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OSEDA
OPEN SOURCE
Education and Development Association

Linux Quickstart

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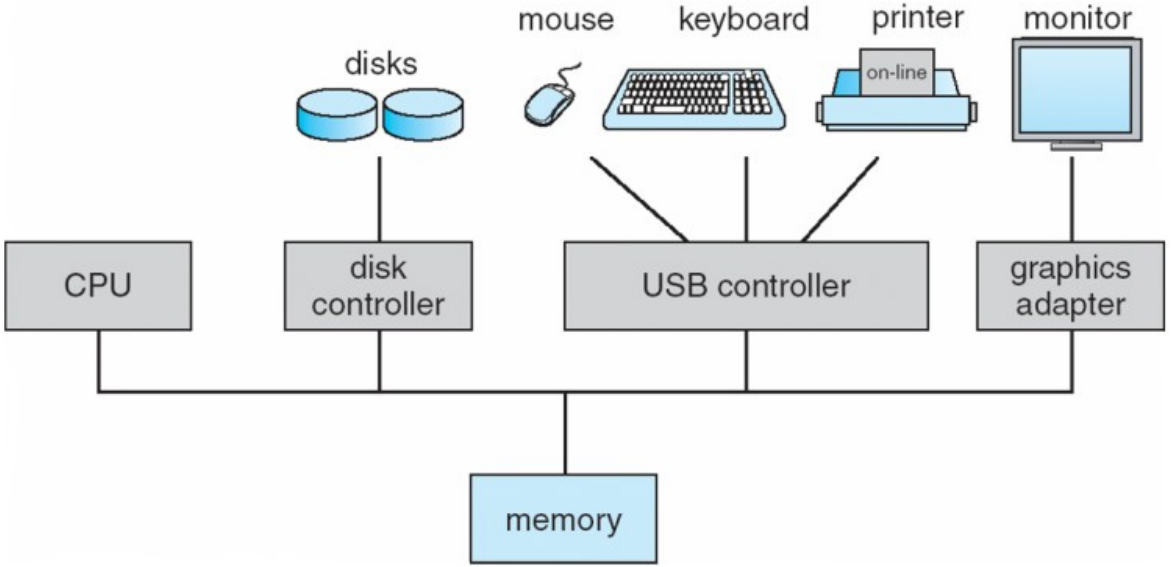
Agenda

1. A little bit of Operating System(OS)
2. Easy Install
3. Port and Firewall
4. Secure Shell (SSH)
5. Service Management
6. Vi Editor
7. File and Directory
8. User Management & Permission

Computer System Organization

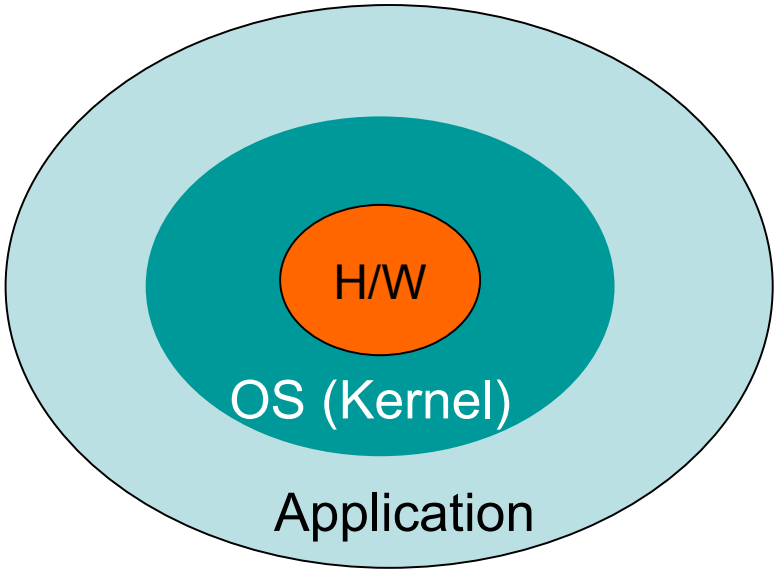
- Computer-system operation
  - One or more CPUs, device controllers connect through common bus providing access to shared memory
  - Concurrent execution of CPUs and devices competing for memory cycles



Linux Kernel

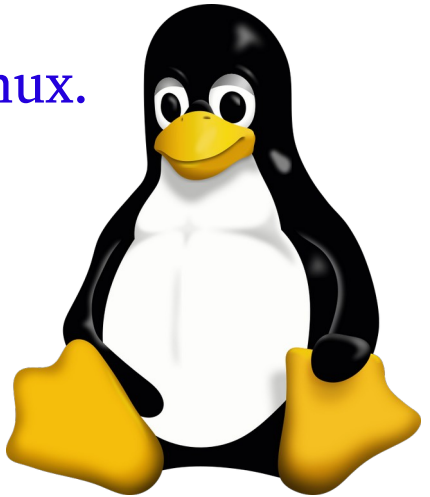
- The core of Linux operating system

  Provides
  - Interface to hardware
  - File system
  - Process management
  - Inter-process communication
  - Protection and security



Introduction to Linux

- Linux is a UNIX-like operating system
- Linus Torvalds, who released it to the public, free of charge, in 1991, originally created Linux
- Linux offers all the complexity of UNIX at no cost
- Most cloud servers and web servers are based on Linux.



