Validation of standard compliance and interoperability of grid software using the ETICS Test System

EGEE UF 4 / OGF 25

Lorenzo Dini
CERN

Catania, 4 March 2009
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ETICS Overview
The ETICS System

• Continuous software **build, test and QA verification** system

• **Easily extensible** with additional **plugins**

• **Scheduled** or **on-demand** build and test jobs

• **User** computers or **remote** distributed infrastructures

• **Built-in connectors** to distribute build and test jobs on different types of infrastructures from standard job management systems to the grid

• **Open repository** of configuration metadata, packages and build, test and QA reports

• Support for standard **package management** systems like **YUM**

• It’s **multi-platform** and **independent** from any specific language, build or test tool
Architecture
The Configuration Web Client
Command-line Client

```
[dimeglıo@lxplus225 tmp/dimeglıo/ws]$ etics-version
ETICS Client version: 1.4.4-1

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http://www.eu-etics.org
[dimeglıo@lxplus225 ws]$
dimeglıo@lxplus225 ws]$ ls $ETICS_HOME/bin
chrpath etics-list-configuration etics-set
CommandBase.py etics-list-env etics-show-configuration-structure
CommandBase.pyc etics-list-platform etics-show-module-structure
etics-build etics-list-project etics-status
etics-certificate-server etics-list-property etics-submit
etics-checkout etics-list-user etics-tag
etics-client-setup etics-log etics-test
etics-commit etics-module etics-user
etics-configuration etics-platform etics-version
etics-get etics-plugin-manager etics-workspace-setup
etics-get-project etics-role
[dimeglıo@lxplus225 ws]$ ```
The Repository Web Application

ETICS Testing Tools
The Reports

ETICS Testing Tools

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Interoperability Testing
Interoperability Scenario

Job submission

• The case study is interoperability in job submission among different middleware implementations

• The test involve ARC, gLite and UNICORE and tests job submission with any of the clients towards any of the servers

• The packages are taken from their official distribution repositories

• The servers/services are provided by their respective maintainers
Topology
Test Structure
Results

<table>
<thead>
<tr>
<th>Test number</th>
<th>Test name</th>
<th>Description</th>
<th>Last test time</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001</td>
<td>check-arc-client</td>
<td>Check for presence of arc client by running a simple command</td>
<td>02/03/2009 04:18:12</td>
<td>Success</td>
</tr>
<tr>
<td>0002</td>
<td>generate-arc-proxy</td>
<td>Generate a proxy certificate using the arcp-proxy command</td>
<td>02/03/2009 04:18:12</td>
<td>Success</td>
</tr>
<tr>
<td>0003</td>
<td>submit-arc-to-arc</td>
<td>Submit a simple Hello Grid job from ARC client to ARC server</td>
<td>02/03/2009 04:18:13</td>
<td>Success</td>
</tr>
<tr>
<td>0004</td>
<td>stat-arc-to-arc</td>
<td>Monitor the status of the submitted job with arcstat</td>
<td>02/03/2009 04:19:06</td>
<td>Success</td>
</tr>
<tr>
<td>0005</td>
<td>get-output-arc-to-arc</td>
<td>Get the output of submitted job with arcget</td>
<td>02/03/2009 04:19:09</td>
<td>Success</td>
</tr>
<tr>
<td>0010</td>
<td>submit-arc-to-cream</td>
<td>Submit a simple Hello Grid job from ARC client to CREAM server</td>
<td>02/03/2009 04:19:27</td>
<td>Failed</td>
</tr>
<tr>
<td>0030</td>
<td>check-ucc-client</td>
