

Introduction to Programming Laboratory

Lab1 - Linux

2017/7/3

Outline

- ◆ Introduction to the platform
- ◆ Linux command
- ◆ Vim

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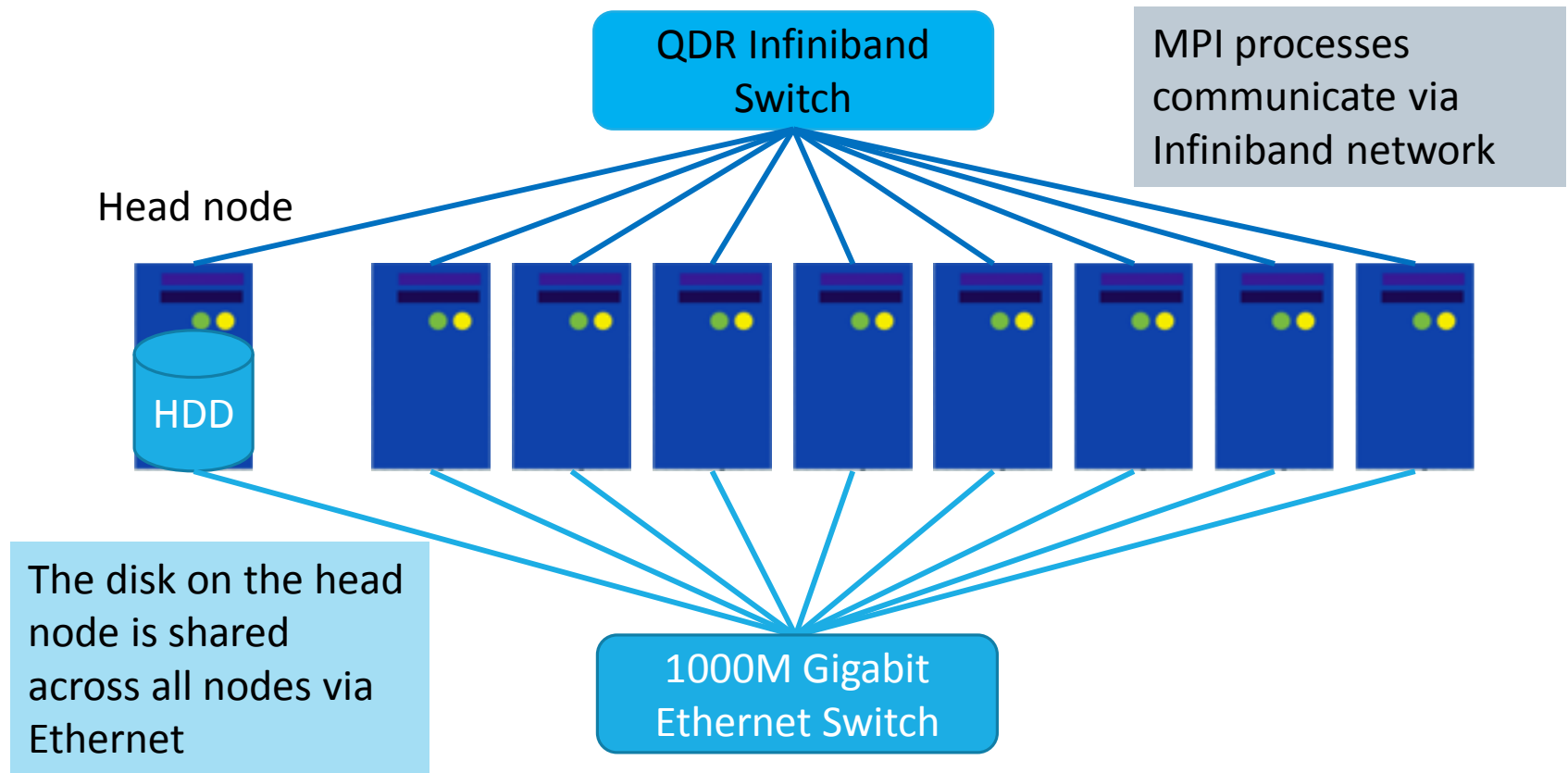
About the platform-Hardware

