EGI-InSPIRE

UMD Compute Capabilities Quality Criteria v1.2

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Abstract

This document describes the Quality Criteria for the Compute Capabilities identified in the UMD Roadmap.

Document Log

Issue	Date	Comment	Author/Partner
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1.1	02/02/2011	Review and added Job Scheduling	Enol Fernández, Álvaro Fernández
1.2	09/02/2011	More review of criteria	Enol Fernández

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1 JOB EXECUTION

The Compute Capability relates to the ability to describe, submit, manage and monitor a work item on a specific site submitted for either queued batch or interactive execution. Currently, there are different interfaces considered for the Compute Capability. The implementations must support, at least, one of them.

1.1 CREAM Interface

These QC refer to implementation of the Compute capability using the CREAM interface [R 5]. May be deprecated in future versions of the QC.

Cream API TestSuite	
ID	**JOBEXEC_CREAM_API_1**
Mandatory	
Applicability	Job Execution Appliances with CREAM interface
Related Requirements	None

Description Test the all the functions of the CREAM interface.	
Input from TP Complete Test suite for the CREAM API. It must include tests for all the documented functions in the CREAM WSDL. For all functions, check both correct and invalid input. Invalid output should throw an exception as documented. Test also with valid and invalid credentials. Invalid credentials should throw security related exceptions.	
Test Suite Description	
Pre-condition	Valid user credentials.
Test	Test all CREAM functionality, with correct/incorrect input and with valid and invalid credentials.
Expected Outcome	Log of all the operations performed. All the documented functions work as documented.
Pass/Fail Criteria Pass if the testsuite is provided and passes.	
Related Information	
History	

1.1.1 Job Submission tests

The following job submission tests use the gLite JDL format for the specification of jobs.

Simple Job Submission	
ID	**JOBEXEC_CREAM_JOB_1**
Mandatory	
Applicability	Job Execution Appliances with CREAM interface
Related Requirements	None

Description

Test the job submission for simple job.

Input from TP

Test for the submission of a job.

Test 1

Pre-condition	Valid User proxy and valid delegation in the service.
Test	Job submission of simple job:
Expected Outcome	Job finishes correctly. Unique Identifier for the submitted jobs, status log of the job.

```
Executable = /bin/sleep;
Arguments = "120";
```

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Simple Job Submission with files	
ID	**JOBEXEC_CREAM_JOB_2**
Mandatory	
Applicability	Job Execution Appliances with CREAM interface
Related Requirements	None

Description

Test the job submission for simple job with input and output files.

Input from TP

Test for the submission of a job with input and output files.

Test 1

Pre-condition Valid User proxy and valid delegation in the service.
Non-empty file “myfile”

Test Job submission for job with input and output files:

```
Executable = "/bin/ls";
Arguments = "-l";
StdOutput = "std.out";
StdError = "std.err";
InputSandbox = {"myfile"};
OutputSandbox = {"std.out", "std.err"};Job Submission
```

Expected Outcome Job finishes correctly, output contains the listing of the directory including the input file with correct size. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Job Cancel	
ID	**JOBEXEC_CREAM_JOB_3**
Mandatory	
Applicability	Job Execution Appliances with CREAM interface
Related Requirements	None

Description

Test the job cancellation for a job.

Input from TP

Test for the cancellation of a job.

Test 1

Pre-condition	Valid User proxy and valid delegation in the service.

Test	Job Submission and then cancellation.
	Possible description for job:
	`Executable = "/bin/sleep";`
	`Arguments = "20m";`

Expected Outcome	Job is submitted and then cancelled correctly. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

1.2 ARC Interface

These QC refer to implementation of the Compute capability using the ARC-CE interface [R 6]. May be deprecated in future versions of the QC.

ARC-CE API TestSuite	
ID	**JOBEXEC_ARC_API_1**
Mandatory	
Applicability	Job Execution Appliances with ARC CE interface
Related Requirements	None

Description

Test the all the functions of the ARC-CE interface.

Input from TP

Complete Test suite for the ARC-CE API. It must include tests for all the documented functions of the API.

For all functions, check both correct and invalid input. Invalid output should throw an exception as documented. Test also with valid and invalid credentials. Invalid credentials should throw security related exceptions.

Test Suite Description

Pre-condition	Valid user credentials.
Test	Test all ARC-CE functionality, with correct/incorrect input and with valid and invalid credentials.
Expected Outcome	Log of all the operations performed. All the documented functions work as documented.

Pass/Fail Criteria

Pass if the testsuite is provided and passes.

Related Information

History

1.2.1 Job Submission tests

The following job submission tests use the ARC xRSL format for the specification of jobs.

Simple Job Submission	
ID	**JOBEXEC_ARC_JOB_1**
Mandatory	
Applicability	Job Execution Appliances with ARC CE interface
Related Requirements	None

Description

Test the job submission for simple job.

