A Test Infrastructure for Inspecting the Availability of Grid Resources

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Outline

- Motivation
  - The g-Eclipse project
- The Test Infrastructure
- Implementation
- Integration in the Nightly Build System
- Conclusion

Motivation

- The grid technology
  - Many resource centres
  - Heterogeneity of resources
  - Different middleware stacks, batch systems, programming paradigms/languages, ……
  - Monitoring generally applied
- Quality of services
  - Service Level Agreement
    - Hardware metrics
    - Availability/reliability
  - Site testing
    - EGEE SAM test

Motivation

- The grid technology
  - □ Many resource centres
  - □ Heterogeneity of resources
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  - □ Site testing
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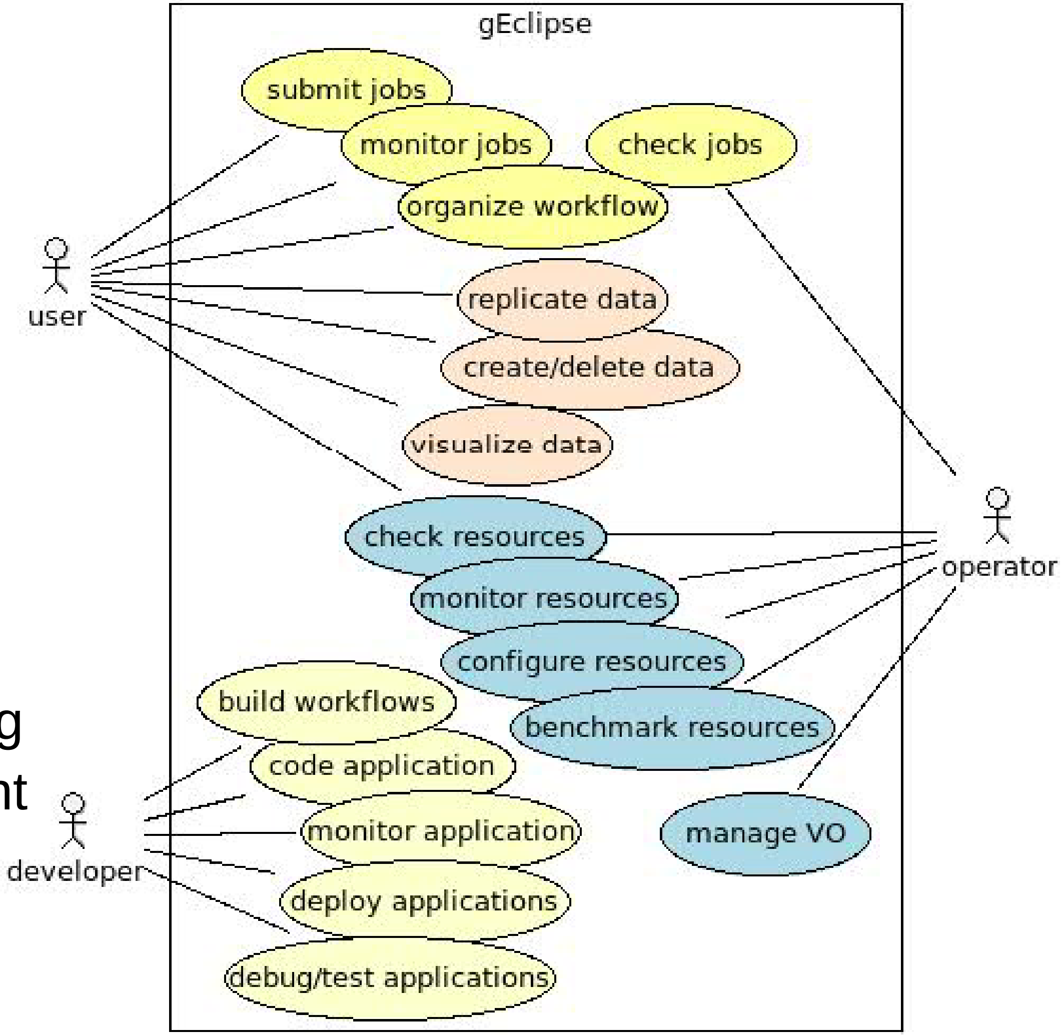
Region	Availability	Reliability
AsiaPacific	95%	96%
CERN	98%	99%
CentralEur.	96%	98%
France	97%	98%
Germ/Switz	92%	93%
Italy	90%	92%
NorthenEur.	83%	88%

Motivation (cont.)

