



gLite Implementation for BES/HPC-BP/JSDL/GLUE

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(Slides kindly provided by Moreno Marzolla, INFN-Padova)



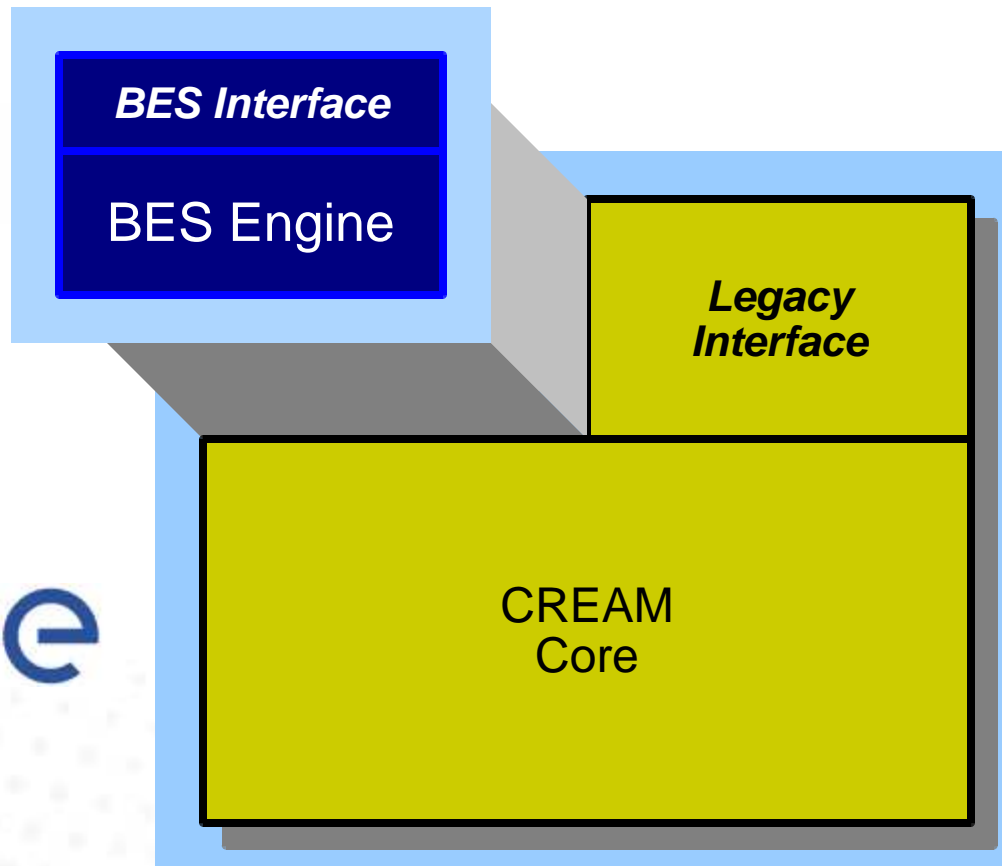
What is CREAM?

- Computing Resource Execution And Management (CREAM) is a webservice-based Execution Service
 - Written in Java
 - Executes as an Axis container in the Tomcat application server
 - CREAM is being developed in EGEE as part of the gLite middleware
- CREAM “legacy” interface is not BES compliant
 - Developed long before BES was available
- The OMII-EU project contributed the BES interface to CREAM

CREAM-BES

- CREAM-BES is made of two separate components
 - The legacy CREAM job execution server, which is being developed by the EGEE collaboration and is used in the gLite middleware
 - The BES interface for CREAM, which is being developed by the OMII-Europe project

CREAM-BES and gLite



eGEE

Legacy vs BES interfaces

- Legacy interface

- JobRegister
- JobStart
- JobCancel
- JobList
- JobLease
- JobInfo
- JobPurge
- JobSignal
- JobSuspend / JobResume
- JobProxyRenew
- GetInfo
- GetCEMonURL
- EnableAcceptJobSubmissions
- DisableAcceptJobSubmissions
- DoesAcceptJobSubmissions

- BES Interface

- CreateActivity
- TerminateActivities
- GetActivityStatuses
- GetActivityDocuments
- GetFactoryAttributesDocument
- StopAcceptingNewActivities
- StartAcceptingNewActivities