Input from TP

Test for the submission of a job.

Test 1

Pre-condition	Valid User proxy.
Test	Job submission for simple job: `&(executable="/bin/sleep")(arguments="120")`
Expected Outcome	Job finishes correctly. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Simple Job Submission with files	
ID	**JOBEXEC_ARC_JOB_2**
Mandatory	
Applicability	Job Execution Appliances with ARC CE interface
Related Requirements	None

Description

Test the job submission for simple job with input and output files.

Input from TP

Test for the submission of a job with input and output files.

Test 1

Pre-condition	Valid User proxy and valid delegation in the service. Non-empty file “myfile”
Test	Job Submission of job with input and output files:

```
&
(executable="/bin/ls")
(arguments="-l")
(stdout="std.out ")
(stderr="std.err ")
(inputFiles=("myfile" ""))
```

Expected Outcome	Job finishes correctly, output contains the listing of the directory including the input file with correct size. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Job Cancel	
ID	**JOBEXEC_ARC_JOB_3**
Mandatory	
Applicability	Job Execution Appliances with ARC CE interface
Related Requirements	None

Description

Test the job cancellation for a job.

Input from TP

Test for the cancellation of a job.

Test 1

Pre-condition	Valid User proxy and valid delegation in the service.
Test	Job Submission and then cancellation. Possible job description for job: `&(executable="/bin/sleep")(arguments="20m")`
Expected Outcome	Job is submitted and then cancelled correctly. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

1.3 BES Interface

These QC refer to implementation of the Compute capability using the OGSA BES interface [R 7]. May be deprecated in future versions of the QC.

BES API TestSuite	
ID	**JOBEXEC_BES_API_1**
Mandatory	
Applicability	Job Execution Appliances with BES interface
Related Requirements	None

Description

Test the all the functions of the BES interface.

Input from TP

Complete Test suite for the BES API. It must include tests for all the mandatory documented functions of the specification.

For all functions, check both correct and invalid input. Invalid output should throw an exception as documented. Test also with valid and invalid credentials. Invalid credentials should throw security related exceptions.

Test Suite Description

Pre-condition	Valid user credentials.
Test	Test all OGSA BES functionality, with correct/incorrect input and with valid and invalid credentials.
Expected Outcome	Log of all the operations performed. All the documented functions work as documented.

Pass/Fail Criteria

Pass if the testsuite is provided and passes.

Related Information

History

1.3.1 Job Submission tests

The following job submission tests use the UNICORE UCC JSON format for the specification of jobs.

Simple Job Submission	
ID	**JOBEXEC_BES_JOB_1**
Mandatory	
Applicability	Job Execution Appliances with BES interface
Related Requirements	None

Description

Test the job submission for simple job.

Input from TP

Test for the submission of a job.

Test 1

Pre-condition Valid User credentials.

Test Job Submission for simple job:

```
{
  Executable: "/bin/sleep",
  Arguments: ["20"],
}
```

Expected Outcome Job finishes correctly. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Simple Job Submission with files	
ID	**JOBEXEC_BES_JOB_2**
Mandatory	
Applicability	Job Execution Appliances with BES interface
Related Requirements	None

Description

Test the job submission for simple job with input and output files.

Input from TP

Test for the submission of a job with input and output files.

Test 1

Pre-condition Valid User proxy and valid delegation in the service.
Non-empty file “myfile”

Test Job Submission of job with input/output files:

```
       {
         Executable: "/bin/ls",
         Arguments: ["-l"],
         Stdout: std.out,
         Stderr: std.err,
         Imports: [
           { From: "myfile", To: "myfile" },
         ]
         Exports: [
           { From: "std.out", To: "std.out" },
           { From: "std.err", To: "std.err" },
         ]
}
```

Expected Outcome Job finishes correctly, output contains the listing of the directory including the input file with correct size. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Job Cancel	
ID	JOBEXEC_BES_JOB_3
Mandatory	
Applicability	Job Execution Appliances with BES interface
Related Requirements	None

Description

Test the job cancellation for a job.

Input from TP

Test for the cancellation of a job.

Test 1

Pre-condition	Valid User proxy and valid delegation in the service.
Test	Job Submission and then cancellation. Possible Job description for job:

```
{
  Executable: "/bin/sleep",
  Arguments: ["20m"],
}
```

Expected Outcome	Job is submitted and then cancelled correctly. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

1.4 DRMAA Interface

These QC refer to implementation of the Compute capability using the OGF DRMAA interface [R 8]. May be deprecated in future versions of the QC.