<td>Check for presence of ucc client by running a simple command</td>
<td>02/03/2009 04:19:28</td>
<td>Success</td>
</tr>
<tr>
<td>0031</td>
<td>connect-ucc-to-unicore</td>
<td>Connect to a UNICORE system with a ucc client</td>
<td>02/03/2009 04:19:37</td>
<td>Success</td>
</tr>
<tr>
<td>0032</td>
<td>submit-ucc-to-unicore</td>
<td>Submit a simple Hello job from UCC client to UNICORE server</td>
<td>02/03/2009 04:19:42</td>
<td>Success</td>
</tr>
<tr>
<td>0033</td>
<td>get-status-ucc-to-unicore</td>
<td>Monitor the status of the submitted job with ucc get-status</td>
<td>02/03/2009 04:19:57</td>
<td>Success</td>
</tr>
<tr>
<td>0034</td>
<td>get-output-ucc-to-unicore</td>
<td>Get the output of submitted job with ucc get-output</td>
<td>02/03/2009 04:20:04</td>
<td>Success</td>
</tr>
<tr>
<td>0040</td>
<td>connect-ucc-to-arc</td>
<td>Connect to a ARC system with a ucc client</td>
<td>02/03/2009 04:20:04</td>
<td>Failed</td>
</tr>
<tr>
<td>0041</td>
<td>submit-ucc-to-arc</td>
<td>Submit a simple Hello job from UCC client to ARC server</td>
<td>02/03/2009 04:20:08</td>
<td>Failed</td>
</tr>
<tr>
<td>0042</td>
<td>get-status-ucc-to-arc</td>
<td>Monitor the status of the submitted job with ucc get-status</td>
<td>02/03/2009 04:20:08</td>
<td>Failed</td>
</tr>
<tr>
<td>0043</td>
<td>get-output-ucc-to-arc</td>
<td>Get the output of submitted job with ucc get-output</td>
<td>02/03/2009 04:20:08</td>
<td>Failed</td>
</tr>
</tbody>
</table>

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Multi Node
Multi-Node

The ability to setup scenarios where multiple services are automatically deployed in multiple nodes.

These services must be able to **work properly** as if they would be installed manually by a user performing any required operation in the required order.
Issues
Service Synchronization

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Issues
Phase identification

NODE1

TOMCAT SERVICE

INSTALL PHASE

CONFIGURATION PHASE

WEB APPLICATION1 SERVICE

WEB APPLICATION2 SERVICE

START PHASE

WEB APPLICATION1

WEB APPLICATION2
Issues
Information Interchange

---

**NODE1**

- **TOMCAT1 SERVICE**
  - RAM = 256MB
  - THREAD = 300

**CONFIGURATION PHASE**

- NODE1.TOMCAT1.CONFIG
- CATALINA_HOME

**WEB APPLICATION SERVICE**

- TOMCAT.CONFIG.
- CATALINA_HOME

**CONFIGURATION PHASE**

- LOGGER = CONSOLE

---

**NODE2**

- **MYSQL1 SERVICE**
  - CACHE = TRUE

**INIT PHASE**

- NODE2.MYSQL1.INIT.IP

---

**REQUIRED**
- (GLOBAL / NODE)

**OPTIONAL**
- (WITH DEFAULTS)

---

**IN / OUT**
- IN / OUT

**DESIGN-TIME**

---

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Issues:
Flow Monitoring

LOG

- NODE1: START
- NODE1.TOMCAT1: START
- NODE1.TOMCAT1.CONFIG: RAM = 256MB && THREAD = 300
- NODE1.TOMCAT1.CONFIG: START
- NODE1.TOMCAT1.CONFIG: END
  CATALINA_HOME = /usr/share/tomcat/
- NODE1.TOMCAT: END
- NODE1.WA: START
- NODE1.WA.CONFIGURATION: START
  CATALINA_HOME = /usr/share/tomcat/
- NODE1.WA: FAILED:
  ERROR MESSAGE
- NODE1: END
ETICS Solution

- **ETICS-SET** is used to publish **key-value pairs** or only **keys** to the central information system in order to make the information available to all the other nodes, services or phases.

- **ETICS-GET** is used to get (**blocking** or **not-blocking**) the information published by some local or remote execution of ETICS-SET.

- **ETICS-LOG** is used to **log** and for real-time **monitoring**.

Server Node

- [ ... INSTALL ... ]
- [ ... CONFIG ... ]
- [ ... START ... ]
