



# MPICH 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 CrossGrid packaging of the MPICH message-passing protocol implementation, compiled with either the ch\_p4 device for networks of workstations, or the globus2 device for Grids. CrossGrid WP 4 Item. The tests were performed by Mario David 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 CrossGrid packaging of the MPICH message-passing protocol implementation, compiled with either the ch\_p4 device for networks of workstations, or the globus2 device for Grids. Packaging preformed by the CrossGrid WP4 Iteam.

### 1.1. TEST REQUEST

The package test request was assigned by Jorge Gomes ([jorge@lip.pt](mailto:jorge@lip.pt)) to Mario David ([david@lip.pt](mailto:david@lip.pt)) on 15 May 2004. The test requester was Ariel Garcia ([garcia@iwr.fzk.de](mailto:garcia@iwr.fzk.de)) from FZK. The request was submitted properly by a request form through the test and validation web form, and was assigned the Request ID 108630562854.8383239497529.

The software URL provided in the “Test Request” was correct containing the several packages of the MPICH libraries. The version is 1.2.5.2.

The URL for Installation and User Manuals were correctly given in the Test Request, the URL containing the Development Manual and Software Design documentation were correctly given.

### 1.2. TEST TEAM

The tests were performed by task 4.4 members from LIP Lisbon:

- Mario David ([david@lip.pt](mailto:david@lip.pt))
- Jorge Gomes ([jorge@lip.pt](mailto:jorge@lip.pt))

### 1.3. RESOURCES INVOLVED

The following nodes located at LIP Lisbon were involved in the tests:

User Interface – ui02.lip.pt

Computing Element – ce02.lip.pt

Worker Nodes – wn03.lip.pt and wn04.lip.pt

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## 2. TEST AND VALIDATION

### 2.1. SOFTWARE INSTALLATION

The Crossgrid Testbed running the version CG1.9.0 based on LCG2 was used.

The list of RPM's are the following:

```
mpich-p4-1.2.5.2-cg2.i386.rpm  
mpich-g2-1.2.5.2-cg2.i386.rpm  
mpich-compat-1.0-2.noarch.rpm
```

The CG tag 1.9.0 has a previous version of those packages, so the RPM lists for the CE and WN was updated to this version. The RPM's were also added to the User Interface list in order to be able to test the compilation of mpich programs.

The installation was successful on all elements:

```
[INFO] updaterpms: 3 installs, 0 removals  
[INFO] updaterpms: Flagging mpich-compat-1.0-2 for upgrade  
[INFO] updaterpms: Flagging mpich-g2-1.2.5.2-cg2 for upgrade  
[INFO] updaterpms: Flagging mpich-p4-1.2.5.2-cg2 for upgrade  
[INFO] updaterpms: upgrading to mpich-g2-1.2.5.2-cg2  
[INFO] updaterpms: upgrading to mpich-p4-1.2.5.2-cg2  
[INFO] updaterpms: upgrading to mpich-compat-1.0-2  
[WARNING] updaterpms: updaterpms generated some warnings  
[OK] updaterpms: started
```

The packages installs in `/opt/mpi/mpich-p4` and `/opt/mpi/mpich-g2`. The installation directory is not `/opt/cg` because those packages are not from Crossgrid, but a repackaging made by the CG Item.

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The package `mpich-docs-1.2.5.2-cg2.i386.rpm` was also installed in the UI, providing documentation and example programs

The packages don't depend on any other software.

## 2.2. ADDITIONAL TESTBED MODIFICATIONS

Since the LCG2 distribution already includes the package `mpich-1.2.5` in the UI, CE and WN's, we will take this package out of those elements, in order to have only the `mpich` packages distributed by CrossGrid.

No additional changes or configurations were necessary in the testbed elements for the software to be usable.

## 2.3. TEST DEVELOPMENTS

The package `mpich-docs-1.2.5.2-cg2.i386.rpm` contains examples of source code and a Makefile to compile with the `mpich-p4` libraries. The Makefile was also modified in order to compile with `mpich-g2` libraries.

## 2.4. USABILITY

The software are the `mpich` libraries both P4 and G2 flavors, its very easy to install and no additional configuration is needed.

