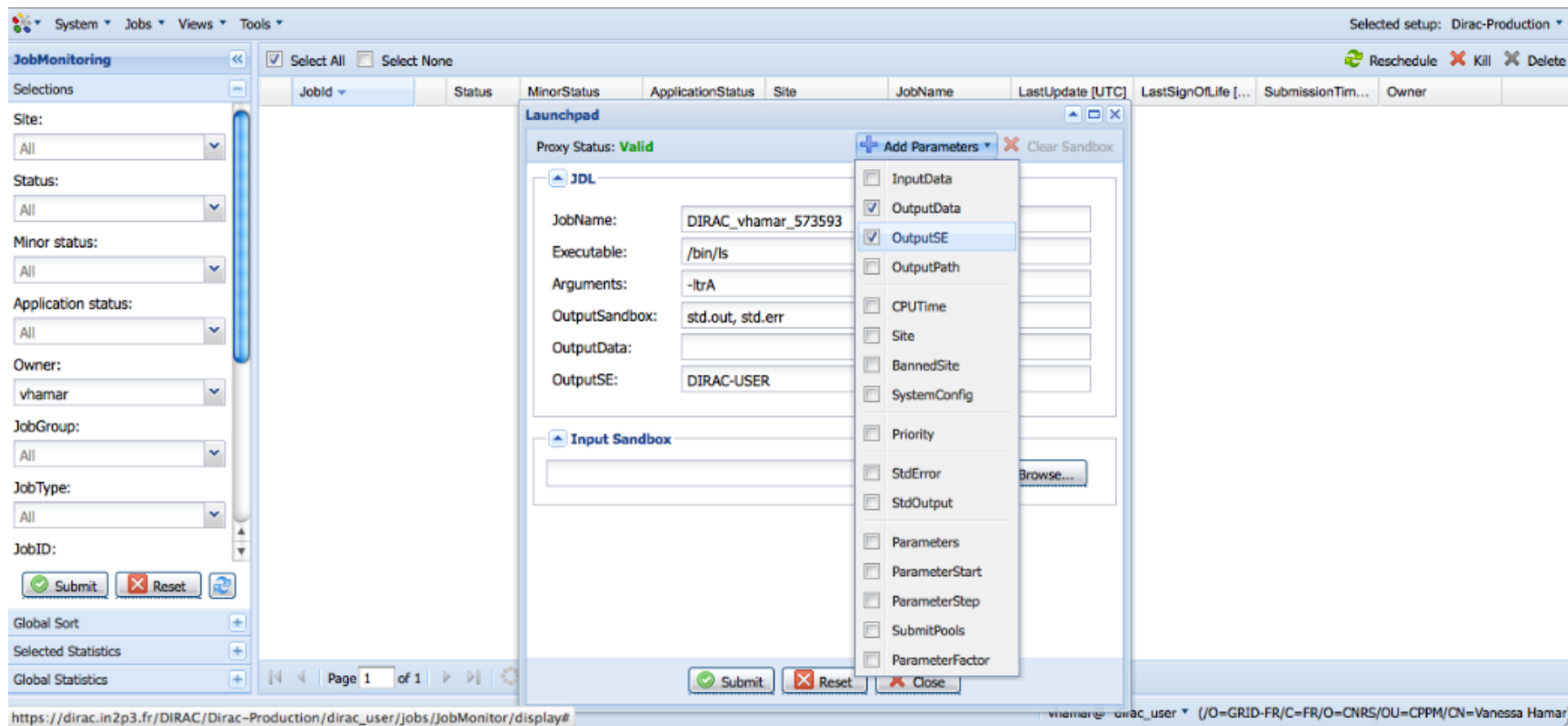
▶ `testJob.sh`

```
#!/bin/bash
```

```
/bin/hostname
```

```
cat test.txt
```





The screenshot displays the DIRAC JobMonitoring web interface. On the left, there is a sidebar with filters for Site, Status, Minor status, Application status, Owner, JobGroup, JobType, and JobID. The main area shows a table of jobs with columns for JobID, Status, MinorStatus, ApplicationStatus, Site, JobName, LastUpdate [UTC], LastSignOfLife [...], SubmissionTim..., and Owner. A 'Launchpad' window is open, showing the configuration for a job named 'DIRAC_vhamar_573593'. The job's executable is '/bin/lis' and its arguments are '-ltrA'. The output sandbox is 'std.out, std.err' and the output SE is 'DIRAC-USER'. A dropdown menu is open over the 'Add Parameters' button, listing various parameters such as InputData, OutputData, OutputSE, OutputPath, CPUTime, Site, BannedSite, SystemConfig, Priority, StdError, StdOutput, Parameters, ParameterStart, ParameterStep, SubmitPools, and ParameterFactor. The 'OutputData' and 'OutputSE' options are checked.