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What is Linux Distribution

- The distribution is a suite of software for Linux system

Includes:

- Kernel
- System-installatsion
- Management utilities
- Program

Examples: Red Hat, Slackware, Debian, SuSE, Ubuntu

http://www.fsf.org/

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The Free Software Foundation

- FSF four Freedom
  - Freedom to run the program, for any purpose
  - Freedom to study and adapt to your need
  - Freedom to redistribute copies
  - Freedom to improve to the public

CentOS

- CentOS – Community Enterprise Operating Systems
- CentOS is an Enterprise-class Linux Distribution
- CentOS is 100% Binary Compatible with RedHat Enterprise Distribution
- CentOS is "**Free**"
- For More information
  http://www.centos.org
- Now we use https://rockylinux.org/

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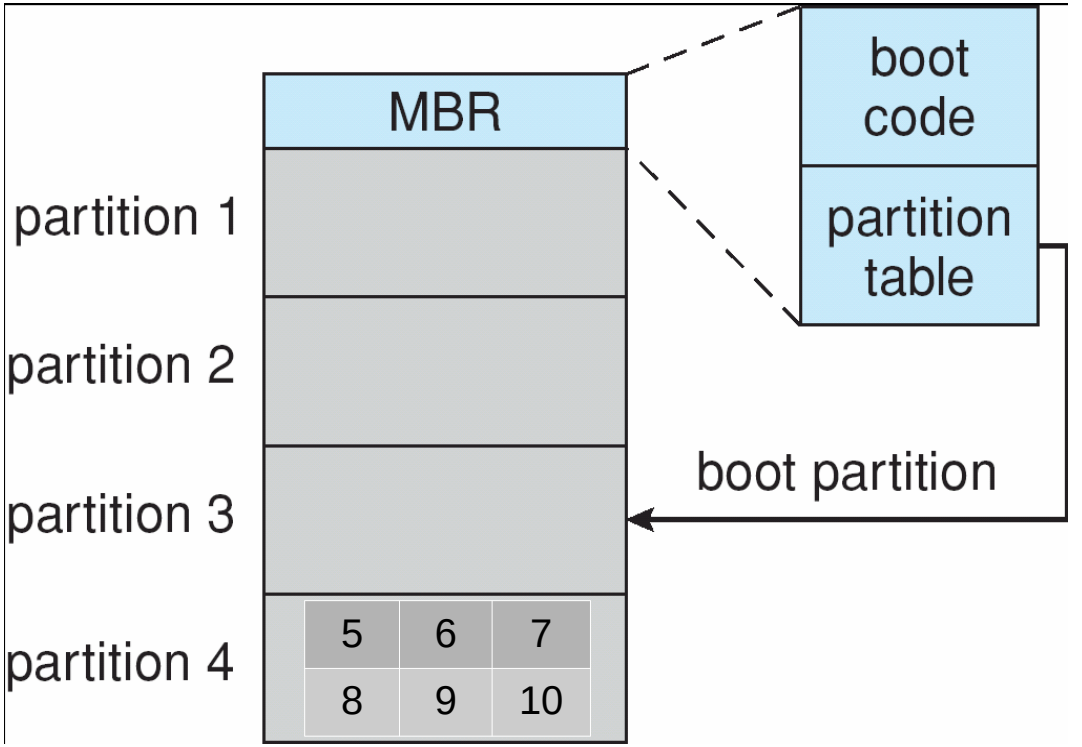
Linux Installation

Partitioning

- 4 Primary Partitions
- 3 + 1 Partitions
  (3 active + 1 Extended)
- If you want more than 4 partition you will create partition under Extended partition
- IDE Limited 63 Partitions
- SCSI and SATA Limited 15 Partitions



File systems for linux

- File systems is a method of storing and organizing computer files and the data they contain to make it to find and access them
  - **Ext3/ext4** — The **ext3/ext4 filesystem** is based on the ext2 filesystem and has one main advantage — journaling. Using a journaling filesystem reduces time spent recovering a filesystem after a crash as there is no need to fsck the filesystem.
  - **swap** — Swap partitions are used to support virtual memory. The data is written to a swap partition when there is not enough RAM to store the data when system is processing.

File systems for linux

- XFS
  - high-performance 64-bit journaling file system
  - Fast with execution of parallel input/output (I/O)
  - Support Maximum File systems size:
    - xfs 500TB
    - ext3/4 16TB / 50TB
  - Support Maximum file size:
    - xfs 500TB
    - ext3/4 2TB / 16TB

Note Default filesystem on RHEL7/CentOS7 is xfs.

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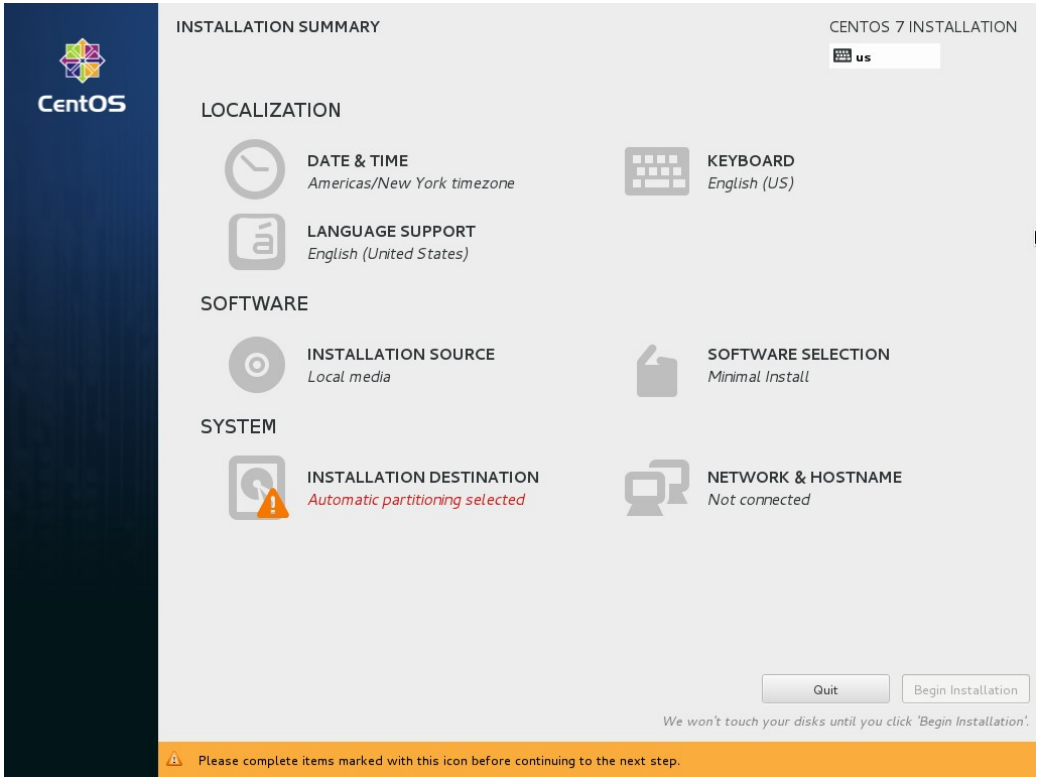
Workshop – Install Linux