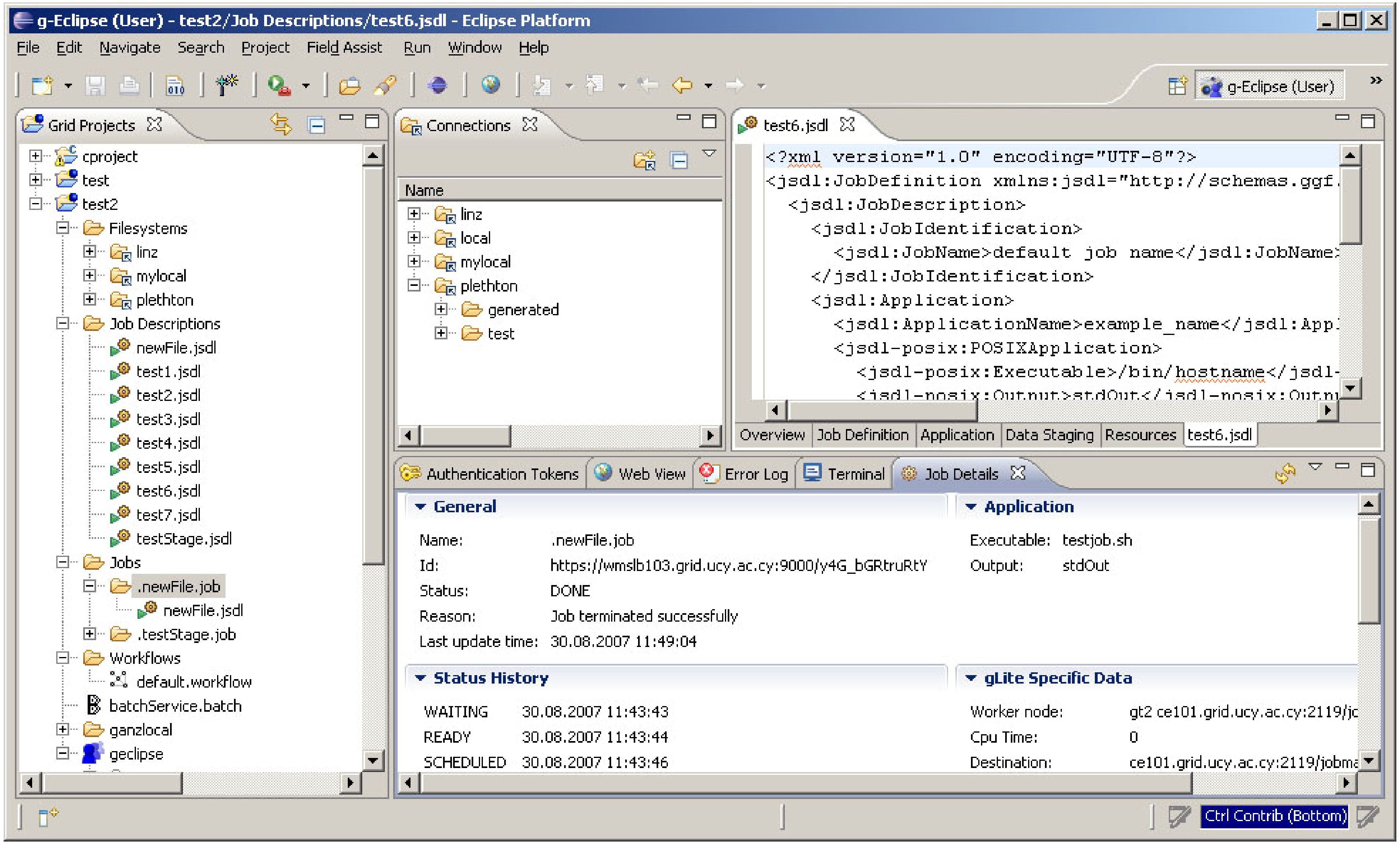
- The g-Eclipse project
  - □ Building a general, middleware-independent framework for accessing the grid
  - □ Allowing users to interact with the grid infrastructure without knowing all details
  - □ Hiding the complexity with wizards, views, editors…
  - □ Supporting different grid actors
    - Grid applications users
    - Grid resources providers and operators
    - Grid application developers
  - □ (Re-)use Eclipse and contribute
    - Eclipse is an eco system
      - □ Build for extension
      - □ More than a JAVA IDE
      - □ The biggest “coordinated” Open Source project
    - Gain OS independence (by using JAVA)

Motivation : the g-Eclipse Project

- 3 different roles
  - □ User
  - □ Operator
  - □ Developer
- In general...
  - □ Job management
  - □ Resource management
    - Files
    - Applications
    - Hardware
  - □ Application deployment
  - □ Infrastructure monitoring
  - □ Application development
  - □ Visualization tools