DRMAA API TestSuite	
ID	**JOBEXEC_DRMAA_API_1**
Mandatory	
Applicability	Job Execution Appliances with DRMAA interface
Related Requirements	None

Description Test the all the functions of the DRMAA interface.	
Input from TP Complete Test suite for the DRMAA API. It must include tests for all the mandatory documented functions of the specification. For all functions, check both correct and invalid input. Invalid output should throw an exception as documented. Test also with valid and invalid credentials. Invalid credentials should throw security related exceptions.	
Test Suite Description	
Pre-condition	Valid user credentials.
Test	Test all OGF DRMAA functionality, with correct/incorrect input and with valid and invalid credentials.
Expected Outcome	Log of all the operations performed. All the documented functions work as documented.
Pass/Fail Criteria Pass if the testsuite is provided and passes.	
Related Information	
History	

1.5 *Execution Manager Support*

These QC refer to the interaction of the Job Execution Capability with the underlying execution manager (usually a LRMS) for the work items submitted. Job Execution Capabilities are expected to support the most common LRMS used in the current EGI infrastructure:

- Torque/PBS
- LSF
- SGE/OGE

Not Invasive Deployment	
ID	**JOBEXEC_EXECMNGR_1**
Mandatory	
Applicability	Job Execution Appliances.
Related Requirements	None

Description The Job Execution Capability should not introduce any modifications to the underlying execution manager or to the operations of the resources.
Input from TP Description of all the needed modifications on the local resources in order to deploy the Job Execution Capability implementation.
Pass/Fail Criteria Pass if the modifications are not invasive, namely: • Installation of additional software at the WN is permitted as long as no extra services are run permanently at the WN. • Do not require the deployment of extra shared filesystems • Do not modify the local submission mechanism of jobs (e.g. do not require the modification of prologue/epilogue scripts of the batch system) • Do not require the creation of extra user accounts or add special privileges to a specific account.
Related Information
History

Job Submission	
ID	**JOBEXEC_EXECMNGR_2**
Mandatory	
Applicability	Job Execution Appliances.
Related Requirements	None

Description

The Job Execution Capability must be able to submit, manage and monitor jobs to the underlying execution manager.

Input from TP

Test for job submission.

Test 1

Pre-condition	None
Test	Job submission to batch system
Expected Outcome	Job is submitted to batch system, a valid Job ID is returned.

Test 2

Pre-condition	Already submitted job.
Test	Query job status in the execution manager.
Expected Outcome	Job status can be fetched, show a message with it.

Test 3

Pre-condition	Already submitted job.
Test	Cancel job in the execution manager.
Expected Outcome	Job is successfully cancelled.

Pass/Fail Criteria

Pass if the test is provided and passes for each of the supported execution managers.

Related Information

History

Information Retrieval	
ID	**JOBEXEC_EXECMNGR_3**
Mandatory	
Applicability	Job Execution Appliances.
Related Requirements	None

Description	
The Job Execution Capability must be able to fetch information from the underlying execution manager and make it available to a Information Discovery Appliance.	
Input from TP	
Test for information retrieval from execution manager.	
Test 1	
Pre-condition	Configured system.
Test	Retrieve current status from execution manager.
Expected Outcome	All Computing Element related entities of GlueSchema using the **actual** information from the execution manager is generated.
Pass/Fail Criteria	
Pass if the test is provided and passes.	
Related Information	
History	

1.6 Availability/Scalability

Stress Test	
ID	**JOBEXEC_AVAIL_1**
Mandatory	
Applicability	Job Execution Appliances.
Related Requirements	None

Description The Job Execution Capability should be available under realistic conditions.		
Input from TP Stress test for the service that calculates the maximum throughput of the service.		
Test 1		
Pre-condition	Correctly configured service.	
Test	Stress test the service until is not available.	
Expected Outcome	Throughput of the service.	
Pass/Fail Criteria Pass if the throughput is enough to handle at least 5000 simultaneous jobs.		
Related Information		
History		

Service Redundancy	
ID	**JOBEXEC_AVAIL_2**
Mandatory	
Applicability	Job Execution Appliances.
Related Requirements	None

Description More than one Job Execution Capability implementation should be able to access a single local batch system concurrently.	
Input from TP Test for the concurrent access of more than one implementation to a single batch system.	
Test 1	
Pre-condition	More than one Compute Capability configured to use the same execution manager
Test	Submission of jobs to all the Compute Capabilities
Expected Outcome	All jobs are executed correctly; they are not mixed up in any situation.
Pass/Fail Criteria Pass if the test is provided and passes.	
Related Information	
History	

Self-disabling Mechanism	
ID	**JOBEXEC_AVAIL_3**
Not Mandatory	
Applicability	Job Execution Appliances.
Related Requirements	None

Description

The Job Execution Capability should detect high load conditions and self-disable the job submission in order to maintain the quality of the service.

Input from TP

Stress test for the service that triggers a self-disabling mechanism.

