



JIMS TEST REPORT

SOFTWARE TEST AND VALIDATION REPORT

WP4 TASK4 - Verification and Quality Control

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Abstract: This report describes the validation performed on the package JIMS developed by CrossGrid WP 3 task 3.3. The tests were performed by Tomás F. Pena, José C. Cabaleiro, Marcos Boullón and Carlos Fernández on the behalf of the CrossGrid task 4.4 testbed verification and quality control.



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1. CONTEXT

Test and validation of the package JIMS version 1.2.3 developed by CrossGrid WP 3 task 3.3. JIMS is an infrastructure monitoring system for exposing operating system parameters (CPU statistics, number of processes, memory used, filesystems statistics), and network infrastructure (SNMP attributes) parameters to external monitoring applications through Web Services.

1.1. TEST REQUEST

The package test request was assigned by Jorge Gomes (jorge@lip.pt) to Francisco F. Rivera (fran@dec.usc.es) and Tomás F. Pena (tomas@dec.usc.es) on 25 May 04. The request was submitted properly by a request form through the test and validation web form, and was assigned the Request ID 10850473563.65254383805258.

The software URL provided in the request was correct, containing the packaged RPMs of JIMS.

The URL for the documentation was correctly provided. The Installation [1], Users [2] and Development manual [4] are very short and simple INSTALL and README files, and they provide insufficient information for testing purposes and general use. Unit tests have not been provided. The features to be tested are not indicated in the test request.

The test requestor was Kazimierz Balos (kbalos@agh.edu.pl) from the University of Science and Technology (AGH) in Krakow, WP 3, task 3.3. The test was authorized by Jorge Gomes (jorge@lip.pt) from the WP4 Iteam.

1.2. TEST TEAM

The tests were performed by task 2.3.2 members from USC and CESGA

- Tomás F. Pena (tomas@dec.usc.es)
- José C. Cabaleiro (caba@dec.usc.es)
- Marcos Boullón (marcos@dec.usc.es)
- Carlos Fernández (carlosf@cesga.es)

1.3. RESOURCES INVOLVED

The production testbed of CESGA was used for the purpose of testing:

- 1 User interface (ui.grid.cesga.es)
- 1 Computing element (ce.grid.cesga.es)
- 2 Working node (grid01.grid.cesga.es, grid03.grid.cesga.es)

2. TEST AND VALIDATION

2.1. SOFTWARE INSTALLATION

The production testbed was used: LCG-1.1.4, which runs RH7.3 installed through a LCFGng server. The software to be installed is distributed as RPMS, and is composed by four packages:

```
cg-wp3.3.3-jims-client-1.2.3-1.noarch.rpm  
cg-wp3.3.3-jims-thirdparty-1.2.3-1.noarch.rpm  
cg-wp3.3.3-jims-service-1.2.3-1.noarch.rpm  
cg-wp3.3.3-jims-commons-1.2.3-1.noarch.rpm
```

The packages can be obtained from the repository. Additionally, the package `net-snmp>=5.0.7` is needed to install (`net-snmp-5.1.1-1.rh72` was used). Initially they were installed using `rpm` and later the changes needed in the configuration of the LCFG were introduced. The software needs to install files in the following directories:

```
/opt/cg/bin  
/opt/cg/lib  
/opt/cg/docs  
/opt/cg/etc/jims  
/opt/cg/share/java  
/opt/cg/share/java/res  
/opt/cg/var/log/jims  
/etc/init.d
```

In order to install these packages (the `snmp` packages) is necessary to include the flags “`--nodeps --force`” to not check any additional dependencies not needed by the code, because there are dependencies problems between `net-snmp-5.1.1-1.rh72` and `rpm-4.0.4`:

```
$ rpm --install net-snmp-5.1.1-1.rh72.i386.rpm  
error: failed dependencies:  
librpm-4.0.4.so is needed by net-snmp-5.1.1-1.rh72  
librpmdb-4.0.4.so is needed by net-snmp-5.1.1-1.rh72  
librpmio-4.0.4.so is needed by net-snmp-5.1.1-1.rh72
```

This problem occurs at the CESGA testbed running LCG1, under LCG2 this problem should not happen.