- Install CentOS with GUI (Desktop)



Network ports

- a port or port number is a number assigned to uniquely identify a connection endpoint and to direct data to a specific service.
- Example well-known port numbers
  - http = 80
  - https = 443
  - ssh = 22
  - ftp = 21

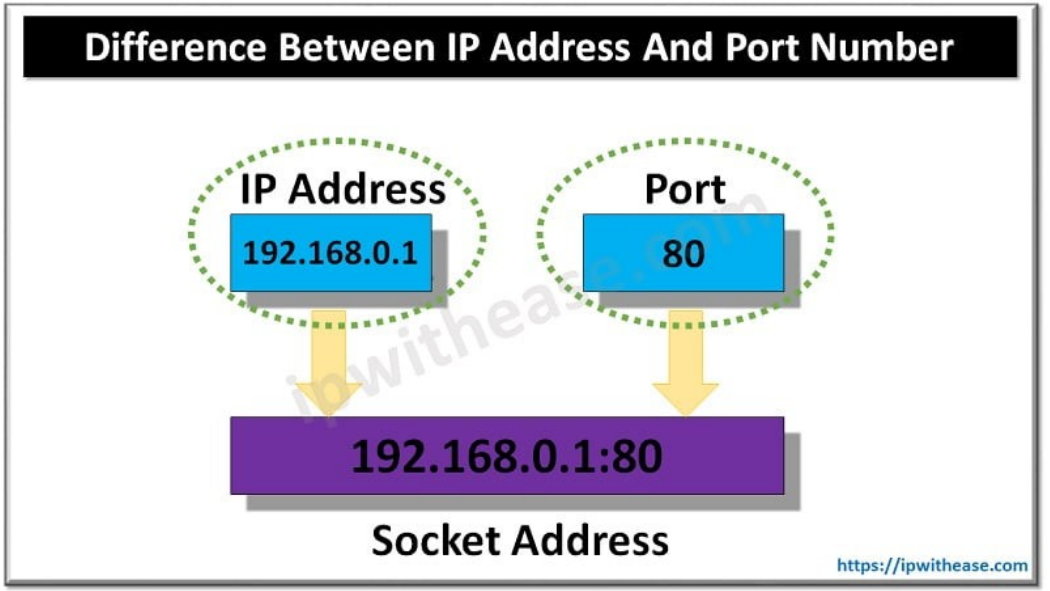


Image from:
https://ipwithease.com/difference-between-ip-address-and-port-number/