Motivation: g-Eclipse Screenshot



Grid Projects:

```
cproject
test
test2
  Filesystems
    linz
    mylocal
    plethton
  Job Descriptions
    newFile.jsdl
    test1.jsdl
    test2.jsdl
    test3.jsdl
    test4.jsdl
    test5.jsdl
    test6.jsdl
    test7.jsdl
    testStage.jsdl
  Jobs
    .newFile.job
      newFile.jsdl
    .testStage.job
  Workflows
    default.workflow
  batchService.batch
ganzlocal
geclipse
```

Connections:

```
Name
linz
local
mylocal
plethton
  generated
  test
```

test6.jsdl:

```
<?xml version="1.0" encoding="UTF-8"?>
<jsdl:JobDefinition xmlns:jsdl="http://schemas.ggf.
  <jsdl:JobDescription>
    <jsdl:JobIdentification>
      <jsdl:JobName>default job name</jsdl:JobName>
    </jsdl:JobIdentification>
    <jsdl:Application>
      <jsdl:ApplicationName>example_name</jsdl:App
      <jsdl-posix:POSIXApplication>
        <jsdl-posix:Executable>/bin/hostname</jsdl-
        <jsdl-posix:Output>stdOut</jsdl-posix:Outp
```

Job Details:

General

Name:	.newFile.job
Id:	https://wmslb103.grid.ucy.ac.cy:9000/y4G_bGRtruRtY
Status:	DONE
Reason:	Job terminated successfully
Last update time:	30.08.2007 11:49:04

Application

Executable:	testjob.sh
Output:	stdOut

Status History

WAITING	30.08.2007 11:43:43
READY	30.08.2007 11:43:44
SCHEDULED	30.08.2007 11:43:46

gLite Specific Data

Worker node:	gt2 ce101.grid.ucy.ac.cy:2119/jc
Cpu Time:	0
Destination:	ce101.grid.ucy.ac.cy:2119/jobma

Motivation: the g-Eclipse Project

Funded by European Union

24 months, approx. 2 M€ funding

6 Partners

Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft

POZNAN SUPERCOMPUTING NETWORKING

University of Cyprus

INNOOPRACT

The University of Reading

More Information:

