



GRIDBENCH 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 GridBench developed by CrossGrid WP 2 task 2.3. The tests were performed by Stuart Kenny 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 GridBench developed by CrossGrid WP 2 task 2.3.

1.1. TEST REQUEST

The test request submitted did not contain all the required fields. The required manuals were not provided. The installation instructions were contained in a text file in the CVS. The user requirements and software design document URLs were also not given. No unit tests have been provided.

The test requester was George Tsouloupas (georget@ucy.ac.cy) from UCY and CrossGrid WP2 task 2.3.

1.2. TEST TEAM

The tests were performed by task 4.4 members from TCD

- Stuart Kenny (Stuart.Kenny@cs.tcd.ie)

1.3. RESOURCES INVOLVED

The only testbed resources used in the tests were a UI (cagnode46.cs.tcd.ie) located at the TCD CrossGrid testbed site (csTCD.ie). The UI was used to host the **GridBench webservice**, **GridBench GUI**, and **GridBench benchmarks executables**. The UI also hosted a Tomcat 4 web server as well as a PostgreSQL database server, both required by GridBench.

2. TEST AND VALIDATION

2.1. SOFTWARE INSTALLATION

The installation was performed manually. GridBench requires a working Tomcat 4 server and a working PostgreSQL v7.4.x database server. For tomcat the following RPM was installed:

```
tomcat4-4.1.18-full.1jpp.noarch.rpm
```

For PostgreSQL the following RPMs had to be installed:

```
postgresql-7.4.2-1PGDG.i386.rpm  
postgresql-libs-7.4.2-1PGDG.i386.rpm  
postgresql-server-7.4.2-1PGDG.i386.rpm
```

The RPMs for Postgres were obtained from the following URL:

```
http://developer.postgresql.org/ftp/site/binary/v7.4.2/redhat/redhat-7.3/
```

The following GridBench RPMs were also installed:

```
gridbench-libs-0.9.2-cg2.noarch.rpm  
gridbench-1.0.1-cg2.noarch.rpm  
gridbench-benchmarks-0.9.5-cg2.i386.rpm
```

The operating system used was Redhat 7.3.

First the Tomcat and PostgreSQL servers had to be installed and configured. Once this was done the GridBench RPMs were installed.

The first RPM to be installed was the GridBench libs RPM package. This contains the jar files needed by GridBench, `gridbench-libs-0.9.2-cg2.noarch.rpm`. This installs a number of jar files in the `/opt/cg/share/java/gridbench` directory. The second RPM contains files for the webservice, the GUI, and some configuration scripts, `gridbench-1.0.1-cg2.noarch`. These installed correctly and no dependency problems were detected.

The final RPM installs the benchmark executables:

```
$ rpm -ivh gridbench-benchmarks-0.9.5-cg2.i386.rpm  
error: failed dependencies:  
    libblas.so.3 is needed by gridbench-benchmarks-0.9.5-cg2
```

The installation of this RPM failed due to a dependency on the BLAS libraries. An RPM that provides this was obtained and installed:

```
$ rpm -ivh blas-3.0-14.i386.rpm  
Preparing... ##### [100%]  
 1:blas ##### [100%]
```

```
$ rpm -ivh gridbench-benchmarks-0.9.5-cg2.i386.rpm  
Preparing... ##### [100%]  
file /opt/cg/share/java/gridbench/gb_webapp.tgz from install of gridbench-  
benchmarks-0.9.5-cg2 conflicts with file from package gridbench-1.0.1-cg2
```

file /opt/cg/share/java/gridbench/gridbench.jar from install of gridbench-benchmarks-0.9.5-cg2 conflicts with file from package gridbench-1.0.1-cg2

Installation of benchmarks rpm fails due to conflicting files.

The installation of the RPM again failed as it tried to install two files that had already been installed by the previous RPM. This was fixed by specifying that the RPM install should replace the files:

```
$ rpm --replacefiles -ivh gridbench-benchmarks-0.9.5-cg2.i386.rpm
Preparing...          ##### [100%]
 1:gridbench-benchmarks ##### [100%]
```

All files were installed under /opt/cg. The RPMs do not comply with the developers guide in that there is a conflict between the packages.

2.2. ADDITIONAL TESTBED MODIFICATIONS

Once the packages were installed the configuration had to be done manually. Two setup scripts were provided: *gb_init_db.sh*, to create the PostgreSQL database needed, and *gb_setup_ws.sh* to create the GridBench webservice. Although not mentioned in the installation instructions the file */opt/cg/share/java/gridbench/gb_settings.properties* also had to be edited to enter the hostname of the webservices and database server machine.