Firewall

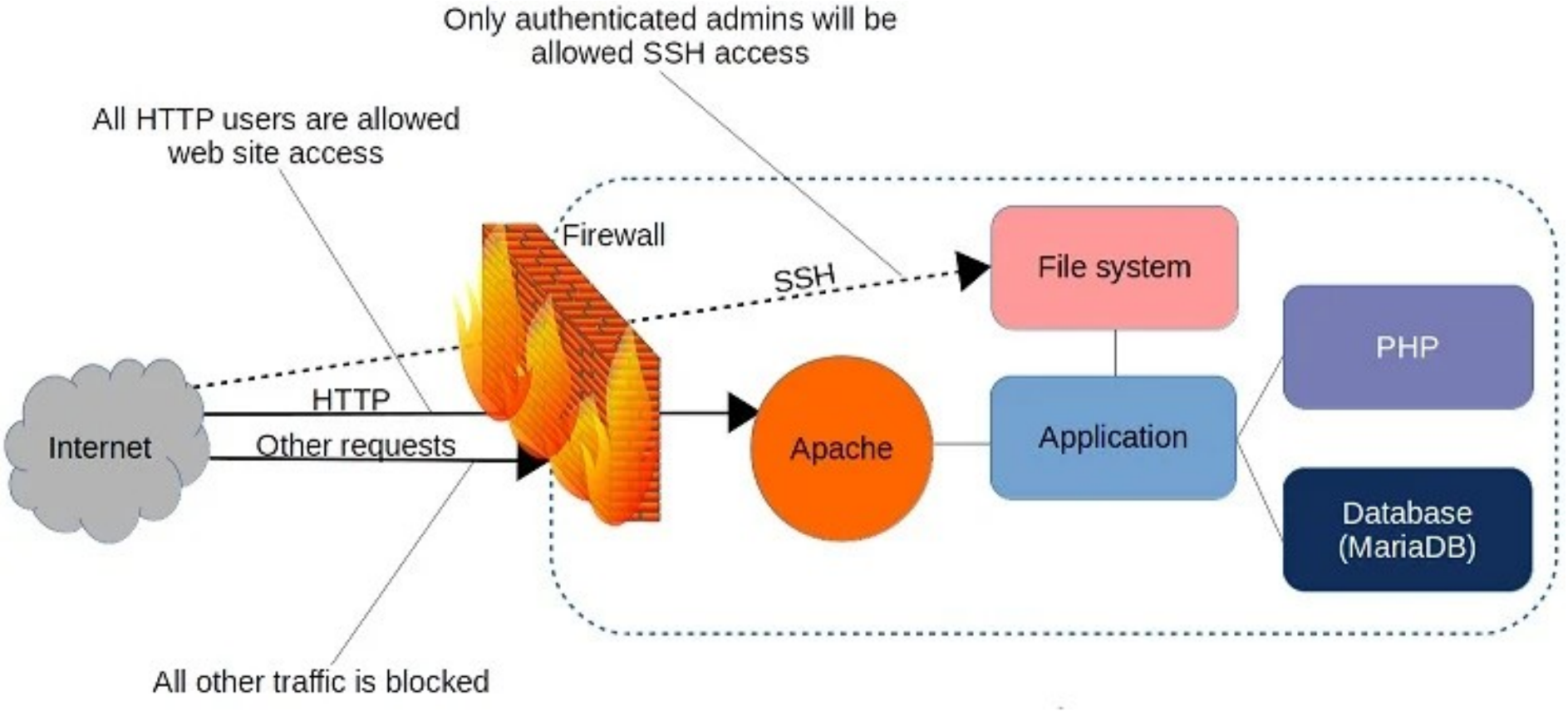


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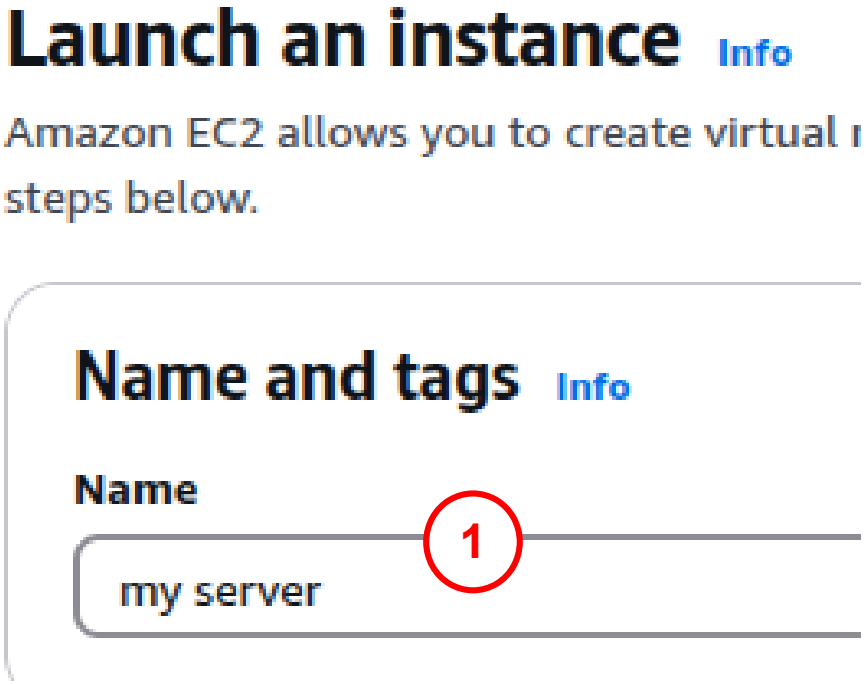
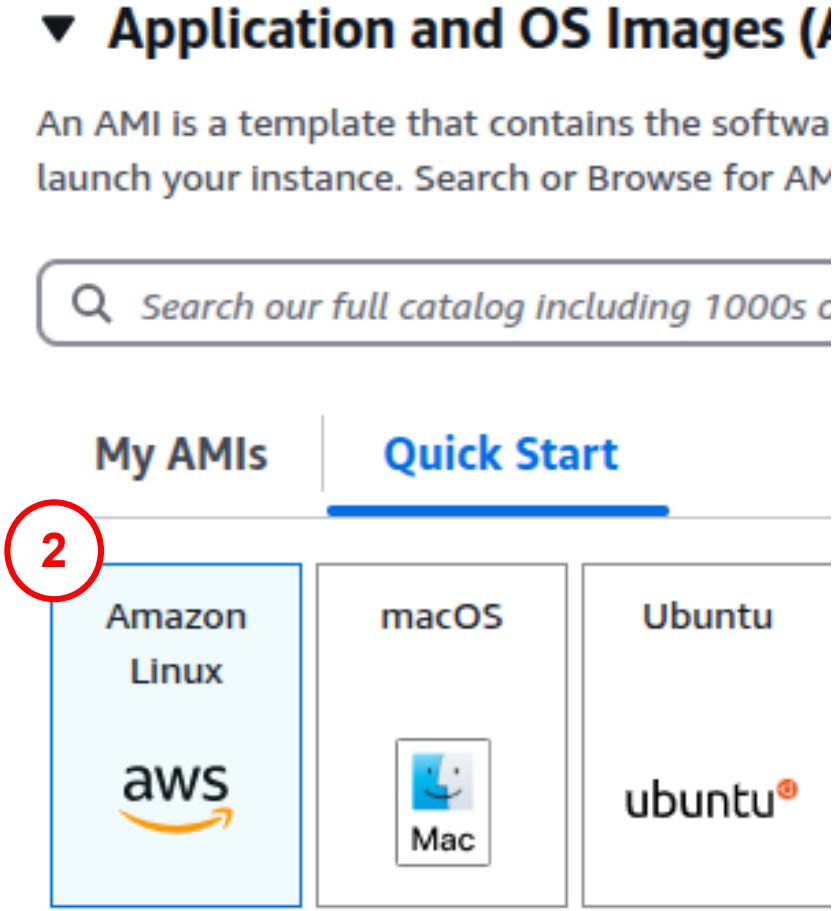
Image from: https://opensource.com/article/18/9/linux-iptables-firewalld

