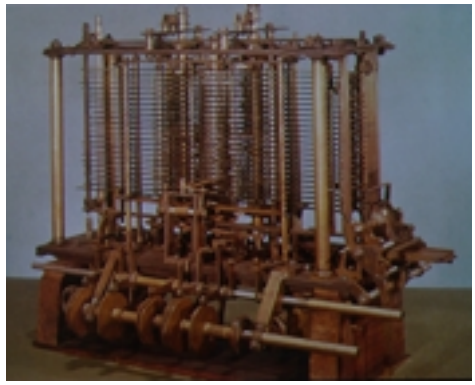
HPC Users Guide



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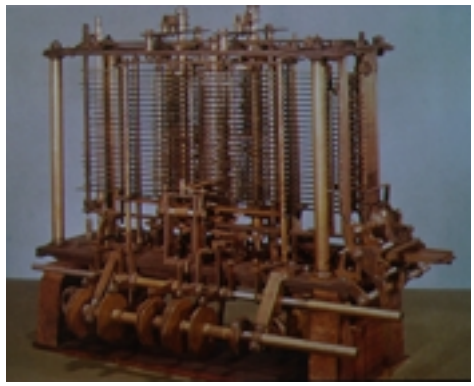

HPC Users Guide :

7.0 Edition

Published Dec 01 2017

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Preface

The primary purpose of the HPC Roll is to provide configured software tools that can be used to run parallel applications on your cluster.

The following software packages are included in the HPC Roll:

- MPI over ethernet environments (OpenMPI, MPICH, MPICH2)
- PVM
- Benchmarks (stream, iperf, IOzone)

Chapter 1. Overview

Table 1-1. Summary

Name	hpc
Version	7.0
Maintained By	Rocks Group
Architecture	i386, x86_64
Compatible with Rocks®	7.0

The hpc roll has the following requirements of other rolls. Compatability with all known rolls is assured, and all known conflicts are listed. There is no assurance of compatiblity with third-party rolls.

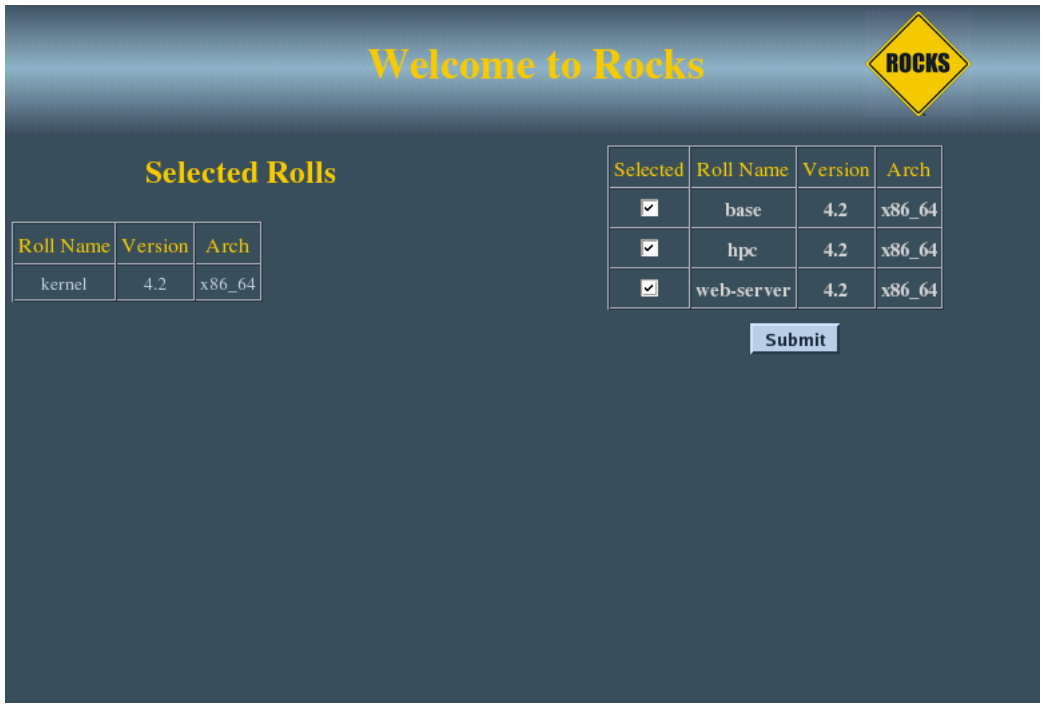
Table 1-2. Compatibility

Requires	Conflicts
Base	
Kernel	
OS	

Chapter 2. Installing

2.1. On a New Server

The hpc roll should be installed during the initial installation of your server (or cluster). This procedure is documented in section 3.2 of the Rocks® usersguide. You should select the hpc roll from the list of available rolls when you see a screen that is similar to the one below.