1 + 19 nodes, from apollo31~apollo50

each node has:

- 96GB memory
- 2TB HDD Storage (Besides headnode)
- 2 x 6-core
Intel(R) Xeon(R) CPU X5670 @ 2.93GHz

The network configuration



User view on the server

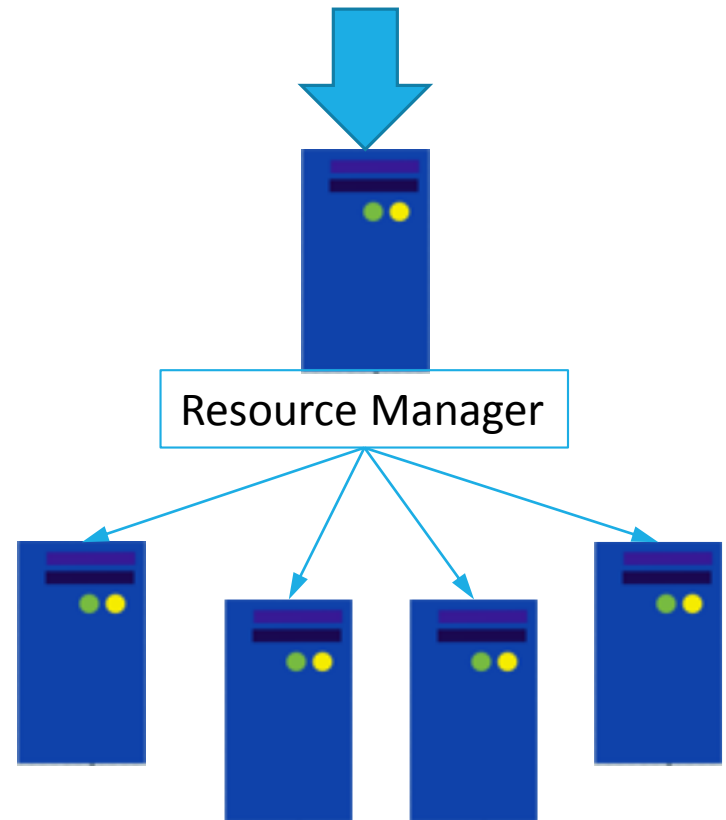
On each cluster, there are:

- 1 log-in node
 - login
 - write/compile codes
 - submit jobs
- several computing nodes
 - run jobs

DO NOT ssh TO COMPUTING NODES DIRECTLY!

This will affect other legal users!

You can only log in to **apollo31**.



Login to server: from Linux

Open terminal first

SSH login

- `ssh USER@HOST [-X] [-C]`
- `-X`: enable X11 window forwarding
- `-C`: enable compression (can speedup connection when using X window)

SFTP file transfer

- `scp [-r] [-C] [[USER@]HOST1:]PATH1 [[USER@]HOST2:]PATH2`
- `-r`: recursive (for directory)
- `-C`: enable compression
- e.g. `scp my_file s104567890@140.114.91.170:hw/`

Login to server: from Windows

SSH login: Putty or Pietty

- Putty: <http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>
- Pietty: <http://ntu.csie.org/~piaip/pietty/download>

SFTP file transfer: FileZilla

- FileZilla: <https://filezilla-project.org/>

Alternatively, you can use **MobaXterm** which integrates all features above!

- MobaXterm: <http://mobaxterm.mobatek.net/download-home-edition.html>

Parallel Programming Platform

IP address

- 140.114.91.183

account

- ID: **s + studentID**
 - e.g. s105012345
- If your student id starts with 'x' => ID: **x + studentID**
 - e.g. x1050123

password

- (will announce on iLMS)

Change your password

You are required to **change your password** at the 1st login.

Please **remember the password** you set.