Start AWS EC2

https://awsacademy.instructure.com/





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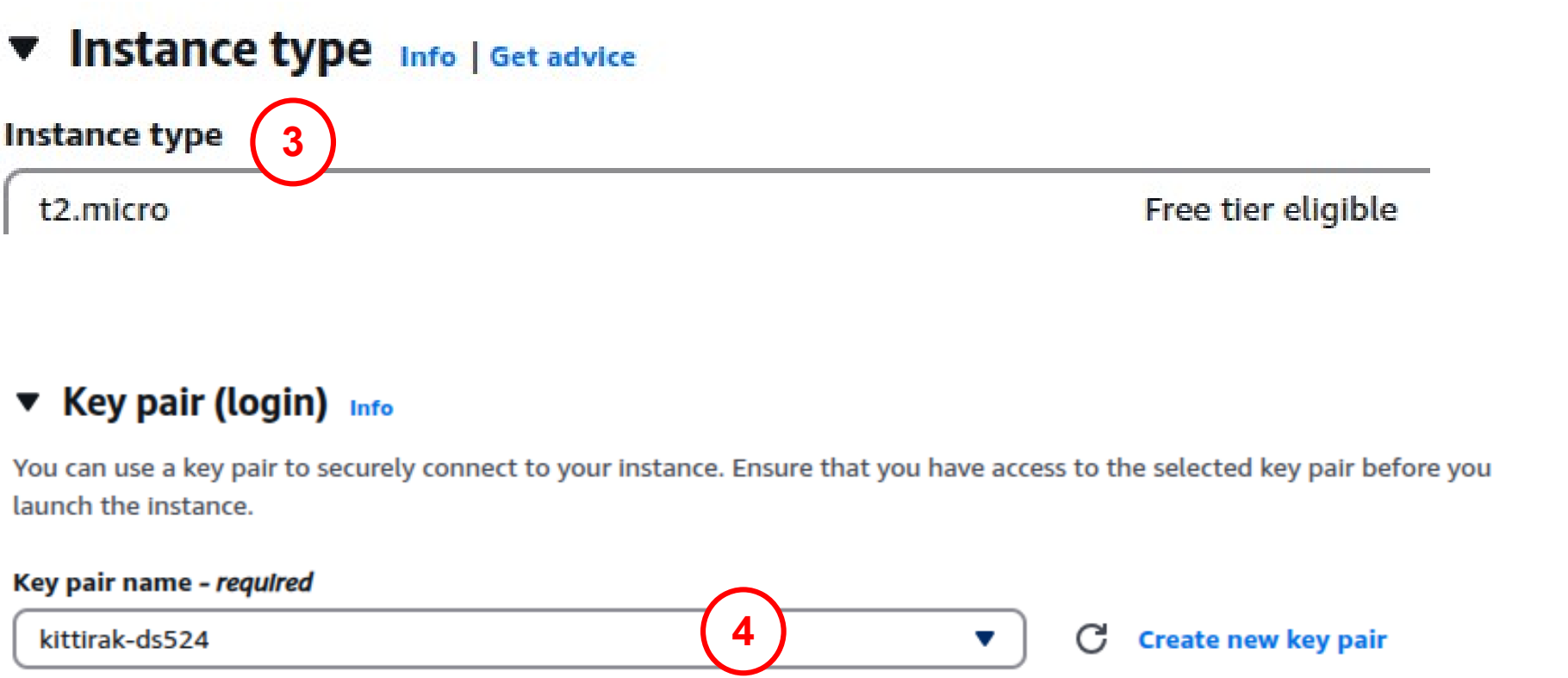
Start AWS EC2 (contd)



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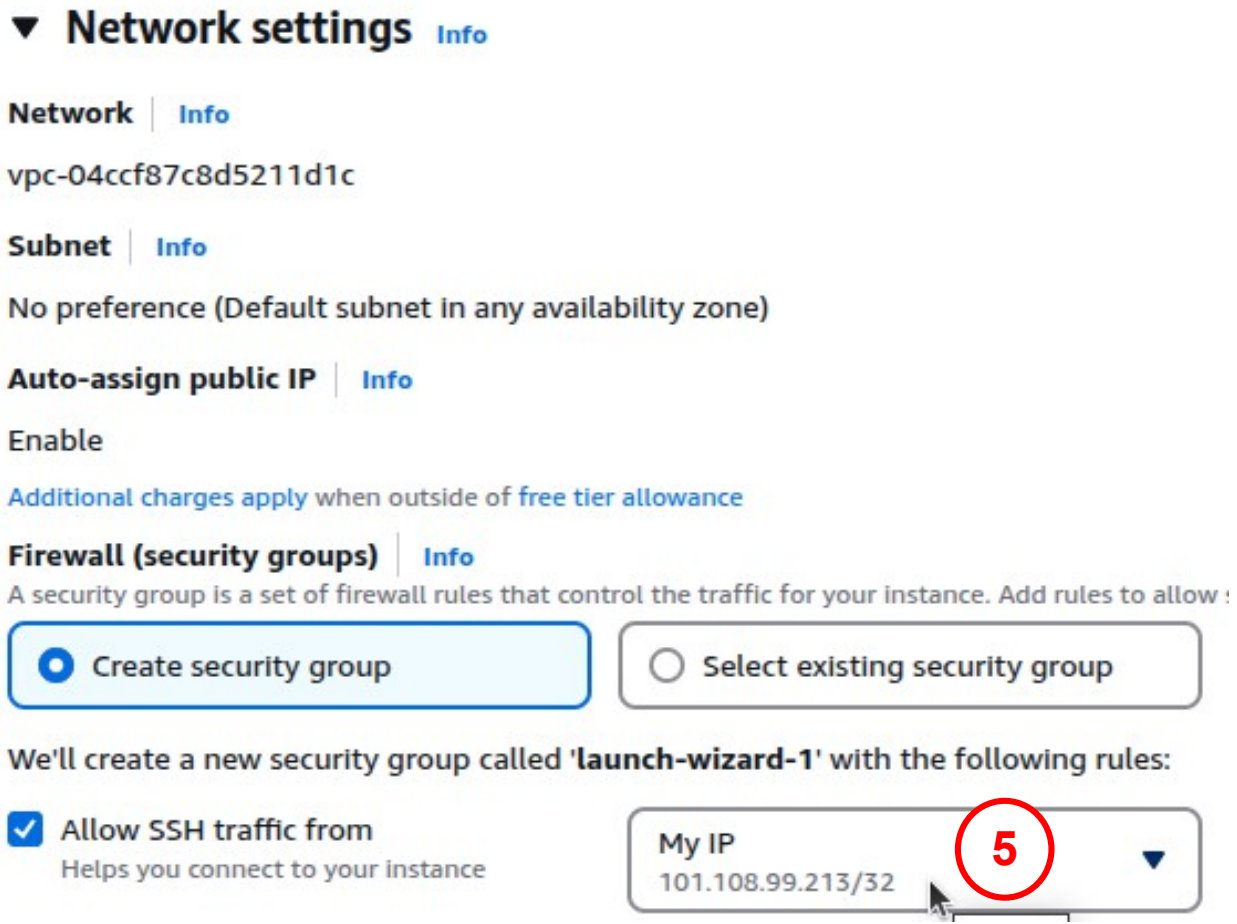
Start AWS EC2 (contd)