Main differences between legacy and BES interfaces

- CREAM security model uses the concept of *delegation*
 - Users can delegate their credentials to the CE for a limited time, so that the CE can perform actions (e.g., staging files) on behalf of the user
 - BES itself does not mandate any specific security implementation
- The legacy CREAM state model is a superset of the BES one

Standards addressed

- Basic Execution Service (BES) v1.0
- Job Submission Description Language (JSDL) v1.0
- HPC Basic Profile v1.0

GetFactoryAttributesDocument

- Let us check the capabilities of the top-level BES container

```
./cream-bes.sh attributes -r \  
https://omiivm03.cnaf.infn.it:8443/ce-cream/services/CreamBes
```

- We get a textual rendering of some of the service attributes, as in the next slide

Output

```
CommonName = CREAM-BES test
Long Description = CREAM-BES CE for tests
Is Accepting New Activities = true
Local Resource Manager Type = urn:lrms.type.undefined
Total number of contained resources = 2
Total Number Of Activities = 4
    activity epr = https://omiivm03.cnaf.infn.it:8443/ce-cream/services/CreamBes
    jobId = https://omiivm03.cnaf.infn.it:8443/CREAM882464212
----- raw epr begin -----
[...]
```

```
----- raw epr end -----
[...]
```

```
Root basic resource attributes:
    No basic attributes found
Contained basic resource attributes:
    Resource Name = https://omiivm03.cnaf.infn.it:8443/ce-cream/services/CreamBes?
lrms=pbs&queue=cert
    CPUArchitecture = other
    Operating System Name = other
    Operating System Version = SLC
    CPUCount = 4.0
    CPUSpeed (Hz) = 2000.0
    Physical Memory = 1024.0
    Virtual Memory = 2048.0
Contained basic resource attributes:
    Resource Name = https://omiivm03.cnaf.infn.it:8443/ce-cream/services/CreamBes?
lrms=pbs&queue=omii
    CPUCount = 4.0
    CPUSpeed (Hz) = null
    Physical Memory = null
    Virtual Memory = null
```

Note

- The output shows the list of activities on the BES service
- It also shows a number of “contained resources”, each one being a specific Queue
 - For compatibility with the legacy CREAM, each queue is identified by the pair (Batch_System_Name, Queue_Name)
- Each resource (queue) is identified by an URI, which points to the same BES service

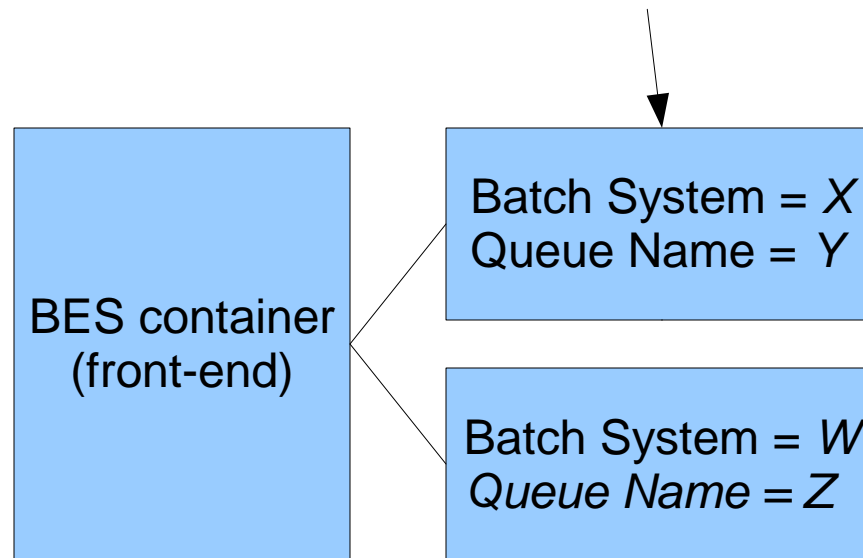
`https://omiivm03.cnaf.infn.it:8443/ce-cream/services/CreamBes?lrms=pbs&queue=cert`

Batch System

Queue Name

Multiple batch queues

`https://www.foo.org:8443/<path>?lrms=X&queue=Y`



`https://www.foo.org:8443/<path>`

`https://www.foo.org:8443/<path>?lrms=W&queue=Z`

Multiple batch queues

- If the user interacts with the BES front-end
 - Job submissions will be directed to one of the available queues (at the moment always the default one)
 - A user can query the status of any job he owns, regardless the queue where the job is running
- If the user interacts with a specific queue
 - Job submissions will be directed to that specific queue
 - The user can query the status of any job she owns, **provided that the job is executing in that queue**