After the installation of the packages, additional hand configuration is needed, in the following files:

```
/opt/cg/etc/jims/jims-client.conf: change “jims.manager-sg-url” with the name of the computing  
element  
/opt/cg/etc/jims/jims-service.conf: change “jims.agent.mlet.url” with the name of the computing  
element  
/opt/cg/share/java/mbeanLinux.mlet: change “CODEBASE” with the name of the computing element
```

Additional files need to be changed in order to reflect the change in the directory tree structure:

/opt/cg/bin/cg-jims-agent, change “LOG4J” to the location /opt/cg/lib/log4j-1.2.8.jar
/opt/cg/bin/cg-jims-{client,manager,service}, change the “CLASSPATH” to the library log4j to /opt/cg/lib/log4j-1.2.8.jar
/opt/cg/bin/cg-jims-{client,manager,service}, change the “CLASSPATH” to the library xml-apis to /opt/cg/lib/xml-apis.jar

2.2. ADDITIONAL TESTBED MODIFICATIONS

In order to run the software as a non-root user, some additional changes need to be done. First, all log files are written in a directory owned by root, namely /opt/cg/var/log/jims, so there are two possibilities:

1. Give the user the property of this directory
2. Change the configuration so that the logs are written in another directory. These files would need to be changed:
 - /etc/init.d/jims
 - /opt/cg/etc/jims/jims-service.conf
 - /opt/cg/etc/jims/jims-client.conf
 - /opt/cg/etc/jims/jims-defaults
 - /opt/cg/bin/cg-jims-service

We adopted option number 1, so is needed to change the ownership of this directory to the one of the user running the JIMS daemons.

2.3. TEST DEVELOPMENTS

The test programs used by test team are heavily based on that provided by JIMS team (cg-jims-client). This code was modified in order to perform several continuous measurements to ease stress tests.

2.4. USABILITY

As described the installation procedure is simple, automated and only changes in configuration files are required. JIMS monitoring agents and SoapGateway are intended to operate continuously without supervision or user intervention.

In this test, the deployment step was done manually because the computer elements and the working nodes do not share the filesystem.

JIMS is easy to understand and to use. There are two ways to get monitoring data: direct request to monitoring agent using the web user interface in working nodes and by means of calls to the Java API from the user code. In this last case all the information is obtained by means of the SoapGateway, which communicates with the monitoring agents, using web services. The obtained information is just the requested one.

The response speed is acceptable for most parameters which evolution is slow, but in some cases it would be desirable a higher speed, for example, “measureThroughput” or “Ut”, because they are those which best define the node status.

2.5. FUNCTIONALITY

The test and validation request does not include any specific features to be tested. The functionality and the flawless operation of the software can be tested either through the web user interface or using calls from a Java program. Both methods have been tested. In these tests it has been seen that the announced functionality is present, the software works without flaws and the software is compliant with the design and user requirements, however more accuracy for some parameters (network metrics) would be better.

2.5.1. Unit tests

Unit tests were performed through the web user interface and using calls from a Java program. Using this second method, several one hour tests were performed. In each one of these tests, all parameters from SystemInformation and NetworkMetrics classes were measured in intervals of five seconds. The parameters of the class SNMPMirror could not be measured because the lack of the proper configuration of the SNMP software in the target testbed.

2.5.2. System tests

System tests were performed using the Performance Prediction Component (PPC) [5] of WP 2, task 2.3.2. Currently, from PPC only “It” parameter is required. From this tool, any site with JIMS installed can be monitorized, at this moment only two.

2.5.3. Stress tests

Stress tests were performed using ten concurrent processes doing simultaneous and continuous requests (with no delay between them) to a few parameters from SystemInformation and NetworkMetrics classes during one hour. This stress test should cover any real use case. Apart from a logic delay in the response, no problems were detected.

2.6. COMPATIBILITY

The software is compatible with the other components of the middleware installed in the “production” testbed. The packages on which the JIMS depends are distributed by CrossGrid, except the package net-snmp-5.1.1-1.rh72, which should also be provided in order to install the software.

The installation of *net-snmp* rpm had to be forced due to an incompatibility with the rpm manager at the mentioned testbed.

There are no software backwards compatibility issues, since this is the first version of the tool to be tested.

2.7. SECURITY AND NETWORKING

To report the information, JIMS uses these TCP ports by default:

HTTP server 7701

Web Service 7702

UDP client	7703
UDP server	7704
SNMP agent	7705
Discovery	7706
RMI connector	7707
HTML adaptor	7708
MBS RMI connector	7709

The following ports are used by the JIMS client applications:

JIMS/SNMP Manager 7702 (Web Service port)

CLI client 7702 (Client port)

WEB interface 7708 (HTTP adapter port)

From the outside world there should be opened only one port 7702 on CE, and in theory, the port 7708. For development reasons, it is useful to have port 7708 opened to the outside world from each WN but it is not required. It is only the web interface which will probably be disabled in the next releases of JIMS. So finally, we can state that only port 7702 on CE must be opened.

These port numbers can be modified changing the following files:

`/opt/cg/etc/jims/jims-service.conf`

`/opt/cg/etc/jims/jims-client.conf`

Some SNMP parameters require write support and the RO and RW passwords are clearly available in the CVS repository [6], in the configuration file (`snmpd.conf`).

There is no known other security issues regarding JIMS, but it is recommended to run the services as a non-root user in order to restrict any not known exploit of these services. Also, the access to these ports should be restricted to the CrossGrid testbeds.