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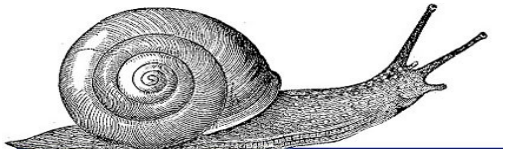
Using Linux

SSH

- SSH is a network protocol use to secure exchange data from device in n etwork.
- SSH was designed for replacement other insecure remote shell
- SSH is base to other service. Exemple
  - scp Copy files from server and remote host
  - sftp Secure FTP File transfer protocol
  - rsync Secure backup, copy and mirror files



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Secure Shell

- Secure Shell is a remote login program client
- Use command ***ssh*** to secure shell to remote server
- Ssh use port 22 to connected

ssh <user>@<ip addr>

- ***Example***

```
ssh clusterkit@192.168.1.99
```

- ssh with key

```
ssh -i priv.key ec2-user@34.235.137.58
```

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SCP – Secure Copy

- Copy to server

```
scp data1.csv clusterkit@192.168.1.99:/data
```

- Copy from server

```
scp clusterkit@192.168.1.99:/data/data2.csv /input/data
```

Shell

- **$** is user **shell**

```
[clusterkit@namenode1 ~]$
```

- # is root shell, **root** is an administrator of system

```
[root@namenode1 ~]#
```

Sudo Configuration

- Sudo : Super User DO
- Sudo allows a permitted user to execute a command as the super user.
- Using sudo
  - Install package
    - sudo apt install nginx
  - Login to root
    - sudo su -

```
[user@localhost ~]$ sudo su -
 password :
[root@localhost ~]#
```

Package Management (Installer/Remover)

- A high-level commandline interface for the package management system.
- It can automaticallyperform system updates, including dependency analysis and obsolete processing based on "repository" metadata
- Redhat/SUSE use “**yum**” or “**dnf**” command.
- Debian/Ubuntu use “**apt**” command.

Yum/Apt Command

	Redhat	Ubuntu
Search	yum search nginx	apt search apache
Install	yum install nginx	apt install nginx
Remove	yum remove nginx	apt remove nginx

System and Service manager

- In Linux “services” like in MS windows “services”
- Use “systemctl” to control the state of the service
- Using systemctl
  - systemctl <start/stop/restart/enable/disable> <service>
    - # systemctl start httpd
    - # systemctl enable httpd
- Service scripts locate at /usr/lib/systemd/system

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Exercise : Install web server & PHP

- Login to root and run

```
yum install httpd php
systemctl start httpd
```

- Open web browser to http://[Your Instance IP]/

Try to use webserver

- Create file /var/www/html/phpinfo.php with the following content

```
<?php
   phpinfo()
?>
```

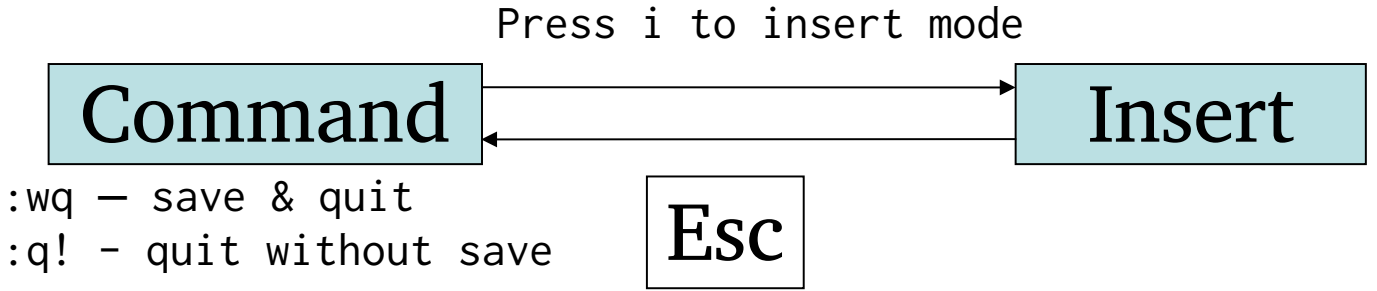
- Open Web browser to http://[IP address]/phpinfo.php

