Introduction to Programming Laboratory

Lab1 - Linux

2017/7/3

Outline

- Introduction to the platform
- Linux command
- Vim

Outline

- Introduction to the platform
- Linux command
- Vim

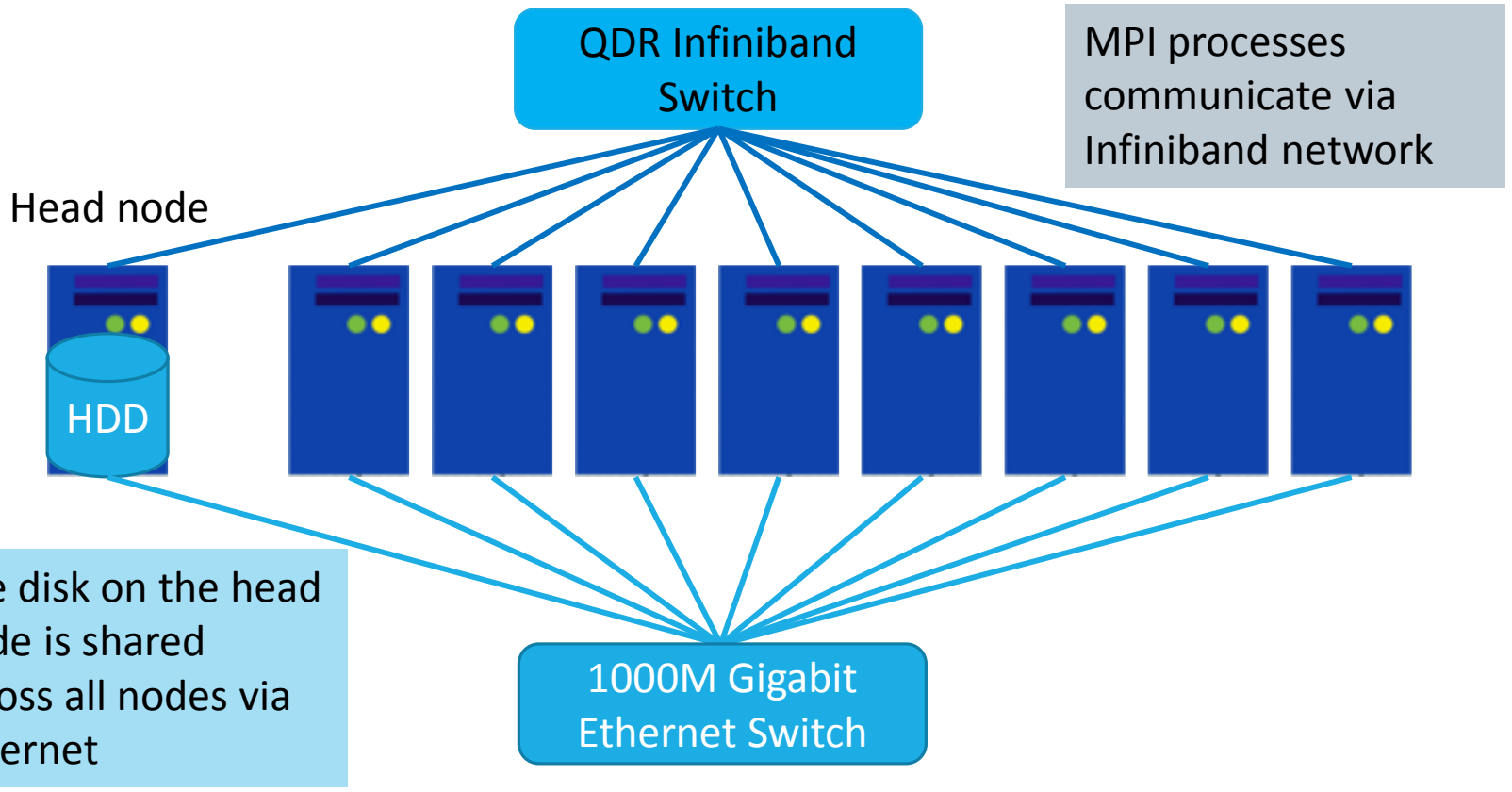
About the platform-Hardware

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

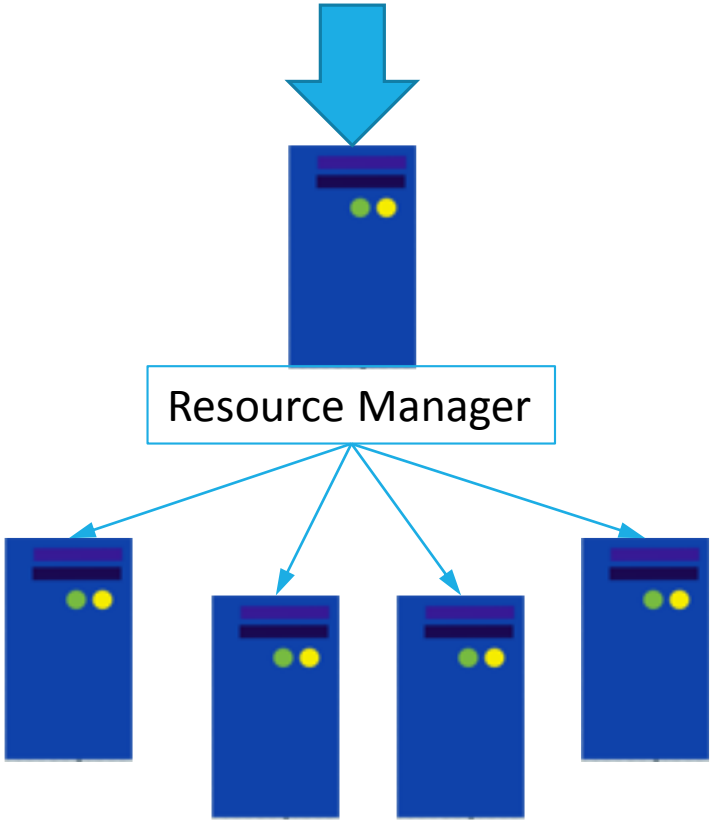
The network configuration



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`

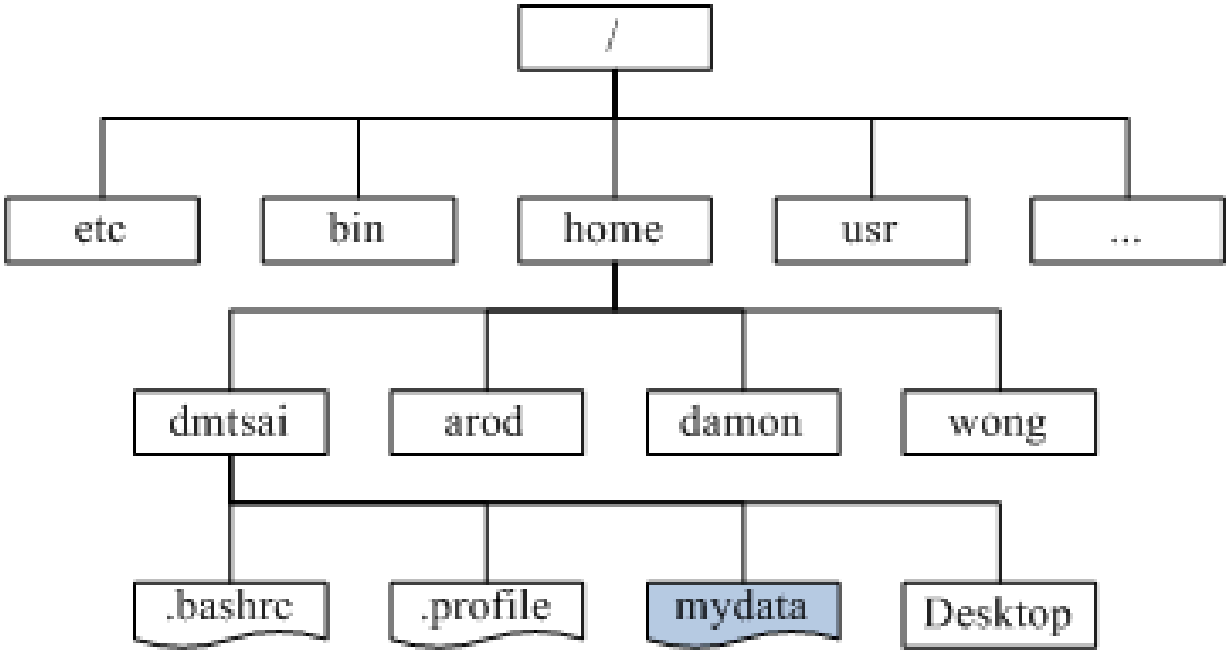
Lab1-1 Login