As JIMS is mostly JAVA based, the security concerns of JIMS are related to the ones found in the JAVA services and applications.

2.8. PREVIOUSLY REPORTED ISSUES

This was the first version of JIMS that was tested.

3. ISSUES FOUND

3.1. ISSUES FOUND IN THE SOFTWARE

3.1.1. Issue 001

(Severity: high Priority: high)

Due to the fact that the filesystems of the CE and WN are different, JIMS is unable to report the real status of the service in the testbed, it always reports that the monitoring agents are stopped.

3.1.2. Issue 002

(Severity: high Priority: medium)

In order to run the JIMS service as user, it is necessary to give to the user write permissions for the log directory (`/opt/cg/var/log/jims`).

3.1.3. Issue 003

(Severity: medium Priority: medium)

In dual CPU nodes, JIMS gives average measurements instead of measurements per CPU.

3.1.4. Issue 004

(Severity: medium Priority: medium)

The parameters of the class `SNMPMirror` could not be measured because the lack of the proper configuration of the SNMP software in the target testbed.

3.1.5. Issue 005

(Severity: high Priority: high)

Some SNMP parameters require write support and the RO and RW passwords are clearly available in the CVS repository [6], in the configuration file (`snmpd.conf`). In this version JIMS requires RW access to SNMP agents in the WNs. Clear text passwords and RW access must be avoided. The package must be distributed with the SNMP RW access disabled.

3.1.6. Issue 006

(Severity: medium Priority: medium)

`net-snmp` package should be installed before JIMS packages. This requirement should be enforced in the rpmlists provided by the common directory of GridPortal.

3.1.7. Issue 007

(Severity: high Priority: high)

All the manual configuration steps that are now required after the installation of the RPMs must be avoided. The package should be installable without manual intervention.

3.1.8. Issue 008

(Severity: high Priority: high)

The package must use the `init.d` startup mechanisms defined for CrossGrid. Namely the init script must be moved to `/opt/cg/etc/init.d` and renamed to “`cg-jims`”.

3.2. ISSUES FOUND IN THE DOCUMENTATION

3.2.1. Issue 001

(Severity: high Priority: high)

The installation and user manuals are not very clear. The user manual is very incomplete regarding the functionality and use of the software. The RPMs do not contain any “man pages” or any other kind of documents.

3.2.2. Issue 002

(Severity: high Priority: high)

The installation manual should describe which RPMs must be installed on which kind of machine (CE, WN, UI), and any specific manual steps that must be performed in JIMS installation.

3.2.3. Issue 003

(Severity: high Priority: high)

The manual must clearly state that an SNMP agent is configured and activated in each WN, and call the attention of the site administrators for the fact that it is highly advisable to protect the SNMP agent from network access by other machines in the LAN or in the Internet. The manual should advise that for better security the community name used for RO access should be modified. The steps for performing this modification should be clearly described.

4. RECOMMENDATION

- The documentation must be improved; specific user and installation manuals must be extended.
- In the next test and validation requests, specific issues to be validated should be indicated.

In spite of the mentioned problems with the documentation and installation, our recommendation to the CrossGrid ITEAM is that the package could be deployed with minor issues found, with the condition of that the installation manual is improved.

5. REFERENCES

- [1] http://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp3/wp3_3-moninfr/wp3_3_3-jims/INSTALL?rev=HEAD&content-type=text/plain
- [2] http://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp3/wp3_3-moninfr/wp3_3_3-jims/USER_MANUAL?rev=HEAD&content-type=text/plain
- [3] http://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp3/wp3_3-moninfr/wp3_3_3-jims/INTEGRATION?rev=HEAD&content-type=text/plain
- [4] http://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp3/wp3_3-moninfr/wp3_3_3-jims/DEPENDENCIES?rev=HEAD&content-type=text/plain
- [5] https://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp2/wp2_4-perf/wp2_4_2-perfpred/wp2_4_2-perfpred-PPC/doc/user-manual.pdf?rev=1.3&only_with_tag=v1_2_0&content-type=application/pdf
- [6] https://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp3/wp3_3-moninfr/wp3_3_3-jims/src/snmp/cfg/snmpd.conf?rev=HEAD&content-type=text/plain

6. INTEGRATION/VALIDATION REQUEST

Component name: JIMS

Version (CVS tag): v1_2_3 **Request priority:** 2

Package brief description:

JIMS - the JMX Infrastructure Monitoring System, Crossgrid component, WP3.3.3.