You can also change you password in the future by typing

- passwd

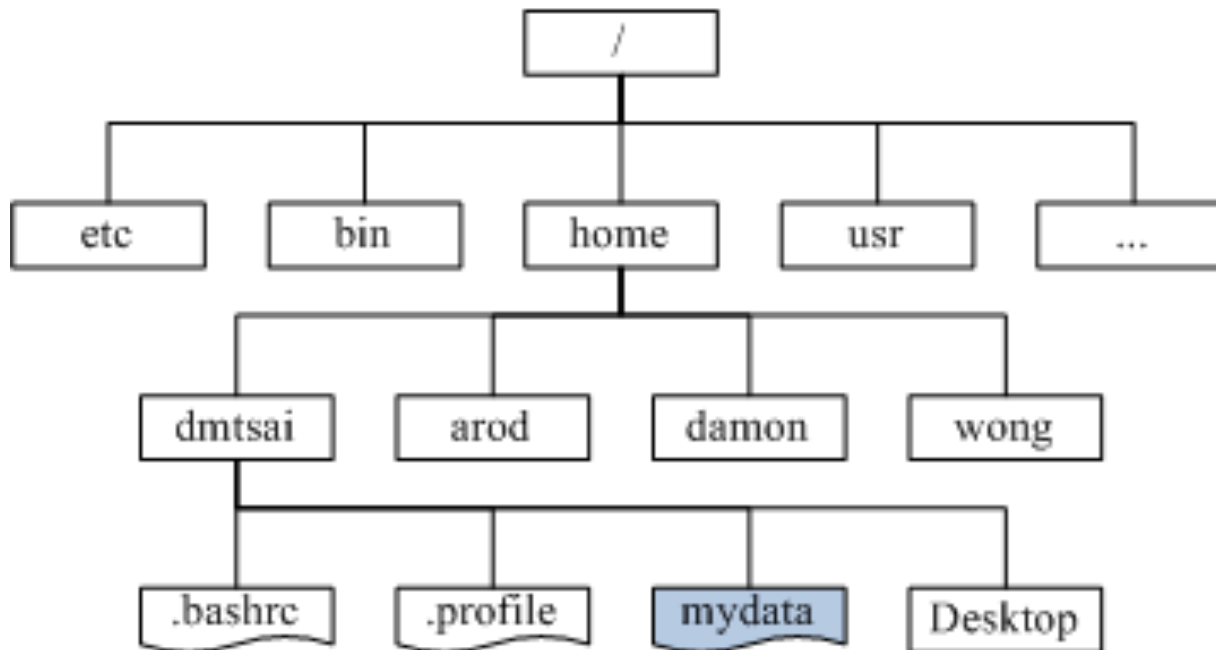
Lab1-1 Login

Make sure you can login to the server.

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Linux Directory Tree



To get the path of current working directory :

- pwd

Linux Commands

Change directory

- `cd [path]`
 - `.` & `..` & `~`

Look inside the directory

- `ls [path]`
 - Default : `ls .`
 - `-a` : list all files (include hidden ones
 - `-l` : long list, equals to `ll` command
- Result of `ll`

```
drwxrwxr-x 2 per0325 per0325 4096 Dec 31 11:23 1218
-rw-rw-r-- 1 per0325 per0325 2791859 Dec 25 00:19 Log
```

[permissions] [# links] [owner] [group] [size] [last modified]
[name]

Linux Commands

Create a new directory

- `mkdir [path]`

Move files to another directory

- `mv [file, directory] [destination]`

Copy file

- `cp [source] [target]`

Copy directory

- `cp -r [src] [target]`
- `-r` : recursively

Remove file

- `rm [file]`
- `rm -r [directory]`

Linux Commands

Download a file given web link

- `wget [link]`

Extract content from tarball/zip file

- `tar [options] [file]`
 - `-x` : extract
 - `-f` : filename
- `gzip, unzip, bzip2, ...`