Test 1

Pre-condition	Correctly configured service in high load system.
Test	Submission of job.
Expected Outcome	Service self-disables submission, a message to the client is sent when the submission is tried.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

2 PARALLEL JOB

2.1 Submission of parallel jobs

CREAM Simple Parallel Job Submission	
ID	**PARALLEL_JOB_1**
Mandatory	
Applicability	Parallel Job Appliances with CREAM interface.
Related Requirements	None

Description

Test the submission of a parallel job.

Input from TP

Test for the submission of parallel jobs.

Test 1

Pre-condition Valid User proxy and valid delegation in the service.

Test Submission of a job requesting more than one execution slot:

```
Executable = "/bin/sleep";
CPUNumber = 2;
Arguments = "20";
```

Expected Outcome Job is submitted and the requested slots are allocated. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

CREAM Fine grained Parallel Job Submission	
ID	**PARALLEL_JOB_2**
Not Mandatory	
Applicability	Parallel Job Appliances with CREAM interface.
Related Requirements	None

Description

Test the submission of a parallel job with fine grained specification for the layout of processes.

Input from TP

Test for the submission of parallel jobs with fine grained specification for the layout of processes: use complete node, specify number of cores per node.

Test 1

Pre-condition Valid User proxy and valid delegation in the service.

Test Submission of job requesting a complete node:

```
Executable = "/bin/sleep";
NodeNumber = 2;
SMPGranularity = 2;
Arguments = "20";
```

Expected Outcome Job is submitted and the requested slots were allocated. Unique Identifier for the submitted jobs, status log of the job.

Test 2

Pre-condition Valid User proxy and valid delegation in the service.

Test Submission of job requesting a complete node:

```
Executable = "/bin/sleep";
NodeNumber = 1;
SMPGranularity = 4;
WholeNode = True;
Arguments = "20";
```

Expected Outcome Job is submitted and the requested slots are allocated. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

ARC Simple Parallel Job Submission	
ID	**PARALLEL_JOB_3**
Mandatory	
Applicability	Parallel Job Appliances with ARC-CE interface.
Related Requirements	None

Description

Test the submission of a parallel job.

Input from TP

Test for the submission of parallel jobs.

Test 1

Pre-condition	Valid User proxy and valid delegation in the service.

Test	Submission of job requesting more than one execution slot:
	`&(executable="/bin/sleep")`
	`(count="2")`
	`(arguments="20")`

Expected Outcome	Job is submitted and the requested slots are allocated. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

BES Simple Parallel Job Submission	
ID	**PARALLEL_JOB_4**
Mandatory	
Applicability	Parallel Job Appliances with BES interface.
Related Requirements	None

Description

Test the submission of a parallel job.

Input from TP

Test for the submission of parallel jobs.

Test 1

Pre-condition Valid User proxy and valid delegation in the service.

Test Submission of job requesting more than one execution slot:

```
{
  Executable: "/bin/sleep",
  Arguments: ["20"],
  Resources: { CPUs: 2, },
}
```

Expected Outcome Job is submitted and the requested slots are allocated. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

BES Fine grained Parallel Job Submission	
ID	**PARALLEL_JOB_5**
Not Mandatory	
Applicability	Parallel Job Appliances with BES interface.
Related Requirements	None

Description

Test the submission of a parallel job with fine grained specification for the layout of processes.

Input from TP

Test for the submission of parallel jobs with fine grained specification for the layout of processes: use complete node, specify number of cores per node.

Test 1

Pre-condition Valid User proxy and valid delegation in the service.

Test Submission of job requesting a complete node:

```
{
  Executable: "/bin/sleep",
  Arguments: ["20"],
  Resources:{
     CPUsPerNode: 2,
     Nodes: 2,
  }
}
```

Expected Outcome Job is submitted and the requested slots were allocated. Unique Identifier for the submitted jobs, status log of the job.

Test 2

Pre-condition Valid User proxy and valid delegation in the service.

Test Submission of job requesting a particular process distribution:

```
{
  Executable: "/bin/sleep",
  Arguments: ["20"],
  Resources: { CPUsPerNode: 4, Nodes: 1 },
  ExclusiveExecution: True,
}
```

Expected Outcome Job is submitted and the requested slots are allocated. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

2.2 MPI support

Precompiled MPI Job Submission	
ID	**PARALLEL_MPI_1**
Mandatory	
Applicability	Parallel Job Appliances.
Related Requirements	#672: MPI support

Description Test the submission of a precompiled MPI job.
Input from TP Test for the submission of a MPI job that is already compiled.
Test 1 **Pre-condition** Valid User proxy and valid delegation in the service. MPI Binary **Test** Submission of a MPI job requesting more than one execution slot with MPI Binary included in input sandbox of job (description of job depending on Job Execution interface) **Expected Outcome** Job is submitted and executed without errors; the requested slots are allocated. Unique Identifier for the submitted jobs, status log of the job.
Pass/Fail Criteria Pass if the test is provided and passes for all the MPI implementations supported.
Related Information
History

MPI Job Submission with compilation	
ID	**PARALLEL_MPI_2**
Not Mandatory	
Applicability	Parallel Job Appliances.
Related Requirements	None

Description

Test the submission of a MPI job that is compiled at the remote site.