Make sure you can login to the server.

Outline

- Introduction to the platform
- Linux command
- Vim

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

Outline

- Introduction to the platform
- Linux command
- Vim

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)

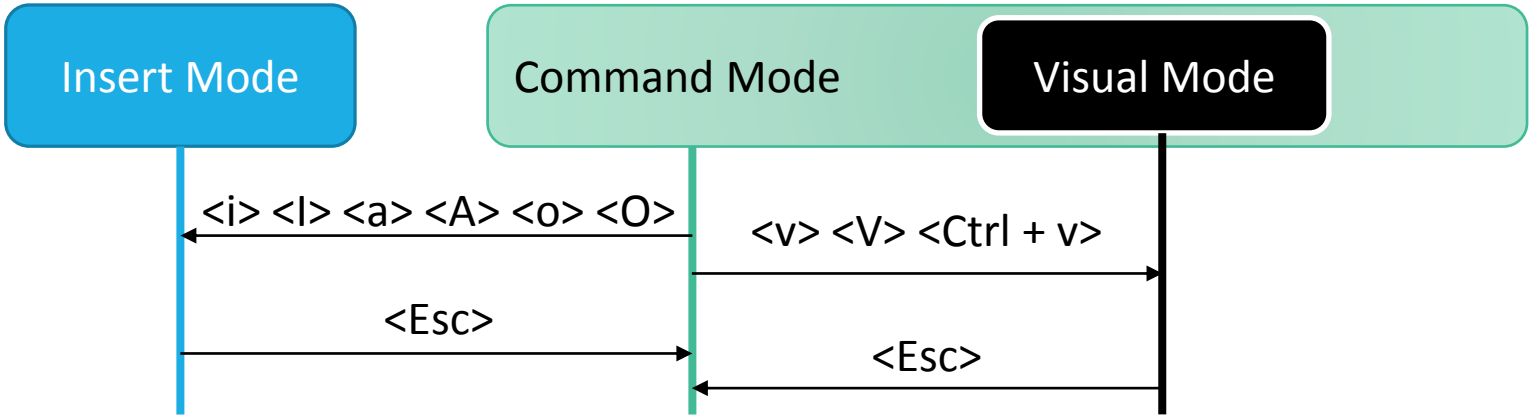
Normal-Mode / Insert-Mode / Visual-Mode

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

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

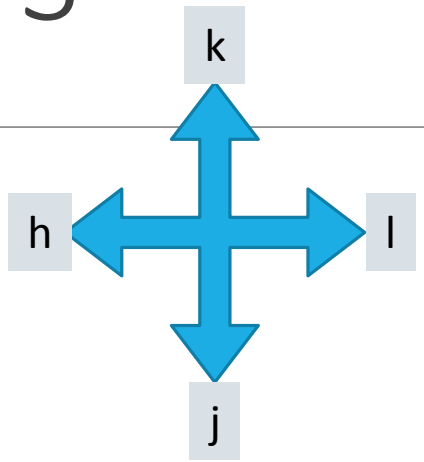
v	Switch to the visual mode (character oriented)
V	Switch to the visual mode (line oriented)
Ctrl + v	Switch to the visual mode (block oriented)

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

[num]G / :[num]	Move to the line with line number [num]
gg	Move to the first line of the file
G	Move to the last line of the file
[num]%	Move to the line at [num]% 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 1st 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 1st 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/