GetFactoryAttributesDocument (for a specific queue)

```
./cream-bes.sh attributes -r \  
  https://omiivm03.cnaf.infn.it:8443/ce-\  
cream/services/CreamBes?lrms=pbs&queue=cert
```

```
CommonName = CREAM-BES test  
Long Description = CREAM-BES CE for tests  
Is Accepting New Activities = true  
Local Resource Manager Type = urn:lrms.type.undefined  
Total number of contained resources = 0  
Total Number Of Activities = 4  
  activity epr = https://omiivm03.cnaf.infn.it:8443/ce-cream/services/CreamBes  
  jobId = https://omiivm03.cnaf.infn.it:8443/CREAM882464212  
----- raw epr begin -----  
[...]  
----- raw epr end -----  
Root basic resource attributes:  
  Resource Name = https://omiivm03.cnaf.infn.it:8443/ce-cream/services/CreamBes?  
lrms=pbs&queue=cert  
  CPUArchitecture = other  
  Operating System Name = other  
  Operating System Version = SLC  
  CPUCount = 4.0  
  CPUSpeed (Hz) = 2000.0  
  Physical Memory = 1024.0  
  Virtual Memory = 2048.0
```

Submitting a test job

```
<?xml version="1.0" encoding="UTF-8"?>
<jSDL:JobDefinition xmlns="http://www.example.org/"
  xmlns:jSDL="http://schema.ggf.org/jSDL/2005/11/jSDL"
  xmlns:jSDL-posix="http://schemas.ggf.org/jSDL/2005/11/jSDL-posix"
  xmlns:jSDL-hpcpa="http://schemas.ggf.org/jSDL/2006/07/jSDL-hpcpa"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <jSDL:JobDescription>
    <jSDL:JobIdentification>
      <jSDL:JobName>Simple Test Job</jSDL:JobName>
      <jSDL:Description>A simple job which just sleeps for 20 seconds</jSDL:Description>
    </jSDL:JobIdentification>
    <jSDL:Application>
      <jSDL:ApplicationName>sleep</jSDL:ApplicationName>
      <jSDL-hpcpa:HPCProfileApplication>
        <jSDL-hpcpa:Executable>/bin/sleep</jSDL-hpcpa:Executable>
        <jSDL-hpcpa:Argument>20</jSDL-hpcpa:Argument>
      </jSDL-hpcpa:HPCProfileApplication>
    </jSDL:Application>

    <jSDL:Resources>
      <jSDL:TotalCPUCount>
        <jSDL:LowerBoundedRange>10.0</jSDL:LowerBoundedRange>
      </jSDL:TotalCPUCount>
    </jSDL:Resources>

  </jSDL:JobDescription>
</jSDL:JobDefinition>
```

Submitting a test job

```
./cream-bes.sh create -r \  
https://omiivm03.cnaf.infn.it:8443/ce-\  
cream/services/CreamBes?lrms=pbs&queue=cert \  
test/test_not_satisfied.jsdl
```

```
UnsupportedFeatureFault raised:  
Detail Message: null  
Feature: jsdl:TotalCPUCount  
MessageElement: <?xml version="1.0" encoding="UTF-8"?>  
<ns2:TotalCPUCount  
xmlns:ns2="http://schemas.ggf.org/jsdl/2005/11/jsdl">  
  <ns2:LowerBoundedRange>10.0</ns2:LowerBoundedRange>  
</ns2:TotalCPUCount>
```

Submitting a test job

- In this case, submission fails
- `UnsupportedFeatureFault`
 - The BES endpoint does not support the requested resource
- In particular, the BES service was unable to satisfy the resource requirements
 - The body of the fault contains the offending XML fragment

Current Status

- The BES implementation for CREAM being ported to the latest CREAM core release
- Additional information:

<http://grid.pd.infn.it/cream>

<http://grid.pd.infn.it/omii>

GLUE 2.0

- Implementation not started yet
- gLite will evaluate the usage of GLUEMan to manage providers for GLUE 2.0 and expose information via BES
 - <http://glueman.sf.net>