Code:

Source code in X# CVS ? (Y/N): Y

Autobuild generates RPMs ? (Y/N): Y

Software download URL: <http://cvs.fzk.de/~autobuild/autobuilt/i386-rh7.3-gcc3.2.2/wp3/RPMS/>

List of RPMs produced:

cg-wp3.3.3-jims-client-1.2.3-1.noarch.rpm
cg-wp3.3.3-jims-service-1.2.3-1.noarch.rpm
cg-wp3.3.3-jims-commons-1.2.3-1.noarch.rpm
cg-wp3.3.3-jims-thirdparty-1.2.3-1.noarch.rpm

Changes:

List of all bugs fixed by this release:

374 - hardcoded paths
375 - licenses to all free software (JARs) redistributed with this package

List of backwards compatibility issues (installation, configuration or run-time):

First release

Documentation:

Installation manual URL: http://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp3/wp3_3-moninfr/wp3_3_3-jims/INSTALL?rev=HEAD&content-type=text/plain

Users manual URL: http://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp3/wp3_3-moninfr/wp3_3_3-jims/USER_MANUAL?rev=HEAD&content-type=text/plain

Development manual URL: http://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp3/wp3_3-

Software requirements URL: moninfr/wp3_3_3-jims/INTEGRATION?rev=HEAD&content-type=text/plain
http://savannah.fzk.de/cgi-bin/viewcvs.cgi/*checkout*/crossgrid/crossgrid/wp3/wp3_3_moninfr/wp3_3_3-jims/DEPENDENCIES?rev=HEAD&content-type=text/plain

Software design URL: http://www.eu-crossgrid.org/Seminars-INP/JIMS_monitoring_system.zip

Files:

List of all configuration files (with full path):

\$JIMS_HOME/etc/jims/jims-service.conf
\$JIMS_HOME/etc/jims/jims-client.conf
\$JIMS_HOME/etc/jims/jims-defaults
\$JIMS_HOME/bin/server-config.wsdd

List of all log files (with full path):

\$JIMS_HOME/var/log/jims/http-server.log
\$JIMS_HOME/var/log/jims/MonitoringAgent\${MONITORED_STATION_IP}.pid
\$JIMS_HOME/var/log/jims/MonitoringAgent\${MONITORED_STATION_IP}.log
\$JIMS_HOME/var/log/jims/serverAXIS.pid
\$JIMS_HOME/var/log/jims/sg.debug.log
\$JIMS_HOME/var/log/jims/sg.info.log
\$JIMS_HOME/var/log/jims/JIMSManager.log
\$JIMS_HOME/var/log/jims/serverHTTP.pid
\$JIMS_HOME/var/log/jims/sg.error.log

List of LCFG configuration objects (and versions):

List of daemons provided:

/etc/init.d/jims

List of init.d scripts and supported directives (start, stop, restart, etc.):

/etc/init.d/jims {start|stop|restart}

Deployment:

Affected machine types (UI, WN, CE, SE, etc) and packages to be deployed on each:

CE, WN:
JIMS commons + service

Component dependencies (required libraries, packages, etc.):

net-snmp >= 5.0.7

junit >= 3.8.1
jakarta-axis >= 1.1
jakarta-jetspeed >= 1.4
jakarta-commons-logging >= 1.0.2

Credentials (if any) used by the service:

10.1 Soap Connector
Leszek Bizoń,
Michał Rozenau
10.2 Discovery Services
Marek Wiącek
Paweł Zawada
10.3 JIMS
Marek Smęt,
Tomasz Sekman,
Kazimierz Bałos - kbalos@agh.edu.pl
10.4 CPU meter
Piotr Chwastowski

List of service ports (inbound,outbound):

1024-65535

Who communicates with the service and from where:

JIMS client through 7702 Web Service port

Range of temporary ports used by the service (inbound,outbound):**INBOUND PORTS**

Ports occupied by JIMS service by default (all configurable through jims-service.conf file):

- a. HTTP server - 7701
- b. Web Service - 7702
- c. UDP client - 7703
- d. UDP server - 7704
- e. SNMP agent - 7705
- f. Discovery - 7706
- h. RMI connector - 7707
- i. HTML adaptor - 7708
- i. MBS RMI connector - 7709

OUTBOUND PORTS

Ports used by JIMS client applications (all configurable through jims-client.conf file):

- a. JIMS/SNMP Manager - 7702 (Web Service port)
- b. CLI client - 7702 (Client port)
- c. WEB interface - 7708 (HTTP adapter port)

Testing and Validation:**Unit tests that have been performed on the package:**

n.a. in this version

Features to be tested:

Will be described later.

Features not to be tested:

n.a.

Test programs
download URL: [n. a. at this time](#)

Other considerations:

All unit tests as well as quality of RPMs will be performed/improved. Current version of JIMS needs to be installed for testing purposes and is required by collaborative tasks (postprocessing, perf. prediction and benchmarks).

Contacts:**Test requester:**

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Task: 3.3 **E-mail:** kbalos@agh.edu.pl

Developer/origin:

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Project: crossgrid
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