Input from TP

Test for the submission of a MPI job that gets compiled at the remote site.

Test 1

Pre-condition	Valid User proxy and valid delegation in the service. Source code for MPI application.
Test	Submission of a MPI job requesting more than one execution slot with MPI source code included in input sandbox of job (description of job depending on Job Execution interface). Prior to the execution of the application, the source must be compiled with the available compiler at the site.
Expected Outcome	Job is submitted, compiled and executed without errors; the requested slots are allocated. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes for all the MPI implementations supported.

Related Information

History

2.3 OpenMP support

Precompiled OpenMP Job Submission	
ID	PARALLEL_OMP_1
Mandatory	
Applicability	Parallel Job Appliances.
Related Requirements	None

Description Test the submission of a precompiled OpenMP job.	
Input from TP Test for the submission of a OpenMP job that is already compiled.	
Test 1	
Pre-condition	Valid User proxy and valid delegation in the service. OpenMP Binary
Test	Submission of a OpenMP job requesting more than one execution slot with OpenMP Binary included in input sandbox of job (description of job depending on Job Execution interface)
Expected Outcome	Job is submitted and executed without errors; the requested slots are allocated. Unique Identifier for the submitted jobs, status log of the job.
Pass/Fail Criteria Pass if the test is provided and passes for all the OpenMP implementations supported.	
Related Information	
History	

OpenMP Job Submission with compilation	
ID	**PARALLEL_OMP_2**
Not Mandatory	
Applicability	Parallel Job Appliances.
Related Requirements	None

Description

Test the submission of an OpenMP job that is compiled at the remote site.

Input from TP

Test for the submission of an OpenMP job that gets compiled at the remote site.

Test 1

Pre-condition	Valid User proxy and valid delegation in the service. Source code for OpenMP application.
Test	Submission of an OpenMP job requesting more than one execution slot with OpenMP source code included in input sandbox of job (description of job depending on Job Execution interface). Prior to the execution of the application, the source must be compiled with the available compiler at the site.
Expected Outcome	Job is submitted, compiled and executed without errors; the requested slots are allocated. Unique Identifier for the submitted jobs, status log of the job.

Pass/Fail Criteria

Pass if the test is provided and passes for all the OpenMP implementations supported.

Related Information

History

3 JOB SCHEDULING

Compute Job Scheduling capability refers to the ‘end-to-end’ service that can be delivered to a user in response to their request for a job to be run. This includes managing the selection of the most appropriate resource that meets the user’s requirements, the transfer of any files required as input or produced as output between their source or destination storage location and the selected computational resource, and the management of any data transfer or execution failures within the infrastructure.

3.1 Job Scheduling Interface

The Job Scheduling Capabilities does not have a standard interface. Any implementation of this capability can support on of the Job Execution interfaces proposed by the OGF (DRMAA, BES) or proprietary interfaces (gLite WMS)

DRMAA API TestSuite	
ID	**JOBSCH_DRMAA_1**
Mandatory	
Applicability	Job Scheduling Appliances implementing DRMAA interface.
Related Requirements	None

Description Test the all the functions of the DRMAA interface.
Input from TP Complete Test suite for the DRMAA API. It must include tests for all the mandatory documented functions of the specification. For all functions, check both correct and invalid input. Invalid output should throw an exception as documented. Test also with valid and invalid credentials. Invalid credentials should throw security related exceptions.
Test Suite Description **Pre-condition** Valid user credentials. **Test** Test all OGF DRMAA functionality, with correct/incorrect input and with valid and invalid credentials. **Expected Outcome** Log of all the operations performed. All the documented functions work as documented.
Pass/Fail Criteria Pass if the testsuite is provided and passes.
Related Information
History

BES API TestSuite	
ID	**JOBSCH_BES_1**
Mandatory	
Applicability	Job Scheduling Appliances implementing BES interface.
Related Requirements	None

Description

Test the all the functions of the BES interface.

Input from TP

Complete Test suite for the BES API. It must include tests for all the mandatory documented functions of the specification.

For all functions, check both correct and invalid input. Invalid output should throw an exception as documented. Test also with valid and invalid credentials. Invalid credentials should throw security related exceptions.

Test Suite Description

Pre-condition	Valid user credentials.
Test	Test all OGSA BES functionality, with correct/incorrect input and with valid and invalid credentials.
Expected Outcome	Log of all the operations performed. All the documented functions work as documented.