VI Text Editor Preview

- Vi Improved
- Editor based on standard UNIX
- Advantage
  - Similar enough to vi
  - VI is ubiquitous on UNIX systems
  - Must use to recover a system (emacs usually is not available)
  - Suitable for programmer
  - Fully integrated with UNIX paradigm

Simple Started

- To create/edit a file enter
  - vi /path/to/file
- Mode Operation
  - Command mode – use vi command to execute
  - Insert mode – editing text file



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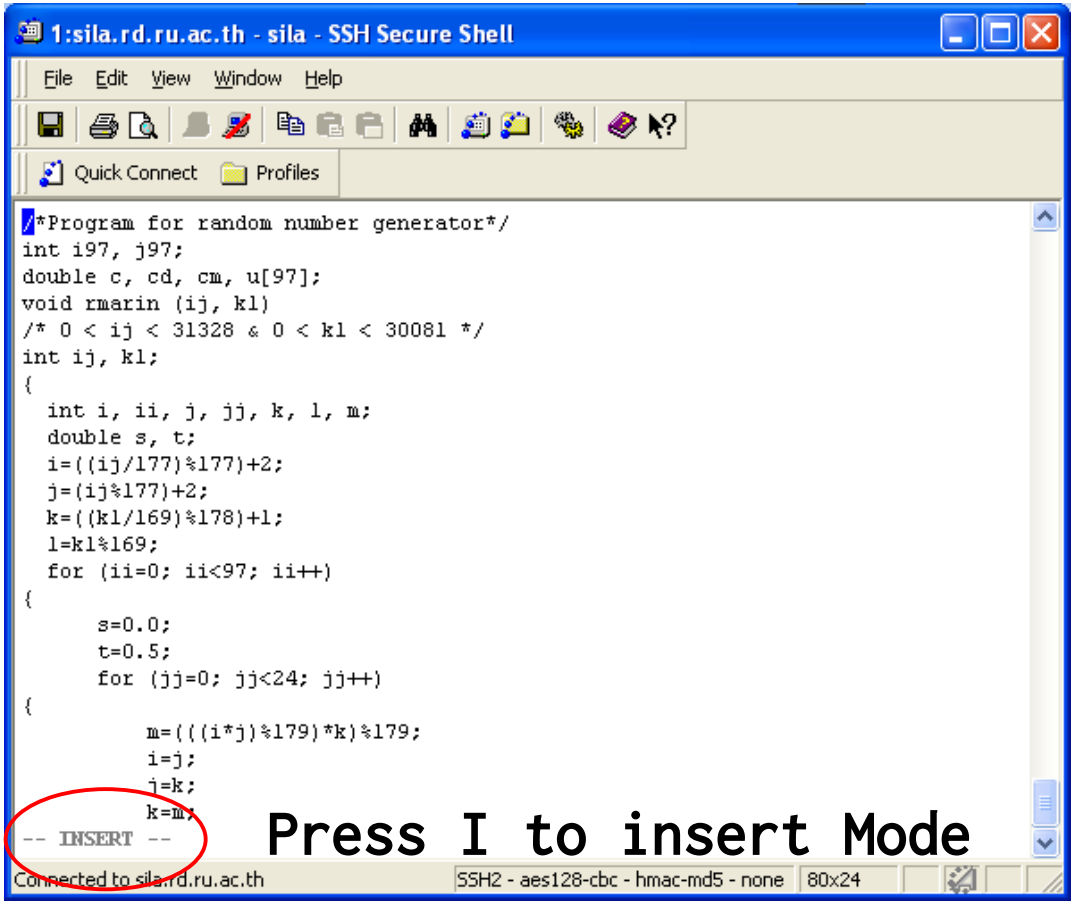
Insert Mode



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Save and Exit

- Enter the ESC button to command mode

  :w [filename] – save file

  :wq [filename] or :x [filename] – save and exit

  :q – exit (after save)

  :q! – exit without save

```
/*Program for random number generator*/
int i97, j97;
double c, cd, cm, u[97];
void rmarin (ij, kl)
/* 0 < ij < 31328 & 0 < kl < 30081 */
int ij, kl;
{
  int i, ii, j, jj, k, l, m;
  double s, t;
  i=((ij/177)%177)+2;
  j=(ij%177)+2;
  k=((kl/169)%178)+1;
  l=kl%169;
  for (ii=0; ii<97; ii++)
{
      s=0.0;
      t=0.5;
      for (jj=0; jj<24; jj++)
{
          m=(((i*j)%179)*k)%179;
          i=j;
          j=k;
          k=m;
:wq
```

Esc to command mode

A little bit of Vi commands

- A – insert mode, end of current line
- G – go to end of file
- gg – go to begining of file
- x – delete a character under cursor
- u – undo
- . – redo

Cut, Copy, and Paste

- dd – delete, cut the cursor line
- yy – copy data up to target into “paste” buffer
- {number}YY – copy up to {number} lines
- p – paste text after cursor

Vi most used command

- Search
  - /[search] – find word
  - n – repeats last regex search
- Replace
  - :%s/[find pattern]/[replace pattern]/g
- Show line number
  - :set nu