http://www.geclipse.eu

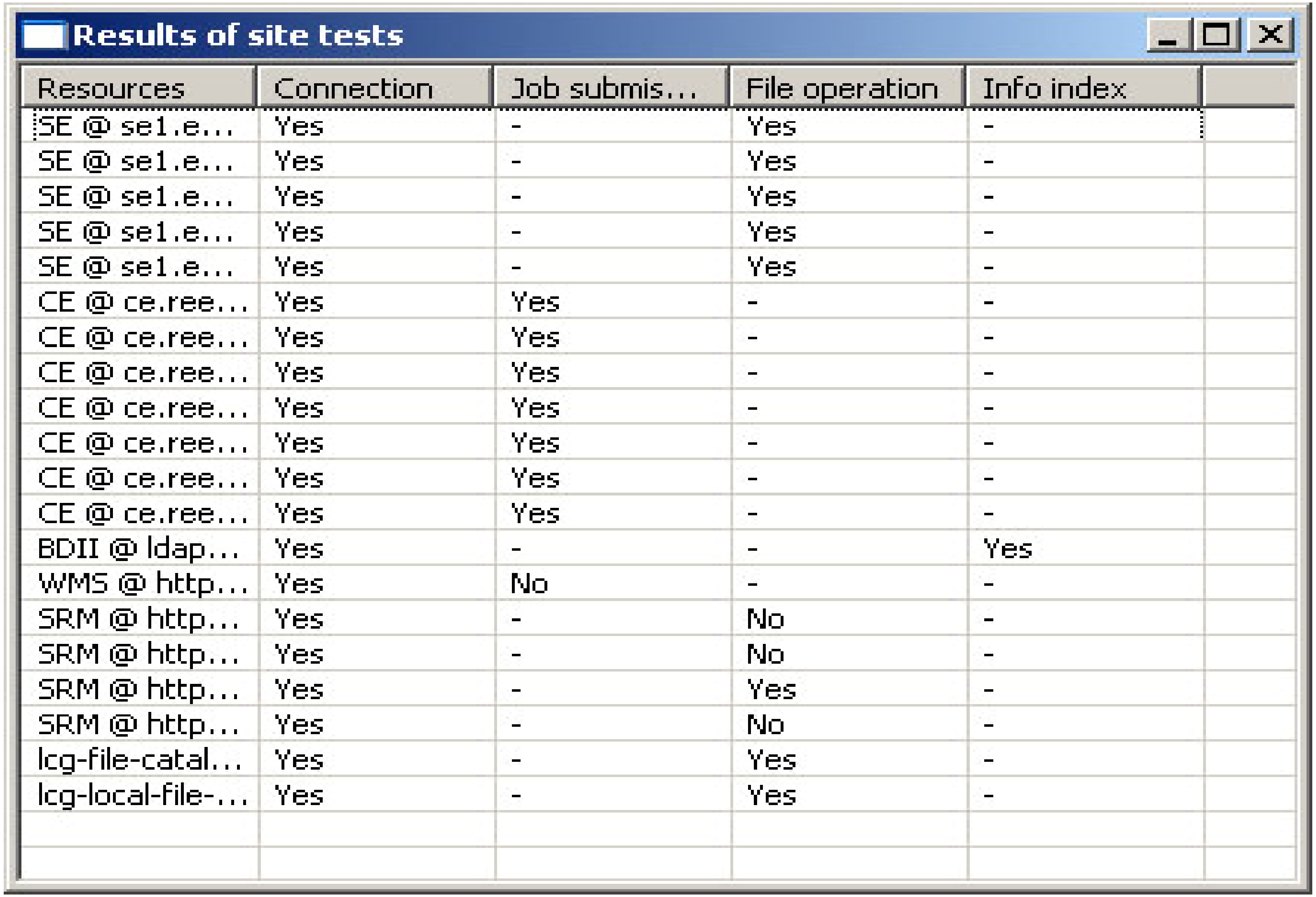
Objectives

- Integration of existing Grid tools
- Exemplary support for the widely deployed gLite middleware during the first project year
  - Selection of a second middleware in year 2
  - Provision of the g-Eclipse framework for other EC Grid projects
- Integration support for third party developments
- Fostering an open source project within the Eclipse community

Test Infrastructure

- What to test
  - Computing elements
  - Storage elements
  - Services
- Test approach
  - Connectivity testing
    - “ping” test
  - Functionality test
    - CE: submitting jobs to the CE; tracing the job status; downloading the execution results
    - SE: conducting file operations (copy, delete, modify, rename) on a single SE; moving data across SEs
    - Services: depending on the type
      - SRM service is verified with data operations
      - Information system is regarded as available if it can deliver correct information about a resource centre

Sample Results



Resources	Connection	Job submis...	File operation	Info index
SE @ se1.e...	Yes	-	Yes	-
SE @ se1.e...	Yes	-	Yes	-
SE @ se1.e...	Yes	-	Yes	-
SE @ se1.e...	Yes	-	Yes	-
SE @ se1.e...	Yes	-	Yes	-
CE @ ce.ree...	Yes	Yes	-	-
CE @ ce.ree...	Yes	Yes	-	-
CE @ ce.ree...	Yes	Yes	-	-
CE @ ce.ree...	Yes	Yes	-	-
CE @ ce.ree...	Yes	Yes	-	-
CE @ ce.ree...	Yes	Yes	-	-
CE @ ce.ree...	Yes	Yes	-	-
BDII @ ldap...	Yes	-	-	Yes
WMS @ http...	Yes	No	-	-
SRM @ http...	Yes	-	No	-
SRM @ http...	Yes	-	No	-
SRM @ http...	Yes	-	Yes	-
SRM @ http...	Yes	-	No	-
lcg-file-catal...	Yes	-	Yes	-
lcg-local-file-...	Yes	-	Yes	-