System ▾ Jobs ▾ Views ▾ Tools ▾ Selected setup: Dirac-Production ▾

JobMonitoring << Select All Select None Reschedule ✕ Kill ✕ Delete ✕

Selections

Site: All ▾

Status: Done ▾

- All
- Completed
- Done
- Failed
- Killed
- Matched

JobGroup: All ▾

JobType: All ▾

JobID:

Submit Reset

Global Sort +

Selected Statistics +

Global Statistics +

JobID	Status	MinorStatus	ApplicationStatus	Site	JobName	LastUpdate [UTC]	LastSignOffLife [...]	SubmissionTim...	Owner
<input type="checkbox"/> 8634	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8633	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8632	Done	Execution Com...	Unknown	LCG.M3PEC.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8631	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8630	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8629	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8628	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8627	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8626	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8625	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:38	2011-10-24 07:38	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8624	Done	Execution Com...	Unknown	LCG.MSFG.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8623	Done	Execution Com...	Unknown	LCG.M3PEC.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8622	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8621	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:38	2011-10-24 07:38	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8620	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8619	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:38	2011-10-24 07:38	2011-10-24 07:28	vhamar
<input type="checkbox"/> 8618	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:37	2011-10-24 07:37	2011-10-24 07:28	vhamar

Page 1 of 135 Refresh Items per page: 25

Displaying 1 - 25 of 3367

vhamar@ dirac_user (/O=GRID-FR/C=FR/O=CNRS/OU=CPPM/CN=Vanessa Hamar)





DIRAC Commands

- ▶ In the *directory scripts* of your DIRAC installation there are a lot of commands that can be used for different purposes:
 - ▶ Job Management
 - ▶ Data Management
 - ▶ Proxy Management
 - ▶ Administration of the system





DIRAC Commands

DIRAC WMS

dirac-wms-job-attributes
dirac-wms-job-delete
dirac-wms-job-get-input
dirac-wms-job-get-jdl
dirac-wms-job-get-output
dirac-wms-job-get-output-data
dirac-wms-job-kill
dirac-wms-job-logging-info
dirac-wms-job-parameters
dirac-wms-job-peek
dirac-wms-job-reschedule
dirac-wms-job-status
dirac-wms-job-submit
dirac-wms-jobs-select-output-search
dirac-wms-select-jobs

DIRAC ADMIN

dirac-admin-add-group
dirac-admin-add-host
dirac-admin-add-site
dirac-admin-add-user
dirac-admin-allow-catalog
dirac-admin-allow-se
dirac-admin-allow-site
dirac-admin-ban-catalog
dirac-admin-ban-se
dirac-admin-ban-site
dirac-admin-bdii-ce
dirac-admin-bdii-site
dirac-admin-ce-info
dirac-admin-delete-user
dirac-admin-externals-versions



DIRAC Commands

DIRAC DMS

dirac-dms-catalog-metadata
dirac-dms-change-replica-status
dirac-dms-check-file-integrity
dirac-dms-clean-directory
dirac-dms-data-size
dirac-dms-filecatalog-cli
dirac-dms-fts-monitor
dirac-dms-fts-submit
dirac-dms-get-file
dirac-dms-get-storage-directories
dirac-dms-lfn-accessURL
dirac-dms-lfn-logging-info
dirac-dms-lfn-metadata
dirac-dms-lfn-replicas
dirac-dms-pfn-accessURL
dirac-dms-pfn-metadata
dirac-dms-remove-catalog-files

DIRAC PROXY

dirac-proxy-get-uploaded-info
dirac-proxy-info
dirac-proxy-init
dirac-proxy-upload