Pass/Fail Criteria

Pass if the testsuite is provided and passes.

Related Information

History

3.2 gLite WMS

WMProxy API TestSuite	
ID	**JOBSCH_WMS_API_1**
Mandatory	
Applicability	Job Scheduling Appliances implementing WMPRoxy interface.
Related Requirements	None

Description Test the all the functions of the WMProxy interface.
Input from TP Complete Test suite for the WMPRoxt API. It must include tests for all the documented functions in the WSDL. For all functions, check both correct and invalid input. Invalid output should throw an exception as documented. Test also with valid and invalid credentials. Invalid credentials should throw security related exceptions.
Test Suite Description **Pre-condition** Valid user credentials. **Test** Test all WMProxy documented functions, with correct/incorrect input and with valid and invalid credentials. **Expected Outcome** Log of all the operations performed. All the documented functions work as documented.
Pass/Fail Criteria Pass if the testsuite is provided and passes.
Related Information WMProxy interface [R 9].
History

JSDL Submission	
ID	**JOBSCH_WMS_API_2**
Non Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	None

Description Job Scheduling services should allow submission of jobs described with JSDL language
Input from TP Testsuite for submission of JSDL jobs covering different kinds of jobs and with several parameters, as much complete as possible. Test will check job submission and correct completion. A third party test can be provided to check it is JSDL compliant.
Test 1
Pre-condition Valid user credentials and delegation in the service.
Test Submission of a provided JSDL compliant job, and follow the job until it reaches final state.
Expected Outcome A complete job output submission, until reaching final state (success/failure)
Pass/Fail Criteria Will pass if every JSDL is analysed and completed. In case of JSDL syntax error, it must be reported as well. Will fail if a JSDL compliant job is not accepted by the job scheduling services, or if it does not behave as expected by the definition of the job
Related Information
History

Proxy Renewal	
ID	**JOBSCH_WMS_API_3**
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	

Description

The WMS must manage the user credentials and renew them if necessary.

Input from TP

Test of the proxy renewal functionality that checks what happens when the user credential expires and the job is still running.

Test 1

Pre-condition	Valid user credentials (short duration) and delegation in the service. Credentials Renewal service available.
Test	Submit job that takes longer to complete that the credential lifetime.
Expected Outcome	Job executes successfully. The scheduling services should perform a proxy renewal and state it in the log messages (if there is an error, log it also). Output of the job, and status messages stating the renewal or not of the user credentials.

Pass/Fail Criteria

Will Pass if the proxy renewal is done, or if there is an error logged stating the problem. Will fail if there is no clear information about the process.

Related Information

History

3.2.1 End-to-end job tests

Simple Job Submission	
ID	**JOBSCH_WMS_JOB_1**
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	None

Description Test the job submission for simple job.
Input from TP Test for the submission of a job.

Test 1
Pre-condition Valid user credentials and delegation in the service.
Test Job submission for simple job:
`Executable = /bin/sleep;`
`Arguments = "120";`
Expected Outcome Job is submitted and finishes its execution correctly, all states of the job must be logged correctly.

Pass/Fail Criteria Pass if the test is provided and passes.
Related Information
History

Simple Job Submission with files	
ID	JOBSCH_WMS_JOB_2
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	None

Description

Test the job submission for simple job with input and output files.

Input from TP

Test for the submission of a job with input and output files.

Test 1

Pre-condition Valid user credentials and delegation in the service.
Non-empty file “myfile”

Test Job submission for simple job with input and output files:

```
Executable = "/bin/ls";
Arguments = "-l";
StdOutput = "std.out";
StdError = "std.err";
InputSandbox = {"myfile"};
OutputSandbox = {"std.out", "std.err"};
```

Expected Outcome Job is submitted and finishes its execution correctly and the output of the job contains the listing of the directory including the input file with correct size, all states of the job must be logged correctly.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Job Cancel	
ID	**JOBSCH_WMS_JOB_3**
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	None

Description

Test the job cancellation for a job.

Input from TP

Test for the cancellation of a job.

Test 1

Pre-condition	Valid user credentials and delegation in the service.

Test	Job submission and then cancellation for simple job:
	`Executable = "/bin/sleep";`
	`Arguments = "20m";.`

Expected Outcome	Job is submitted and cancelled correctly at the Computing Capability.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Parallel Job Submission	
ID	**JOBSCH_WMS_JOB_4**
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	None

Description

Test the submission of a parallel job.

Input from TP

Test for the submission of parallel jobs.

Test 1

Pre-condition	Valid user credentials and delegation in the service.
Test	Job submission for simple job:

```
Executable = "/bin/sleep";
CPUNumber = 2;
Arguments = "20";
```

Expected Outcome	Job is submitted and executed correctly. The requested slots where allocated.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Job List Match and Rank	
ID	**JOBSCH_WMS_JOB_5**
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	None

Description

Test the list match for jobs.