2.2.1. PostGreSQL Setup

The installation instructions state that as the user 'postgres' the *gb_init_db.sh* script should be run to configure the database:

```
$ su - postgres
$ /opt/cg/sbin/gb_init_db.sh
dropdb: database removal failed: ERROR:  database "gridbench" does not
exist
dropuser: removal of user "gridbench" failed: ERROR:  user "gridbench" does
not exist
Creating user (use "gridbench" as the password)

Enter password for new user:
Enter it again:
Shall the new user be allowed to create databases? (y/n) y
Shall the new user be allowed to create more new users? (y/n) n
CREATE USER
Creating database "gridbench"

CREATE DATABASE
CREATE SCHEMA
CREATE SCHEMA
You are now connected as new user "gridbench".
SET
ERROR:  permission denied for schema infocache
ERROR:  permission denied for schema infocache
```

...

The setup script failed. This was due to the gridbench user created not having the correct permissions to access the gridbench and infocache schemas created. This was fixed by editing the *gb_init_db.sh* script to create the schemas as the gridbench user, rather than the postgres user. The script then completed, although the following error still occurs:

```
ERROR: syntax error at or near "[" at character 8
ERROR: syntax error at or near "," at character 43
ERROR: function _pg_keysequal(smallint[], smallint[]) does not exist
HINT: No function matches the given name and argument types. You may need
to add explicit type casts.
ERROR: relation "referential_constraints" does not exist
ERROR: relation "referential_constraints" does not exist
```

2.2.2. Webservice Setup

To setup the webservice the installation instructions state that the *gb_setup_ws.sh* script should be executed:

```
$ /opt/cg/sbin/gb_setup_ws.sh
gridbench/
gridbench/WEB-INF/
gridbench/WEB-INF/server-config.wsdd
gridbench/WEB-INF/users.lst
gridbench/WEB-INF/web.xml
gridbench/fingerprint.jsp
gridbench/happyaxis.jsp
gridbench/index.html
Done. Tomcat may need to be restarted.
```

Although this completes and states that it is done, it in fact did not execute correctly. The script had to be edited to correct an error and re-run before the setup completed correctly. This is explained more in the issues. Tomcat was then restarted.

2.3. TEST DEVELOPMENTS

No tests were provided by the developers.

2.4. USABILITY

The software would have been easy to deploy had the errors in the setup scripts not been present as all the software is installed in a single machine. The absence of a user guide however makes the software quite difficult to understand and use. The user interface produces correct output however in some case errors occur. These are described in the issues.

2.5. FUNCTIONALITY

2.5.1. Unit tests

The unit tests performed included:

- Correct startup of the GridBench GUI.
- Testing for correct functioning of the GUI.

The GUI requires the user to have a valid grid proxy. Once this is generated the GUI started correctly. The GridBench GUI can be used to submit benchmarks to a site and to view the results of these benchmark runs. The GUI does have some flaws however. Error detection is not implemented fully and a large number of null pointer exceptions and array index out of bounds exceptions occur. Also no logging mechanism is implemented. Errors are printed to the console. For example clicking on one of the tabs, GBDL, Globus, or EDG, before a resource is selected, results in a `ArrayIndexOutOfBoundsException` being printed to the console:

```
java.lang.ArrayIndexOutOfBoundsException: Array index out of range: 0
    at java.util.Vector.get(Vector.java:713)
    at
    ucy.gridbench.definition.ResourceCollection.getResource(ResourceCollection.
java:31))
...
```

Similarly pressing submit when no benchmark is selected throws a `NullPointerException`.

2.5.2. System tests

To perform system tests benchmarks were submitted to the TCD site. The steps detailed in the GridBench tutorial were followed to do this:

http://www.eu-crossgrid.org/tutorial/ICCS_2004_CGTutorial/Exercise_Gridbench.htm

Benchmarks were successfully submitted to the TCD site and results were retrieved. These results could then be viewed and charts of the results created.

2.5.3. Stress tests

No “stress tests” were performed.

2.6. COMPATIBILITY

The software is compliant with the other components of the distribution. The software is compatible with EDG2.0 middleware.

2.7. SECURITY AND NETWORKING

In order to start and use the GridBench GUI the user must have a valid grid proxy. For these tests a tomcat server and database server had to be run on the UI, although the database server could have been run on a separate machine.

2.8. PREVIOUSLY REPORTED ISSUES

No previous test report.

3. ISSUES FOUND

3.1. ISSUES FOUND IN THE SOFTWARE

3.1.1. Issue 001, bugtracker #500

(Severity: critical Priority: immediate)

The gridbench-benchmarks RPM contains files that conflict with the gridbench RPM. Installation fails due to this.

3.1.2. Issue 002, bugtracker #501

(Severity: critical Priority: immediate)

The *gb_init_db.sh* script fails due to a permissions error on the created gridbench database. The database is created with the owner set as the postgres user (createdb gridbench -O postgres). The gridbench user cannot then create or access the created schemas.

