MSS Cluster - Basic Guide

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Contents

0 Introduction

This is a tutorial explaining how to connect to the MSS cluster and run a job. At the end of this file you will find a list of usefull linux commands for the cluster, It might be useful to have a look at them prior to reading this tutorial as it will make it easier to understand.

1 Connect To Cluster

1. Enter the following command in terminal:

   ```
   ssh <user_name>@10.100.7.2
   ```

   Where <user_name> is the username provided to you by mss.
   i.e. for username "tstark" enter:

   ```
   ssh tstark@10.100.7.2
   ```

   (a) You might be prompted with message that loks similar to (except the ip will be 10.100.7.2):

   ```
   The authenticity of host '10.100.7.3 (10.100.7.3)' can't be established.
   ECDSA key fingerprint is SHA256:eqJFtLGgrzrdlGuvU2GHoezHJ9Rkf3986MCtE5AFHZY.
   Are you sure you want to continue connecting (yes/no)?
   ```

   Enter "yes"

2. You will be prompted for a password, supply the one provided to you by mss.

Note - if you are connecting from outside the wits network you will need to connect first to an intermediary server using:

```
ssh <user_name>@146.141.21.100
```

Then after connecting into that server you will need to connect to the cluster server using:

```
ssh <user_name>@10.100.7.2
```

2 Initial Configurations

For first time users or people who haven't used the cluster in a while some configurations need to be done. Don't worry, we have scripts doing the heavy lifting, just follow instructions in system-prep/README.txt.

1. You can view instructions using "vim":

   ```
   vim ~/system-prep/README.txt
   ```

   (a) To exit vim press "Esc" and enter ":q"

2.1 Copy file to cluster:

If you have a file you would like to copy from your local machine to the cluster:

2.2 Windows

Install Linux and use Linux instructions.
Otherwise use winSCP (explanation separate)

2.3 Mac

Install Linux and use Linux instructions.
Otherwise:

```
scp /path/to/local/file <user_name>@10.100.7.2:/path/to/save/on/cluster
```

i.e. if I wanted to copy "/home/tstark/jarvis.cpp" to the cluster in "~/top_secret/really_this_is_secret" I would enter the command:

```
scp /home/tstark/jarvis.cpp <user_name>@10.100.7.2:~/top_secret/really_this_is_secret
```

To copy from server to personal PC either run the above command from within the server (notice <user_name> becomes your personal username on your personal computer)
or
from your personal computer switch the first part and second part of the command:

```
scp <user_name>@10.100.7.2:/path/to/save/on/cluster/file /path/to/local/
```

i.e. for the example above but copying "jarvis.cpp" from server to personal computer:

```
scp <user_name>@10.100.7.2:~/top_secret/really_this_is_secret/jarvis.cpp /home/tstark/
```

2.4 Linux

```
rcp /path/to/local/file <user_name>@10.100.7.2:/path/to/save/on/cluster
```

i.e. if I wanted to copy "/home/tstark/jarvis.cpp" to the cluster in "~/top_secret/really_this_is_secret" I would enter the command:

```
rcp /home/tstark/jarvis.cpp <user_name>@10.100.7.2:~/top_secret/really_this_is_secret
```

To copy from server to personal PC either run the above command from within the server (notice <user_name> becomes your personal username on your personal computer)
or
from your personal computer switch the first part and second part of the command:

```
rcp <user_name>@10.100.7.2:/path/to/save/on/cluster/file /path/to/local/
```

i.e. for the example above but copying "jarvis.cpp" from server to personal computer:

```
rcp <user_name>@10.100.7.2:~/top_secret/really_this_is_secret/jarvis.cpp /home/tstark/
```

Note - If you are accessing the cluster via the intermediary server mentioned in the previous section you will also need to preform the copying through it - thus copy to 146.141.21.100, login to 146.141.21.100, and copy from 146.141.21.100 to 10.10.7.2

3 Preparing And Running A PBS Job File

3.1 Template PBS files

Template pbs files are available in ~/system-prep/examples

1. You can copy a template file to a directory of your choice using the cp command as follows.
   (a) Example for copying c pbs file to the directory ~/my_files

   ```
   cp system-prep/examples/07-simple-c/code/sieve.pbs
   ```

2. You can rename the file after you copied it using the mv command:
   (a) example of renaming "sieve.pbs" to "jarvis.pbs"

   ```
   mv sieve.pbs jarvis.pbs
   ```

3.2 Editing PBS File

1. Edit the template file using:

   ```
   vim <file_name>
   ```

   Note:
   see end of file for commands to use in vim.

2. Change the names of the files according to what is needed
   (a) In the c example change "sieve" to the name of the file you are using.
   (b) make sure you have the line 'cd $PBS_O_WORKDIR' at the beginning.
   (c) Change/add

   ```
   #PBS -N <job_name>
   ```

   (d) Change/add

   ```
   #PBS -e /path/to/save/error/file
   ```

   (e) Change/add

   ```
   #PBS -o /path/to/save/output/file
   ```

   (f) Change/add

   ```
   #PBS -l nodes=1:ppn=1,walltime=00:00:10
   ```

   where "nodes" is the amount of computers to run on, "ppn" is the amount of processors per node (up to 3) to be used and "walltime" is maximum time for the job to run.

3.3 Run the job:

To run the job go to the directory with the pbs and the code file (it is best to keep them together) enter the command:

```
qsub <name_of_pbs_file>.pbs
```

3.4 Check Status Of Job Being Run

To check the status of the jobs you have running enter the command:

```
qstat
```

Under the "S" column the letters have the following meaning:

- Q - Queued - Job is waiting for resources to be allocated to it
- R - Running - Job currently running on the cluster
- E - Exiting - Job is exiting after having run
- C - Complete - Job finished running completely

3.5 After Job Completed

You can see the output of the job and if there were errors in the output files that were created for you. To view them use

```
vim output_file
```

and

```
vim error_file
```

If all went well your error file should be empty.

4 Useful Linux Commands When Inside Cluster

Note

~

represents your home directory. Thus

```
~/my_files
```

is the same as

```
/home-108/<user_name>/my_files
```

- cd - change directory. Examples:

  - `cd system-prep`

    change directory to system-prep directory (inside my current directory)
  - `cd -`

    change to previous directory
  - `cd ~`

    change to home directory

`ls`

List files and folders inside current directory

- `vim <file_name>`

  Open file in the vim text editor
  - Example:

    `vim jarvis.cpp`

`cp /path/to/source/file /path/for/destination/file`

Copy a file

- `mv /path/to/source/file /path/for/destination/file`

  Move a file

5 Basic vim Commands

- a

  =Enter insert mode for editing
- Escape key

  =Exit insert mode
- While not in insert mode (default when opening document)
  - :q

    = Exit
  - :q!

    = Exit without saving changes
  - :qw

    = Exit with saving changes