The usage is basically the correct compilation of parallel programs with the `mpich` libraries.

## 2.5. FUNCTIONALITY

Not applicable.

### 2.5.1. Unit tests

Unit tests consisted in the compilation of FORTRAN77 and C example programs with `mpich-p4` and with `mpich-g2` libraries.

The results are:

```
[david@ui02 examples]$ make
/opt/mpi/mpich-p4/bin/mpicc -c cpi.c
/opt/mpi/mpich-p4/bin/mpicc -o cpi cpi.o -lm
/opt/mpi/mpich-p4/bin/mpif77 -c pi3.f
/opt/mpi/mpich-p4/bin/mpif77 -o pi3 pi3.o
/opt/mpi/mpich-p4/bin/mpicc -c cpip.c
/opt/mpi/mpich-p4/bin/mpicc -o cpip cpip.o -lm
/opt/mpi/mpich-p4/bin/mpif77 -c pi3p.f
/opt/mpi/mpich-p4/bin/mpif77 -o pi3p pi3p.o
[david@ui02 examples]$ ll
total 1760
-rw-r--r-- 1 david  csys  2854 Jun 16 13:58 Makefile
-rw-r--r-- 1 david  csys  2754 Jun 16 13:58 Makefile.in
-rw-r--r-- 1 david  csys   993 Jun 16 13:58 README
-rwxr-xr-x 1 david  csys 393474 Jun 16 14:01 cpi
-rw-r--r-- 1 david  csys  1640 Jun 16 13:58 cpi.c
-rw-r--r-- 1 david  csys  2028 Jun 16 14:01 cpi.o
-rwxr-xr-x 1 david  csys 393475 Jun 16 14:01 cpip
-rw-r--r-- 1 david  csys  1650 Jun 16 13:58 cpip.c
-rw-r--r-- 1 david  csys  2036 Jun 16 14:01 cpip.o
-rwxr-xr-x 1 david  csys  3991 Jun 16 13:58 mpirun
-rwxr-xr-x 1 david  csys 462526 Jun 16 14:01 pi3
-rw-r--r-- 1 david  csys  2335 Jun 16 13:58 pi3.f
-rw-r--r-- 1 david  csys  3316 Jun 16 14:01 pi3.o
-rwxr-xr-x 1 david  csys 462527 Jun 16 14:01 pi3p
-rw-r--r-- 1 david  csys  2341 Jun 16 13:58 pi3p.f
-rw-r--r-- 1 david  csys  3324 Jun 16 14:01 pi3p.o
```

Successful compilation with mpich-p4 libraries.  
Also obtained a successful compilation with mpich-g2 libraries:

```
[david@ui02 examples]$ make
/opt/mpl/mpich-g2/bin/mpicc -c cpi.c
/opt/mpl/mpich-g2/bin/mpicc -o cpi cpi.o -lm
/opt/mpl/mpich-g2/bin/mpif77 -c pi3.f
/opt/mpl/mpich-g2/bin/mpif77 -o pi3 pi3.o
/opt/mpl/mpich-g2/bin/mpicc -c cpip.c
/opt/mpl/mpich-g2/bin/mpicc -o cpip cpip.o -lm
/opt/mpl/mpich-g2/bin/mpif77 -c pi3p.f
/opt/mpl/mpich-g2/bin/mpif77 -o pi3p pi3p.o
[david@ui02 examples]$ ll
total 4260
lrwxrwxrwx  1 david  csys  11 Jun 16 14:03 Makefile -> Makefile-g2
-rw-r--r--  1 david  csys    2854 Jun 16 14:02 Makefile-g2
-rw-r--r--  1 david  csys    2854 Jun 16 14:01 Makefile-p4
-rw-r--r--  1 david  csys    2754 Jun 16 13:58 Makefile.in
-rw-r--r--  1 david  csys     993 Jun 16 13:58 README
-rwxr-xr-x  1 david  csys 1026087 Jun 16 14:03 cpi
-rw-r--r--  1 david  csys    1640 Jun 16 13:58 cpi.c
-rw-r--r--  1 david  csys   15008 Jun 16 14:03 cpi.o
-rwxr-xr-x  1 david  csys 1026088 Jun 16 14:03 cpip
-rw-r--r--  1 david  csys    1650 Jun 16 13:58 cpip.c
-rw-r--r--  1 david  csys   15020 Jun 16 14:03 cpip.o
-rwxr-xr-x  1 david  csys    3991 Jun 16 13:58 mpirun
-rwxr-xr-x  1 david  csys 1093054 Jun 16 14:03 pi3
-rw-r--r--  1 david  csys    2335 Jun 16 13:58 pi3.f
-rw-r--r--  1 david  csys    8076 Jun 16 14:03 pi3.o
-rwxr-xr-x  1 david  csys 1093055 Jun 16 14:03 pi3p
-rw-r--r--  1 david  csys    2341 Jun 16 13:58 pi3p.f
-rw-r--r--  1 david  csys    8080 Jun 16 14:03 pi3p.o
```