Implementation

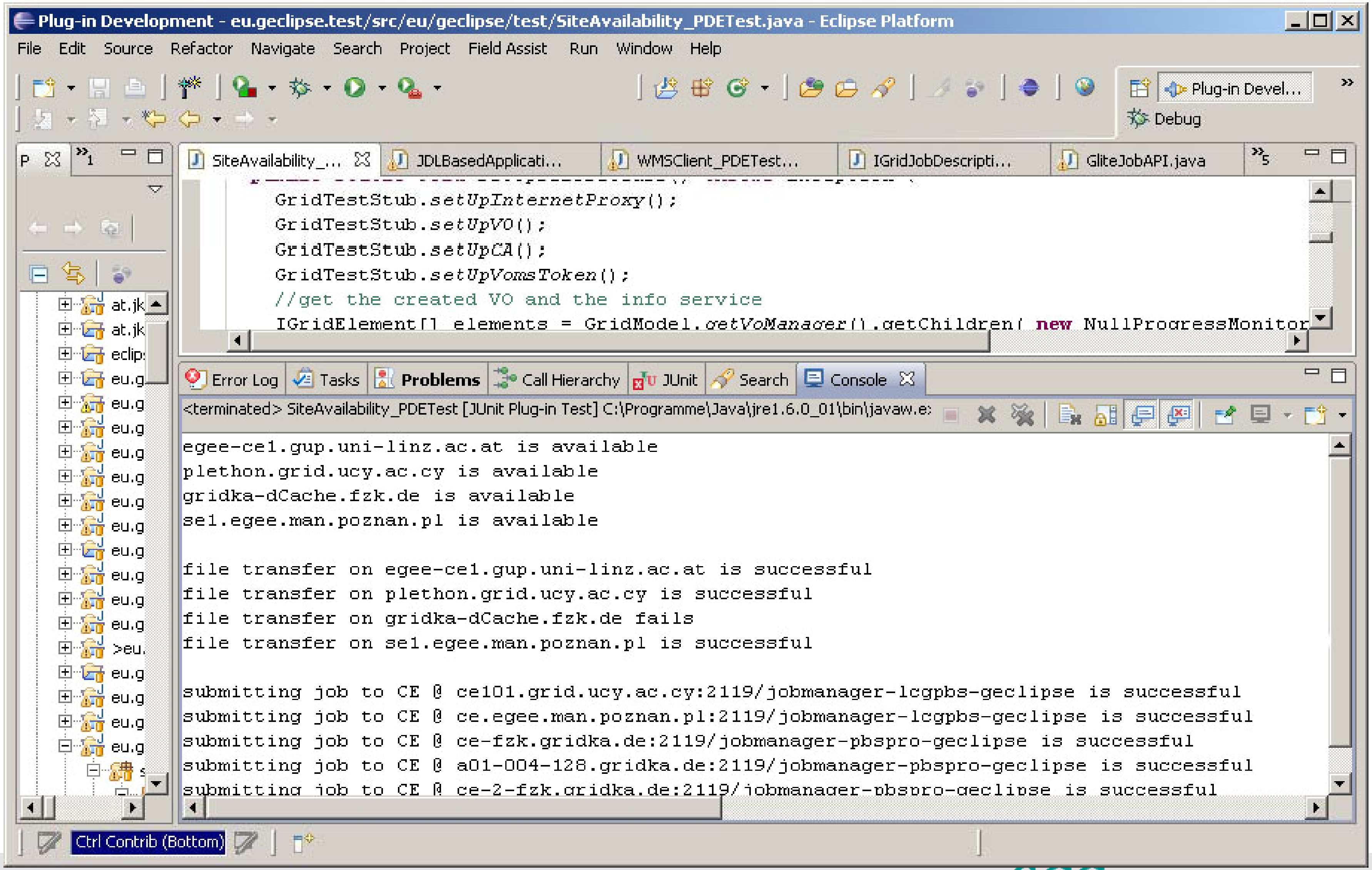
- Junit test on Eclipse development platform
  - Junit: a simple testing tool for JAVA
  - Junit test method
    - An ordinary method without any parameters
    - Assertion statements indicate success or failure
    - Run using a test runner
  - Eclipse unit test
    - Junit integrated
      - Runtime: Java runtime + Junit test classes
    - PDE extension
      - Runtime: Java runtime + Junit test classes +Eclipse runtime
- g-Eclipse used as API
  - Could not rely on wizards
  - Automation of grid initialization

Implementation (cont.)

Stubs	Functionality
SetUpCA ()	Loads the CA certificates
SetUpVO ()	Creates a VO instance for presenting an existing VO
SetUpToken ()	Creates a token for authentication/authorization issues in the Grid
SetUpInternetProxy ()	Configures the Internet connection. It is only needed when a direct Internet
SetUpProject ()	Creates a Grid project within the g-Eclipse framework

```
public static IAuthenticationToken createVomsToken(final String cert, final String key,
                    final String pass, final VomsVirtualOrganization vo) throws Exception
 {
   IAuthenticationToken vomstoken = null;
   VomsProxyDescription vomsdescription;
   // set the cert and key
   File certFile = new File( ConnectionDetails.getLocalDir() + cert );
   File keyFile = new File(  ConnectionDetails.getLocalDir() + key );
   String password = ConnectionDetails.getPasswd(pass);
   /* first initialize a token manager */
   AuthenticationTokenManager authtokenmanager = AuthenticationTokenManager.getManager();
   //initialize CA
     setUpInternetProxy();
     setUpCA();
   ArrayList<VomsVirtualOrganization> vos = new ArrayList<VomsVirtualOrganization>();
   vos.add( vo ) ;
   IVirtualOrganization[] huschel = vos.toArray(new IVirtualOrganization [0]);
   vomsdescription = new VomsProxyDescription( huschel , certFile, keyFile );
   PasswordManager.registerPassword( keyFile.getPath(), password );
   vomstoken = authtokenmanager.createToken( vomsdescription );
   vomstoken.validate() ;
   vomstoken.setActive( true );
   return vomstoken;
 }
```

Implementation (cont.)



```
    GridTestStub.setUpInternetProxy();
    GridTestStub.setUpVO();
    GridTestStub.setUpCA();
    GridTestStub.setUpVomsToken();
    //get the created VO and the info service
    IGridElement[] elements = GridModel.getVoManager().getChildren( new NullProgressMonitor
```