Input from TP

Test for the list match functionality.

Test 1

Pre-condition	Valid user credentials and delegation in the service.
Test	Job list match for job with requirements and rank expressions, for example:

```
Executable = "/bin/sleep";
Requirements = other.GlueCEStateStatus = "Production";
Rank = -other.GlueCEStateEstimatedResponseTime;
```

Expected Outcome	List of resources with correct rank is returned.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Parametric Job Submission	
ID	**JOBSCH_WMS_JOB_6**
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	None

Description

Test the submission of a parametric job.

Input from TP

Test for the submission of parametric jobs.

Test 1

Pre-condition	Valid user credentials and delegation in the service.
Test	Job submission of job with numeric parameters (`Parameters = 10000;ParameterStart = 1000; ParameterStep = 10;`).
Expected Outcome	Job is executed correctly. List of JobIds for the parametric jobs and each of the subjobs is obtained; all states of the jobs must be logged correctly.

Test 2

Pre-condition	Valid user credentials and delegation in the service.
Test	Job submission of job with a list of parameters (`Parameters={A, B, C,…}`).
Expected Outcome	Job is executed correctly. List of JobIds for the parametric jobs and each of the subjobs is obtained; all states of the jobs must be logged correctly.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

Job Collection Submission	
ID	**JOBSCH_WMS_JOB_7**
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	None

Description

Test the submission of a job collection.

Input from TP

Test for the submission of job collections.

Test 1

Pre-condition	Valid user credentials and delegation in the service.
Test	Job submission for job collection.
Expected Outcome	Job is executed correctly. List of JobIds for the job collections and each of the subjobs is obtained; all states of the jobs must be logged correctly.

Pass/Fail Criteria

Pass if the test is provided and passes.

Related Information

History

DAG Submission	
ID	**JOBSCH_WMS_JOB_8**
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	None

Description Test the submission of a DAG.	
Input from TP Test for the submission DAGs.	
Test 1	
Pre-condition	Valid user credentials and delegation in the service.
Test	Job submission for DAG.
Expected Outcome	Job is executed correctly. List of JobIds for DAG and each of the subjobs is obtained; all states of the jobs must be logged correctly.
Pass/Fail Criteria Pass if the test is provided and passes.	
Related Information	
History	

Job Resubmission	
ID	**JOBSCH_WMS_JOB_9**
Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	Requirements gathered in MS305 related to resubmission of jobs, and information provided in error messages.

Description

Job failures due to resource malfunctioning and not to the job itself must be resubmitted to other resources, with a configurable amount of repetitions. In the case of job failures due to the job itself must be resubmitted with a configurable amount of repetitions. In botch situations, status must reflect clearly what is the cause of resubmission, new resource selected and attempt number

Input from TP

Test and for checking resubmission mechanisms

Test 1

Pre-condition	Valid user credentials and delegation in the service.
Test	Job submission that fails due to simulated remote resource malfunctioning.
Expected Outcome	Job is resubmitted to other resource. Log of all failures and a complete trace of the job.

Test 2

Pre-condition	Valid user credentials and delegation in the service.
Test	Job submission for job that always fails (e.g. exit code 1)
Expected Outcome	Job is resubmitted until resubmission attempts reach the configured limit. Log of all failures and a complete trace of the job.

Pass/Fail Criteria

Pass if the test is provided and produces a complete trace of the job failures due to remote causes or the job itself

Related Information

History

JDL Acceptance limits	
ID	**JOBSCH_WMS_JOB_10**
Non Mandatory	
Applicability	gLite WMS Job Scheduling Appliances.
Related Requirements	

Description

The service should accept JDLs without size restrictions.

Input from TP

A test to submit a job and check if it is accepted or rejected, specially for big JDLs.

Test 1

Pre-condition	Valid user credentials and delegation in the service.
Test	Submission of job descriptions (specially large)
Expected Outcome	Normal job submission if everything is correct; an error message if any problem arises.

Pass/Fail Criteria

Will Pass if JDL is correct, and submits the job or if there is a report on a known syntax error in the jdl. Will Fail if a wrong Jdl is accepted or if it crashes

Related Information

History

3.3 Job Execution Capability Support

These QC refer to the interaction of the Job Scheduling Capability with the underlying Job Execution Capability implementations for the work items submitted. Job Scheduling Capabilities are expected to support the most common Job Execution Capability Implementations used in the current EGI infrastructure: CREAM, ARC and UNICORE

Job Submission	
ID	**JOBSCH_EXEC_1**
Mandatory	
Applicability	Job Scheduling Appliances.
Related Requirements	None