Once you forget the parameters or want to know other opts

- `man [command]`
- `[command] --help`

Linux Commands

See all users who are currently logged in

- `who (-aH)`

Monitor system processes

- `htop` (press 'q' to exit)

Displaying and combining files

- `cat file1` (display)
- `cat file2 >> file1` (append content of file2 to file1 without overwriting the current file1)

Lab1-2 Linux command

Make sure you can use Linux command to do following tasks:

1. Create a directory called “test” under your home directory
2. Copy file “country.txt” under “/home/ipl2017/shared/lab1” into your “test” directory
3. Rename the file
4. Remove the test directory
5. Copy directory “lab1” under “/home/ipl2017/shared/” to your home directory

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Common Operations 1

Open / Close / Suspend / Resume

Open / Close File: [:help write-quit]

- `vim file.txt`
- `:q`

Suspend / Resume

- `<Ctrl> + <Z>`
- `jobs`
- `fg [number]`

Common Operations 2

Normal-Mode / Insert-Mode / Visual-Mode

Normal Mode <Esc>

- Every entered are interpreted as commands
- One can always switch to this mode by double tapping <Esc>

Insert Mode <i> <I> <a> <A> <o> <O>

- Most keys are inserted as text

i	switch to insert-mode before cursor
I	switch to insert-mode and jump to first non-blank character of this line
a	switch to insert-mode after cursor
A	switch to insert-mode and jump to the end of the line
o	Add a new line after current line and get into insert-mode
O	Add a new line before current line and get into insert-mode

Common Operations 2 (cont'd)

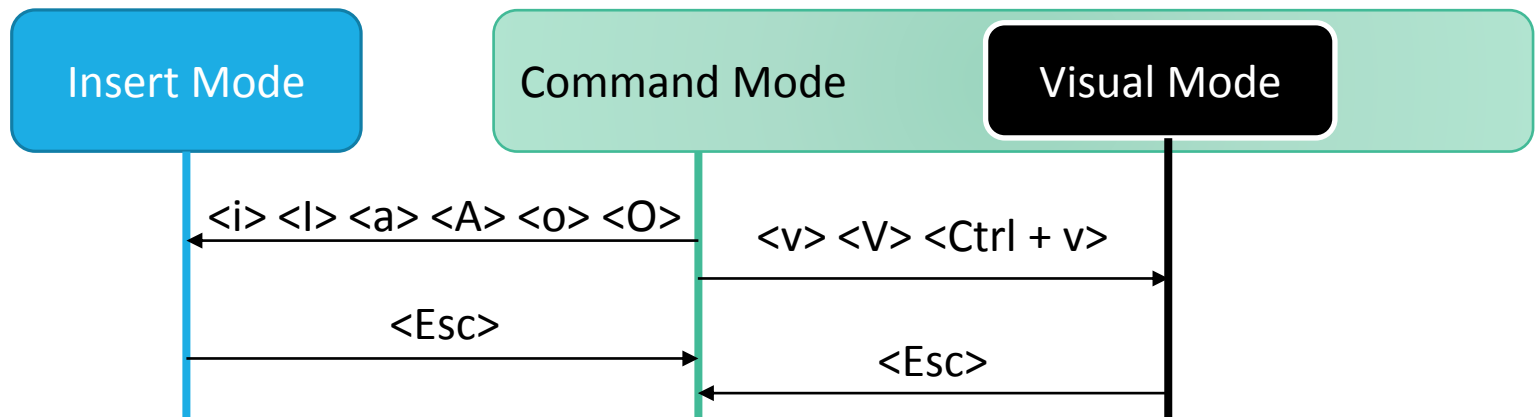
Normal-Mode / Insert-Mode / Visual-Mode

Visual Mode <v> <V> <Ctrl + v>

- Visually select some texts (with most normal-mode commands)

v	Switch to the visual mode (character oriented)
V	Switch to the visual mode (line oriented)
Ctrl + v	Switch to the visual mode (block oriented)

To Sum up:

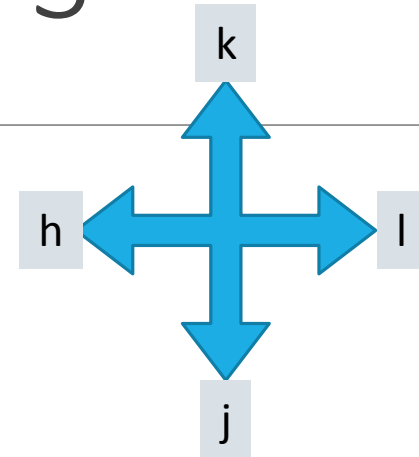


Common Operations 3

Cursor movements

Move in character unit

- in vi (normal mode) `<h> <j> <k> <l>`
- in vim (any mode) `<←> <↓> <↑> <→>`



Move in word unit

w	Jump to the beginning of next word
W	Jump to the beginning of next word, ignore punctuation
e	Jump to the end of next word
E	Jump to the end of next word, ignore punctuation
b	Jump to the beginning of last word
B	Jump to the beginning of last word, ignore punctuation
ge	Jump to the end of last word
gE	Jump to the end of last word, ignore punctuation

Common Operations 3 (cont'd)

Cursor movements

Move to the beginning / end of one line

Home / 0	Move to the first column of the line
^	Move to the first non-blank column of the line
End / \$	Move to the last column of the line
g_	Move to the last non-blank column of the line

Move to somewhere relative to screen

H	Move to the top of current screen
M	Move to the middle of current screen
L	Move to the bottom of current screen

Common Operations 3 cont'd

Cursor movements

Move to any line in a file

<code>[num]G / :[num]</code>	Move to the line with line number <code>[num]</code>
<code>gg</code>	Move to the first line of the file
<code>G</code>	Move to the last line of the file
<code>[num]%</code>	Move to the line at <code>[num]%</code> relative to the file

Common Operations 3 cont'd

Screen Scrolling

Ctrl + F / PgDn	Scroll the screen one page forward
Ctrl + B / PgUp	Scroll the screen one page backward
Ctrl + E	Scroll the screen one line forward
Ctrl + Y	Scroll the screen one line backward
zt	Scroll the screen to place the cursor at the 1 st non-blank line
zb	Scroll the screen to place the cursor at the last non-blank line
zz	Scroll the screen to place the cursor at the 1 st non-blank line

Common Operations 4

Copy / Paste / Delete

Yank (copy) <y>

y[num]l	Yank [num] chars before cursor
y[num]h	Yank [num] chars after cursor
yy	Yank this line
[num]yy	Yank [num] lines from cursor

Paste <p>

p	Paste after cursor
P	Paste before cursor
"[num]p	Paste the [num]-th most recent contents after cursor

Common Operations 4 (cont'd)

Copy / Paste / Delete

Delete <d><x>

- the deleted contents are yanked and can be pasted later

x / Del	Delete chars after cursor
X / BackSpace	Delete chars before cursor
d[num]l / [num]X	Delete [num] chars before cursor
d[num]h / [num]x	Delete [num] chars after cursor
dd	Delete this line
[num]dd	Delete [num] lines from cursor

Common Operations 5

Undo / Redo / Search

Undo / Redo

u	Undo
Ctrl + r	Redo

Search

/[RegExp]	Search for pattern in a file
n	Next occurrence of the searched pattern
N	Last occurrence of the searched pattern

Lab1-2 Vim

Write a helloworld program using vim and execute it on the server!

[Compile]

```
gcc helloworld.c -o helloworld
```

[Run]

```
./helloworld
```

References

鳥哥的 Linux 私房菜

- <http://linux.vbird.org/>

凍仁的筆記 (compression)

- <http://note.drx.tw/2008/04/command.html>

Vim Introduction and Tutorial

- https://blog.interlinked.org/tutorials/vim_tutorial.html

OpenViM Interactive Tutorial

- <http://www.openvim.com/>