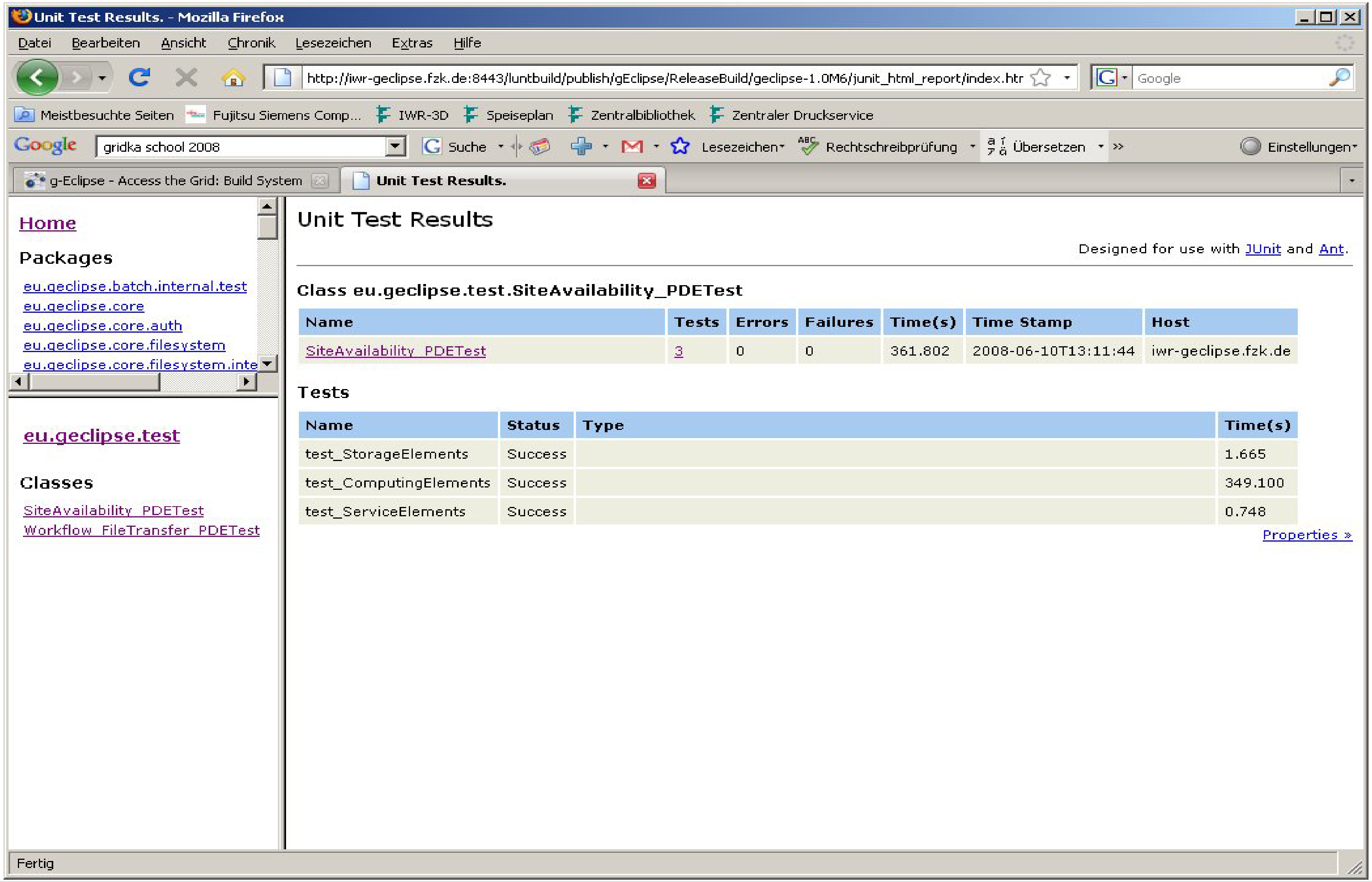
<terminated> SiteAvailability_PDETest [JUnit Plug-in Test] C:\Programme\Java\jre1.6.0_01\bin\javaw.e:

```
egee-ce1.gup.uni-linz.ac.at is available
plethon.grid.ucy.ac.cy is available
gridka-dCache.fzk.de is available
se1.egee.man.poznan.pl is available

file transfer on egee-ce1.gup.uni-linz.ac.at is successful
file transfer on plethon.grid.ucy.ac.cy is successful
file transfer on gridka-dCache.fzk.de fails
file transfer on se1.egee.man.poznan.pl is successful

submitting job to CE @ ce101.grid.ucy.ac.cy:2119/jobmanager-lcgpbs-geclipse is successful
submitting job to CE @ ce.egee.man.poznan.pl:2119/jobmanager-lcgpbs-geclipse is successful
submitting job to CE @ ce-fzk.gridka.de:2119/jobmanager-pbspro-geclipse is successful
submitting job to CE @ a01-004-128.gridka.de:2119/jobmanager-pbspro-geclipse is successful
submitting job to CE @ ce-2-fzk.gridka.de:2119/jobmanager-pbspro-geclipse is successful
```