2.2. On an Existing Server

The hpc Roll may also be added onto an existing server (or frontend). For sake of discussion, assume that you have an iso image of the roll called `hpc.iso`. The following procedure will install the Roll, and after the server reboots the Roll should be fully installed and configured.

```
$ su - root
# rocks add roll hpc.iso
# rocks enable roll hpc
# cd /export/rocks/install
# rocks create distro
# rocks run roll hpc | bash
# init 6
```

Chapter 3. Using

3.1. Environment Modules for OpenMPI

As of Rocks 5.5 and 6.0 (Mamba), Environment Modules are utilized to control MPI path names. By default the rocks-openmpi module is loaded and is openmpi compiled with gnu compiler and the ethernet device.

- To see the currently loaded modules:

```
% module list
Currently Loaded Modulefiles:
  1) rocks-openmpi
%
```

- To see available modules:

```
% module avail
------------------------ /usr/share/Modules/modulefiles ------------------------
dot             module-info   null          use.own
module-cvs      modules       rocks-openmpi

------------------------ /usr/share/Modules/modulefiles ------------------------
dot             module-info   null          use.own
module-cvs      modules       rocks-openmpi
%
```

- To NOT load the Rocks default module Definition. Set the environment variable ROCKS_MODULE_USER_DEF to a non-zero string.

```
export ROCKS_USER_MODULE_DEF=True
```

if modules are already loaded, then ROCKS_USER_MODULE_DEF will not unload already loaded modules. If you do not want the Rocks default then set the above definition in your $HOME/.bashrc or $HOME/.cshrc files

3.2. Using mpirun from OpenMPI

To interactively launch a test OpenMPI program on two processors:

- Create a file in your home directory named `machines`, and put two entries in it, such as:

```
compute-0-0
compute-0-1
```

- Now launch the job from the frontend:

```
$ ssh-agent $SHELL
$ ssh-add
$ /opt/openmpi/bin/mpirun -np 2 -machinefile machines /opt/mpi-tests/bin/mpi-ring
```

You must run MPI programs as a regular user (that is, not root).

If you don't have a user account on the cluster, create one for yourself, and propogate the information to the compute nodes with:

```
# useradd username
# rocks sync users
```

3.3. Using mpirun from MPICH

To interactively launch a test MPICH program on two processors:

- Create a file in your home directory named `machines`, and put two entries in it, such as:

```
compute-0-0
compute-0-1
```

- Compile a test program using the MPICH environment:

```
$ cd $HOME
$ mkdir mpich-test
$ cd mpich-test
$ cp /opt/mpi-tests/src/mpi-ring.c .
$ /opt/mpich/gnu/bin/mpicc -o mpi-ring mpi-ring.c -lm
```

- Now launch the job from the frontend:

```
$ ssh-agent $SHELL
$ ssh-add
$ /opt/mpich/gnu/bin/mpirun -nolocal -np 2 -machinefile $HOME/machines \
 $HOME/mpich-test/mpi-ring
```

You must run MPI programs as a regular user (that is, not root).

If you don't have a user account on the cluster, create one for yourself, and propogate the information to the compute nodes with:

```
# useradd username
# rocks sync users
```

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Appendix B. Third Party Copyrights and Licenses

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B.1. iozone

```
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             Nashua, NH 03060

     Enhancements: Don Capps (capps@iozone.org)
             7417 Crenshaw
             Plano, TX 75025

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```
Distributed Applications Support Team


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Iperf performance test <http://dast.nlanr.net/Projects/Iperf>
Mark Gates
Ajay Tirumala
Jim Ferguson
Jon Dugan
Feng Qin
Kevin Gibbs
National Laboratory for Applied Network Research
National Center for Supercomputing Applications
```

```
University of Illinois at Urbana-Champaign
http://www.ncsa.uiuc.edu

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```
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B.6. PVM

PVM version 3.4: Parallel Virtual Machine System
University of Tennessee, Knoxville TN.
Oak Ridge National Laboratory, Oak Ridge TN.
Emory University, Atlanta GA.
Authors: J. J. Dongarra, G. E. Fagg, M. Fischer
G. A. Geist, J. A. Kohl, R. J. Manchek, P. Mucci,
P. M. Papadopoulos, S. L. Scott, and V. S. Sunderam
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PVM version 3 was funded in part by the U.S. Department of Energy,
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```

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Notes

1. http://git.rocksclusters.org