3.1.3. Issue 003, bugtracker #502

The *gb_init_db.sh* script gives the following error:

```
ERROR: syntax error at or near "[" at character 8
ERROR: syntax error at or near "," at character 43
ERROR: function _pg_keysequal(smallint[], smallint[]) does not exist
HINT: No function matches the given name and argument types. You may need
to add explicit type casts.
ERROR: relation "referential_constraints" does not exist
ERROR: relation "referential_constraints" does not exist
```

3.1.4. Issue 004, bugtracker #503

(Severity: critical Priority: immediate)

The *gb_setup_ws.sh* script fails due to an error in the script. The script copies the jar files to a file, lib, in the \$CATALINA_HOME/webapps/gridbench/WEB-INF directory instead of a lib directory. It also copies the *gb_settings.properties* file into a classes file instead of a directory.

3.1.5. Issue 005, bugtracker #504

(Severity: high Priority: high)

The installation requires a number of manual installation steps, some of which require interaction, for example in creating the PostgreSQL database a password must be entered for the 'gridbench' user being created. This will cause problems in an LCFG installation. These steps should either be removed or LCFG configuration objects should be provided.

3.1.6. Issue 006, bugtracker #505

(Severity: high Priority: high)

The setup scripts and GUI startup script contain absolute paths. They are hardwired to use the /opt/cg directory. They should parse the CG top level configuration file to determine CG_LOCATION, as described in the developers guide.

3.1.7. Issue 007, bugtracker #506**(Severity: high Priority: high)**

The GUI does not handle incorrect usage correctly. NullPointerExceptions and ArrayIndexOutOfBoundsExceptions are frequently thrown. For example if submit is pressed before a benchmark is configured fully, if the Globus/EDG tab is selected before a resource is selected, or if remove is pressed on the chart panel when no metric has been added. These should be tested for and handled correctly.

3.1.8. Issue 008, bugtracker #507**(Severity: high Priority: high)**

The GUI does not have a logging mechanism. Error messages are printed to the console. A logging mechanism should be provided.

3.1.9. Issue 009, bugtracker #508**(Severity: high Priority: high)**

The webservice does not have a logging mechanism. It logs to catalina.out. A logging mechanism should be provided, perhaps using log4j or similar.

3.1.10. Issue 010, bugtracker #509**(Severity: low Priority: medium)**

The *gb_settings.properties* file should probably be located in the /opt/cg/etc or /opt/cg/var directory with a .conf extension as described in the developers guide.

3.2. ISSUES FOUND IN THE DOCUMENTATION**3.2.1. Issue 001, bugtracker #510****(Severity: high Priority: high)**

No installation guide or user guide are provided. This seriously affects the usability of the software.

3.2.2. Issue 002, bugtracker #511**(Severity: high Priority: high)**

The installation instructions in the CVS do not mention editing the *gb_settings.properties* file.

4. RECOMMENDATION

My suggestion for the validation result is MAJOR ISSUES. Deployment would not be possible with the errors in both the RPM packaging and in the configuration scripts. Also a user guide would be required.

It may be preferable for the webservices setup script to create the necessary directories under the /opt/cg/share/ directory and then create a link from this to the \$CATALINA_HOME webapps directory. This would mean the required jar files would not have to be copied from one location to another.

5. REFERENCES

6. INTEGRATION/VALIDATION REQUEST

Request id: 108970504445.2265841727243

Component name: Gridbench
Version (CVS tag): 0.9.5 **Request priority:** 2

Package brief description:

Gridbench is made up of (1) the gridbench benchmarks and (2) the services and (3) the client gui.

Code:

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

Autobuild generates RPMs ? (Y/N): Y

Software download URL: http://savannah.fzk.de/cgi-bin/viewcvs.cgi/crossgrid/crossgrid/wp2/wp2_3-bench/

List of RPMs produced:

gridbench-benchmarks

gridbench

gridbench-libs (NOT produced in autobuild -- external jars) see INSTALL

Changes:

List of all bugs fixed by this release:

First Attempt at Validation! please bear with me...

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

Documentation:

Installation manual URL: [see INSTALL in source](#)

Users manual URL:

Development manual URL:

Software requirements URL:

Software design URL:

Files:**List of all configuration files (with full path):**

/opt/cg/share/java/gridbench

(it's not in etc because it has to be in my CLASSPATH)

List of all log files (with full path):

CATALINA_HOME/logs/catalina.out

List of LCFG configuration objects (and versions):**List of daemons provided:****List of init.d scripts and supported directives (start, stop, restart, etc.):****Deployment:****Affected machine types (UI, WN, CE, SE, etc) and packages to be deployed on each:**

ALL packages on RAS and UI's (gb_wssetup.sh and gb_init_db.sh only executed on the RAS or any one UI)

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

Postgres7.4.x
tomcat 4

Credentials (if any) used by the service:

TBD

List of service ports (inbound,outbound):

(tomcat)

Who communicates with the service and from where:

users from UI

Range of temporary ports used by the service (inbound,outbound):**Testing and Validation:****Unit tests that have been performed on the package:**

no formal unit testing yet

Features to be tested:

if the GUI starts (gridbench-gui.sh) and presents a list of available benchmarks then we are on the right track!

Features not to be tested:

Test programs [TBD](#)
download URL:

Other considerations:

Installation procedure will further be refined, so please use the latest tagged version

Contacts:

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