DIRAC UTILITIES

dirac-platform
dirac-rss-reassign-token
dirac-rss-renew-token
dirac-service



DIRAC Commands: Sending Jobs

- ▶ The command used to submit jobs using DIRAC is:

```
dirac-wms-job-submit <JDL>
```

```
$ dirac-wms-job-submit Simple.jdl
```

```
JobID = 11
```





DIRAC Commands: Common options

- ▶ All the DIRAC commands are following the UNIX notation for passing arguments to the command
- ▶ Some options are common to all the commands:
 - o to pass any configuration option, e.g.
 - o /DIRAC/Setup=DIRAC-Production
 - d, -dd, -ddd to choose various levels of the output verbosity
 - h to show help message for the command
- ▶ In the following there are some examples of commonly used commands



- ▶ The command used to get the job status is:

```
dirac-wms-job-status <Job_ID>
```

```
$ dirac-wms-job-status 11
```

```
JobID=11 Status=Waiting;
```

```
MinorStatus=Pilot Agent Submission;
```

```
Site=ANY;
```



Dirac Commands: Job Retrieval

- ▶ To retrieve job outputs use the command:

```
dirac-wms-job-get-output [ --Dir output_dir] <Job_ID> [<Job_ID>]
```

```
$ dirac-wms-job-get-output --Dir this_dir 470 469 468
```

```
$ ls -la this_dir/
```

```
total 20
```

```
drwxr-xr-x 5 hamar dirac 4096 Oct 26 19:02 .
```

```
drwxr-xr-x 3 hamar dirac 4096 Oct 26 19:02 ..
```

```
drwxr-xr-x 2 hamar dirac 4096 Oct 26 19:02 468
```

```
drwxr-xr-x 2 hamar dirac 4096 Oct 26 19:02 469
```

```
drwxr-xr-x 2 hamar dirac 4096 Oct 26 19:02 470
```



Dirac Commands: Job Retrieval

The screenshot displays the DIRAC JobMonitoring web interface. The main area is a table of jobs with columns for JobID, Status, MinorStatus, ApplicationStatus, Site, JobName, LastUpdate [UTC], LastSignOfLife [...], SubmissionTim..., and Owner. A context menu is open over job 8825, showing options like 'Get input file(s)' and 'Get output file(s)'. The interface includes a left sidebar with filters for Site, Status, Minor status, Application status, Owner, JobGroup, JobType, and JobID. The bottom status bar shows 'Page 1 of 135' and 'Items per page: 25'. The URL at the bottom is `https://dirac.in2p3.fr/DIRAC/Dirac-Production/dirac_user/jobs/JobMonitor/display#`.

JobID	Status	MinorStatus	ApplicationStatus	Site	JobName	LastUpdate [UTC]	LastSignOfLife [...]	SubmissionTim...	Owner
8834	Done	JDL	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
8833	Done	Attributes	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
8832	Done	Parameters	vn	LCG.M3PEC.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
8831	Done	Logging info	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
8830	Done	Peek StandardOutput	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
8829	Done	Get LogFile	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
8828	Done	Get PendingRequest	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
8827	Done	Get StagerReport	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:40	2011-10-24 07:40	2011-10-24 07:28	vhamar
8826	Done	Actions	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
8825	Done	Pilot	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:38	2011-10-24 07:38	2011-10-24 07:28	vhamar
8824	Done	Sandbox	vn	LCG.M3PEC.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
8823	Done	Show value	vn	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
8822	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:38	2011-10-24 07:38	2011-10-24 07:28	vhamar
8821	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:38	2011-10-24 07:38	2011-10-24 07:28	vhamar
8820	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:39	2011-10-24 07:39	2011-10-24 07:28	vhamar
8819	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:38	2011-10-24 07:38	2011-10-24 07:28	vhamar
8818	Done	Execution Com...	Unknown	LCG.IN2P3.fr	DIRAC_vhamar...	2011-10-24 07:37	2011-10-24 07:37	2011-10-24 07:28	vhamar

- ▶ **Submit “Hello World” job with Web Launchpad**
 - ▶ Monitor it
 - ▶ Get results in the Web browser
- ▶ **Submit “Hello World” job with command line tools**
 - ▶ Edit JDL
 - ▶ Monitor it
 - ▶ Get results with command line tools

- ▶ **Goals**
 - ▶ Understand job description
 - ▶ Understanding job Web monitoring and manipulation tools