- ETICS-SET S.IP = x.x.x.x
- ETICS-LOG “RUNNING”
- ETICS-GET C.DONE
- [ ... STOP AND EXIT ... ]

Central IS

- S.IP = x.x.x.x
- S: “RUNNING”
- C.DONE

Client Node

- $IP = ETICS-GET S.IP
- [ ... USE $IP ... ]
- [... RUN TEST ...]
- ETICS-SET C.DONE
- [... EXIT ...]
The OGSA-BES Example

Based on the draft version of the recommendation (v33)

Consisting of four nodes:

- Package repository
  - Metapackages to harvest the full set of packages required
  - APT/YUM format (for SLC3/4 support)
- Worker Node
  - PBS-MOM node attached to the CE
- Computing Element (target BES endpoint)
  - PBS-Server (Maui), CE-CREAM and CE-Monitor services, VOMS-enabled PDP and local BDII service
- BES client
  - Java-based BES compliance tester
## Results

### Unit Test Results

**Class eu.omii.bes.compliance.BESComplianceTestSuite**

<table>
<thead>
<tr>
<th>Name</th>
<th>Tests</th>
<th>Errors</th>
<th>Failures</th>
<th>Time(s)</th>
<th>Time Stamp</th>
<th>Host</th>
<th>Failures Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>BsdFormattedJSDLActivityDocument</td>
<td>27</td>
<td>27</td>
<td>0</td>
<td>77.163</td>
<td>2007-09-24T16:04:51</td>
<td>bhl1303v1.cern.ch</td>
<td>Unexpected exception, expected exception of org.omg.Ice.factories.UnsupportedFeatureFaultType but was eu.omii.bes.exception.ServiceInvocationException</td>
</tr>
<tr>
<td>UnsupportedJSDLActivityDocument</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unexpected exception, expected exception of org.omg.Ice.factories.UnsupportedFeatureFaultType but was java.lang.NullPointerException</td>
</tr>
<tr>
<td>UnsupportedFeatureActivityDocument</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unexpected exception, expected exception of org.omg.Ice.factories.UnsupportedFeatureFaultType but was java.lang.NullPointerException</td>
</tr>
<tr>
<td>PrivilegedActivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unexpected exception, expected exception of org.omg.Ice.factories.NotAuthorizedFaultType but was eu.omii.bes.exception.ServiceInvocationException</td>
</tr>
<tr>
<td>StoppedService</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unexpected exception, expected exception of org.omg.Ice.factories.NotAcceptingNewActivitiesFaultType but was eu.omii.bes.exception.ServiceInvocationException</td>
</tr>
<tr>
<td>InvalidRequest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unexpected exception, expected exception of org.omg.Ice.factories.InvalidRequestMessageFaultType but was eu.omii.bes.exception.ServiceInvocationException</td>
</tr>
</tbody>
</table>

- **Results Designed for use with** [JUnit](https://junit.org) and [Ant](http://ant.apache.org)
PRO / CONS

PRO

• Simple
• Flexible

CONS

• ETICS APIs are intrusive in scripts
• Synchronization management difficult for large deployments
• Deadlocks and circular dependency difficult to track
• Difficult to reuse components (services)

A separation is needed between the service abstraction and the deployment abstraction
Workflow Engine
Prototype
Prototype
Prototype
Prototype
Prototype

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Conclusions

• ETICS has been actively involved in System and Interoperability Testing since 2007

• Collaborations with OMII-Europe, D4Science, gLite, UNICORE and ARC

• Provides tools for test automation in distributed environments both single-node and multi-node

• A new Testing Workflow Engine is under development from the experience gained

• Stay TUNED!
Thanks!

http://www.eticsproject.eu