

New User Guide

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1 Introduction

Welcome to the Cluster! This guide will tell you everything you need to know about the Cluster and its tools.

2 Hardware

The Cluster is composed of the CE, or compute-element, two NAS's, and 20 worker nodes, 16 of which are currently active. Two power supplies keep the nodes and CE active if power failure occurs. The nodes have 8 CPU cores each, making 160 cores total when fully operational.

3 Basic Bash

The cluster uses bash as its command language. Here are some important commands for moving around:

- ls-list items in current directory
- cd-change directory, for example "cd /home/geantuser". The previous directory can be accessed with "cd .."
- mkdir-make directory, for example "mkdir geant-build"
- rm-removes item, use -r flag to remove directories, for example "rm -r geant-build" (may need to be run as root)
- sudo-temporarily gives root access, may only be used by sudoer users
- cat-prints whatever is in file, for example "cat README"
- nano-opens text editor nano, for example "nano file.cpp"
- vim-opens text editor vim, for exmaple "vim file.cpp"
- grep-searches output for desired prompt, for example "ls | grep geant"

4 SSH access

The Cluster can be accessed by running the command "ssh username@163.118.42.1", with username being any active user. If off campus, the FortiClient vpn must be active. VPN setup instructions can be found [here](#)

After running the above command, it will prompt for the password. This is unique to each user. If you have forgotten your password, please contact an admin to change it.

5 GCC/G++

The Cluster comes default with gcc and g++ version 4.5.3. This is far too out of date for many of the applications on the Cluster. To work around this, run the command "scl enable devtoolset-7 bash", which sets up an alternate bash environment with gcc and g++ version 7.3.1. To return to the previous bash environment, use the "exit" command. The alias command "gcc7Start" performs the same function.

After setting up the environment, run gcc -version to ensure the correct version is active.

6 Using Cmake

Cmake is an essential tool in compiling software on the Cluster. Version 3.17 is available by running cmake3, and version 3.20 is available by running /opt/cmake/bin/cmake. For example, compiling example B1 would be done by:

```
'/opt/cmake/bin/cmake -DGEANT4_DIR=/home/geantuser/software/g10.07/geant4.10.07.p04-install/lib64 ../B1'
```

or

```
'cmake3 -DGEANT4_DIR=/home/geantuser/software/g10.07/geant4.10.07.p04-install/lib64 ../B1'
```

Cmake3 is the recommended executable, but either will work.

7 Geant4

Geant4 is accessible under geantuser. Two versions are available, 11.07 patch 4, and 10.03. If you have a personal account and would like geant4 available there, it can be installed using a bash script located at /docs/geantInstall.sh. Before beginning use, make sure the correct gcc is enabled per the above section instructions. The command "source /home/geantuser/software/Geant4/g10.07/geant4.10.07.p04-install/bin/geant4.sh" must then be run to setup the environment. Alias commands "geant410Source" or "geant411Source" have been setup for convenience that perform the same function. The program can then be compiled using cmake.

7.1 Geant4 Compiling B1 Example

1. Setup environment. First command may be "geant410Source" or "geant411Source"

```
$ geant410Source
$ gcc7Start
```

2. Next, change into build directory. This should be alongside the source directory.

```
$ ls
B1 B1-build
$ cd B1-build
```

3. Run cmake with desired flags.

```
$ cmake3 -DGeant4_DIR=../.././software/Geant4/g10.07/geant4.10.07.p04-install/lib64/ ../B1
```

4. After configuration is complete and no errors were thrown, the make command can be run.

```
$ make
```

5. The executable exampleB1 should have been made, and can now be run to begin the simulation

```
$ ./exampleB1
```

8 Further Questions

If you have any further questions, feel free to reach out to one of our admins:

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