Integration in the Nightly Build System (I)



Unit Test Results. - Mozilla Firefox
Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe
http://iwr-geclipse.fzk.de:8443/luntbuild/publish/gEclipse/ReleaseBuild/geclipse-1.0M6/junit_html_report/index.htr
Google
Meistbesuchte Seiten Fujitsu Siemens Comp... IWR-3D Speiseplan Zentralbibliothek Zentraler Druckservice
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Suche Lesezeichen Rechtschreibprüfung Übersetzen Einstellungen
g-Eclipse - Access the Grid: Build System
Unit Test Results.
Fertig

Home

Packages

eu.geclipse.batch.internal.test
eu.geclipse.core
eu.geclipse.core.auth
eu.geclipse.core.filesystem
eu.geclipse.core.filesystem.inte

eu.geclipse.test

Classes

SiteAvailability_PDETest
Workflow_FileTransfer_PDETest

Unit Test Results

Designed for use with JUnit and Ant.

Class eu.geclipse.test.SiteAvailability_PDETest

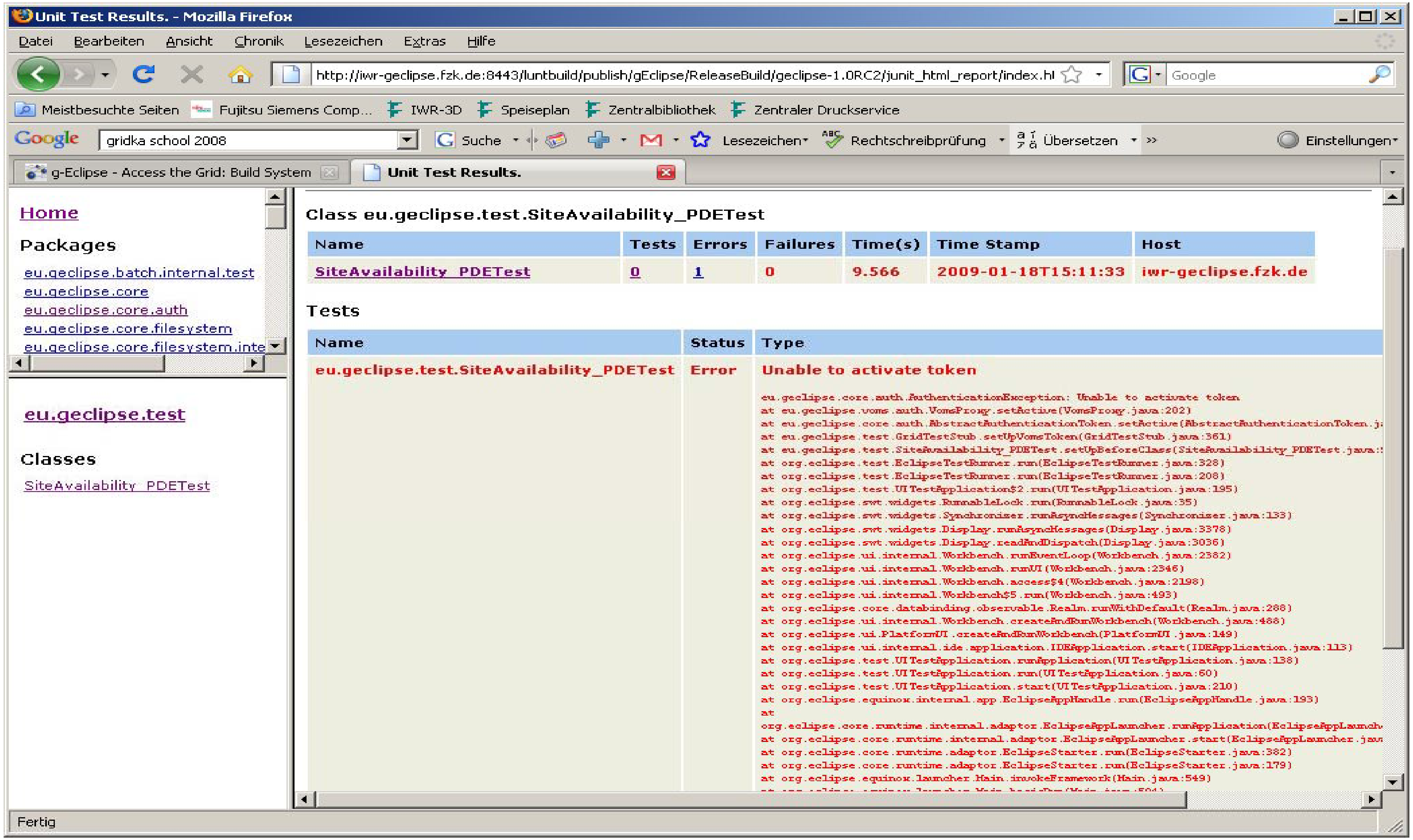
Name	Tests	Errors	Failures	Time(s)	Time Stamp	Host
SiteAvailability_PDETest	3	0	0	361.802	2008-06-10T13:11:44	iwr-geclipse.fzk.de