Description	
The Job Scheduling Capability must be able to submit, manage and monitor jobs to the underlying Job Execution Capability.	
Input from TP	
Test for job submission.	
Test 1	
Pre-condition	None
Test	Job submission to Job Execution Capability
Expected Outcome	Job is submitted to Job Execution Capability, a valid Job ID is returned.
Test 2	
Pre-condition	Already submitted job.
Test	Query job status in the Job Execution Capability.
Expected Outcome	Job status can be fetched, show a message with it.
Test 3	
Pre-condition	Already submitted job.
Test	Cancel job in the Job Execution Capability.
Expected Outcome	Job is successfully cancelled.
Pass/Fail Criteria	
Pass if the test is provided and passes for each of the supported Job Execution capability Implementations.	
Related Information	
Job Execution Capability Criteria (see Section 1 of this document)	
History	

3.4 Service availability, monitoring and error handling.

Service ping	
ID	**JOBSCH_SERVICE_1**
Mandatory	
Applicability	Job Scheduling Appliances.
Related Requirements	

Description Check if all implied services respond to a ping.
Input from TP A test to check all required services are running from a remote machine. This is not a script to check daemons are running, but the services are reachable from a remote machine (usually a User Interface)
Test 1 **Pre-condition** Valid user credentials, information discovery service available. **Test** Contact remote machine providing job scheduling and perform a ping test. **Expected Outcome** Name of remote service and its reachable status (Ok /Fail)
Pass/Fail Criteria Test will effectively contact remote services, and provide their status.
Related Information
History

Error Messages	
ID	**JOBSCH_SERVICE_2**
Non Mandatory	
Applicability	Job Scheduling Appliances. Applicable for every service, and specially for the command line interface
Related Requirements	#705: WMS and error handling enhancements

Description

The error messages provided by the service should be clear and facilitate the solution of those errors.

Input from TP

For every service a list of possible errors that can appear must be provided. In case of command line interface, this list has to be exhaustive to all the messages that a user can obtain from its usage.

The list of messages have to contain the following fields:

- Error code (if applicable)
- Error message
- Error source (internal module or remote resource (specify it explicitly))
- Cause of error (syntax error, module malfunctioning, configuration problem, network error, other (specify it explicit))
- Type (critical, informative)

Pass/Fail Criteria

A complete list of errors per service is provided

Related Information

History

Service Information	
ID	**JOBSCH_SERVICE_3**
Mandatory	
Applicability	Job Scheduling Appliances.
Related Requirements	

Description Job Scheduling services should publish information about themselves.	
Input from TP Test for information generation about the service status.	
Test 1	
Pre-condition	Configured system, Information Discovery Capability available.
Test	Generate service information and publish to Information Discovery Capability
Expected Outcome	Information is produced and can be accessed through the Information Discovery Capability.
Pass/Fail Criteria Pass if the test is provided and passes.	
Related Information	
History	

Stress Test	
ID	**JOBSCH_SERVICE_4**
Mandatory	
Applicability	Job Scheduling Appliances.
Related Requirements	#698: WMS stability and performance #702: Stability of UMD services and improvements

Description

The Job Scheduling Capability should be available under realistic conditions.

Input from TP

Stress test for the service that calculates the maximum throughput of the service.

Test 1

Pre-condition	Correctly configured service.
Test	Stress test the service until is not available.
Expected Outcome	Maximum throughput of the service.

Pass/Fail Criteria

Pass if the maximum throughput is enough for realistic use of the service. The service should support at least 1000 simultaneous jobs.

Related Information

History

Self-disabling Mechanism	
ID	**JOBSCH_SERVICE_5**
Not Mandatory	
Applicability	Job Scheduling Appliances.
Related Requirements	#698: WMS stability and performance #702: Stability of UMD services and improvements

Description The Job Scheduling Capability should detect high load conditions and self-disable the job submission in order to maintain the quality of the service.	
Input from TP Stress test for the service that triggers a self-disabling mechanism.	
Test 1	
Pre-condition	Correctly configured service in high load system.
Test	Submission of job.
Expected Outcome	Service self-disables submission, a message to the client is sent when the submission is tried.
Pass/Fail Criteria Pass if the test is provided and passes.	
Related Information	
History	

4 REFERENCES

R 1	UMD roadmap: https://documents.egi.eu/public/ShowDocument?docid=100
R 2	Generic UMD Quality Criteria
R 3	Security Capabilities Quality Criteria
R 4	Operational Capabilities Quality Criteria
R 5	CREAM: http://grid.pd.infn.it/cream/
R 6	A. Konstantinov, ARC Computational Job Management Component – A-REX, NORDUGRID-TECH-14
R 7	OGSA Basic Execution Service v1.0: http://www.ogf.org/documents/GFD.108.pdf
R 8	OGF DRMAA: http://www.drmaa.org/
R 9	gLite WMS: http://web.infn.it/gLiteWMS/