### 2.5.2. System tests

System tests consists of job submission of mpich-p4 and mpich-g2 jobs of the executables compiled previously.

A mpich-p4 job was submitted through the EDG middleware and although it has run

```
less mpi.err
/home/cg007/.globus/.gass_cache/local/md5/bc/4799384d45739022612c6a
b0b91ff2/md5/e3/c9c7baa04af9d7a8f711c035175b1d/data:      mpirun:
command not found
```

successfully including the output retrieval, the following error occurs:

This has to do with the fact that the `/opt/mpi/mpich-*/bin` is not in the `PATH` environment variable.

This issue can be solved by adding that directory to the `PATH` through the `cg-user-env.sh` script.

The decision was to add again the `mpich-1.2.5` package. Job submission of a `mpich-p4` program went successful after this action:

```
less mpi.err
Process 0 on wn03.lip.pt
Process 1 on wn03.lip.pt
wall clock time = 0.000572
```

The `mpich-g2` executable was submitted through the modified User Interface (`ui01.lip.pt`) to the modified Resource Broker at FZK (`rb.fzk.de`), with successful execution and output retrieval.

### **2.5.3. Stress tests**

Not applicable.

## **2.6. COMPATIBILITY**

The mpich libraries are compatible with the OS and all middleware components.

## **2.7. SECURITY AND NETWORKING**

For mpich-p4 executables, the communications between processors on a single site are performed through ssh, and mpich-g2 instrumented executables use the Globus GSI infrastructure for communication between processors.

## **2.8. PREVIOUSLY REPORTED ISSUES**

Not applicable.

### 3. ISSUES FOUND

#### 3.1. ISSUES FOUND IN THE SOFTWARE

##### 3.1.1. Issue xxxxxxxx

(Severity: high Priority: high)

The mpich-1.2.5 package distributed by LCG was removed from the UI, CE and WN's causing the following error:

```
less mpi.err
/home/cg007/.globus/.gass_cache/local/md5/bc/4799384d45739022612c6a
b0b91ff2/md5/e3/c9c7baa04af9d7a8f711c035175b1d/data:      mpirun:
command not found
```

This has to do with the fact that the `/opt/mpi/mpich-*/bin` is not in the `PATH` environment variable.

#### 3.2. ISSUES FOUND IN THE DOCUMENTATION

No issues were found in the documentation.

#### 4. RECOMMENDATION

The correct mpich directory should be added to the PATH environment variable in `cg-user-env.sh`, package `cg-user-env-cfg-0.0.5-1`.

The new version of the MPICH RPM's should be added to the CE, WN and also UI lists, and tag a new Crossgrid version, recommended 1.9.2.

## 5. REFERENCES

[1] Instalation Manual:

<http://www-unix.mcs.anl.gov/mpi/mpich/docs/install/paper.htm>

[2} MPICH Web site:

<http://www-unix.mcs.anl.gov/mpi/mpich/>

## 6. INTEGRATION/VALIDATION REQUEST

Request URL

[http://www.lip.pt/computing/projects/crossgrid/task4/softvalidation/108630562854.8383239497529/request\\_form.html](http://www.lip.pt/computing/projects/crossgrid/task4/softvalidation/108630562854.8383239497529/request_form.html)