Tests

Name	Status	Type	Time(s)
test_StorageElements	Success		1.665
test_ComputingElements	Success		349.100
test_ServiceElements	Success		0.748

Properties »

Integration in the Nightly Build System (II)


Unit Test Results. - Mozilla Firefox
Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe
http://iwr-geclipse.fzk.de:8443/luntbuild/publish/gEclipse/ReleaseBuild/geclipse-1.0RC2/junit_html_report/index.ht
Google
Meistbesuchte Seiten Fujitsu Siemens Comp... IWR-3D Speiseplan Zentralbibliothek Zentraler Druckservice
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eu.geclipse.batch.internal.test
eu.geclipse.core
eu.geclipse.core.auth
eu.geclipse.core.filesystem
eu.geclipse.core.filesystem.inte
eu.geclipse.test
Classes
SiteAvailability_PDETest
Fertig

Class eu.geclipse.test.SiteAvailability_PDETest

Name	Tests	Errors	Failures	Time(s)	Time Stamp	Host
SiteAvailability_PDETest	0	1	0	9.566	2009-01-18T15:11:33	iwr-geclipse.fzk.de

Tests

Name	Status	Type
eu.geclipse.test.SiteAvailability_PDETest	Error	Unable to activate token

```
eu.geclipse.core.auth.AuthenticationException: Unable to activate token
at eu.geclipse.voms.auth.VomsProxy.setActive(VomsProxy.java:202)
at eu.geclipse.core.auth.AbstractAuthenticationToken.setActive(AbstractAuthenticationToken.j
at eu.geclipse.test.GridTestStub.setUpVomsToken(GridTestStub.java:361)
at eu.geclipse.test.SiteAvailability_PDETest.setUpBeforeClass(SiteAvailability_PDETest.java:
at org.eclipse.test.EclipseTestRunner.run(EclipseTestRunner.java:328)
at org.eclipse.test.EclipseTestRunner.run(EclipseTestRunner.java:208)
at org.eclipse.test.UITestApplication$2.run(UITestApplication.java:195)
at org.eclipse.swt.widgets.RunnableLock.run(RunnableLock.java:35)
at org.eclipse.swt.widgets.Synchronizer.runAsyncMessages(Synchronizer.java:133)
at org.eclipse.swt.widgets.Display.runAsyncMessages(Display.java:3378)
at org.eclipse.swt.widgets.Display.readAndDispatch(Display.java:3036)
at org.eclipse.ui.internal.Workbench.runEventLoop(Workbench.java:2382)
at org.eclipse.ui.internal.Workbench.runUI(Workbench.java:2346)
at org.eclipse.ui.internal.Workbench.access$4(Workbench.java:2198)
at org.eclipse.ui.internal.Workbench$5.run(Workbench.java:493)
at org.eclipse.core.databinding.observable.Realm.runWithDefault(Realm.java:288)
at org.eclipse.ui.internal.Workbench.createAndRunWorkbench(Workbench.java:488)
at org.eclipse.ui.PlatformUI.createAndRunWorkbench(PlatformUI.java:149)
at org.eclipse.ui.internal.ide.application.IDEApplication.start(IDEApplication.java:113)
at org.eclipse.test.UITestApplication.runApplication(UITestApplication.java:138)
at org.eclipse.test.UITestApplication.run(UITestApplication.java:60)
at org.eclipse.test.UITestApplication.start(UITestApplication.java:210)
at org.eclipse.equinox.internal.app.EclipseAppHandle.run(EclipseAppHandle.java:193)
at
org.eclipse.core.runtime.internal.adaptor.EclipseAppLauncher.runApplication(EclipseAppLaunch
at org.eclipse.core.runtime.internal.adaptor.EclipseAppLauncher.start(EclipseAppLauncher.jav
at org.eclipse.core.runtime.adaptor.EclipseStarter.run(EclipseStarter.java:382)
at org.eclipse.core.runtime.adaptor.EclipseStarter.run(EclipseStarter.java:179)
at org.eclipse.equinox.launcher.Main.invokeFramework(Main.java:549)
```

Conclusion

- g-Eclipse is used as an API for resource availability testing
  - Automation of the wizards
  - Junit as a tool
  - Testing with real user operations
- Further work
  - Detecting the reason of problems

Thank you for your attention!