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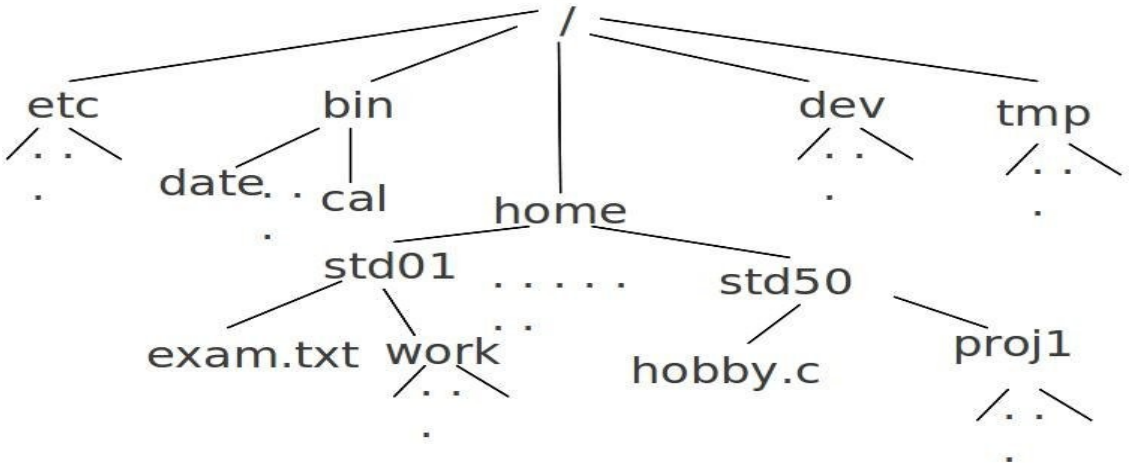
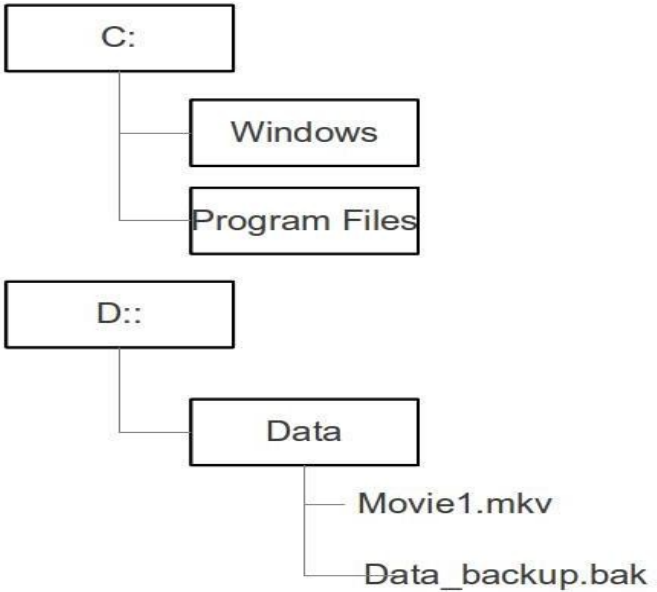
Files & directory

Compare File & Directory

- Unix & Linux



- Windows



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Basic Command

DOS	Linux	Description
dir	ls	List directory
copy	cp	Copy file
del	rm	Remove file
type	cat	Show contain file
md	mkdir	Make Directory
cd	cd	Change directory
rd	rmdir	Remove directory
ren	mv	Rename file

Exercise

- Create directory test
  - mkdir test
- Change directory
  - cd test
- Edit file “program.py”
  - Many text editor tools in linux such as vi and nano
  - Type “**vi program.py**”
  - Run “**python3 program.py**”

```
i=1
i=i+5
print(i)
```

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Exercise (contd.)

- List files in directory
  - ls
  - ls -l
- Copy file
  - cp program.py program2.py
- Remove file
  - rm program.py
- Remove empty directory
  - rmdir test

Exercise (contd.)

- Print working directory
  - pwd
- Concatenate files and print
  - cat program2.py
- ให้สร้างไฟล์ hello.txt ข้างในมีคำว่า hello world
- ทดลองสั่ง

```
cat hello.txt >> program2.py
```

- ดูการเปลี่ยนแปลงในไฟล์ program2.py

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Exercise (contd.)

- Create soft link (like shortcut on MS)
  - ln -s hello.txt test-link.txt
- Change directory
  - cd ..
- Remove directory and all file and sub-directory
  - rm -rf test
  - -r : recursive, -f : force no need to ask y/n
- Print and set system date/time
  - date

Shell I/O

- There are 3 types of I/O
  - Standard input (usually keyboard): 0
  - Standard output (usually monitor): 1
  - Standard error (usually monitor): 2
- I/O can be changed using pipe and redirection mechanism

Pipe

- The output of one program can be in input of other program directly
  - ls /usr/bin | grep zip – list file in /usr/bin directory and send output to grep to display only the line contains ‘zip’

I/O Redirection

- Input and Output of a command can be change from standard ones
- Redirect output
  - ls > list – output of ls is stored in file named list
  - ls > > list – output of ls is appended to file named list
- Redirect input
  - less of use
  - sort < list – run program named sort where input is read from file named list

Archiving Tool

- Compress Tools
- gzip – GNU zip
  - gzip <filename>
  - gzip –d <filename>
- bzip2 – a block-sorting file compressor, smaller than gzip
  - bzip2 <filename>
  - bzip2 –d <filename>

Archiving Tool (cont'd)

- tar – tape archive
- Compress
  - tar zcvf <filename> <input>
  - tar jcvf <filename> <input>
- Extract
  - tar zxvf <filename>
  - tar jxvf <filename>

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Command History and Tab Expansion

- By scrolling with the [Up Arrow] and [Down Arrow] keys, you can find plenty of your previously typed commands.
- By default, up to 500 commands can be stored in the bash command line history file.
- Show old command
  - history – show old command
- Last matched command
  - !s – run the last command
  - !<number> – run the command in history line number

User Account information

- user account information store in
  - */etc/passwd* stores user information on the system
  - */etc/shadow* stores user password and password policy for each user
  - */etc/group* stores group configuration

Account Management

- useradd – Create a new account
- usermod – modify a user account
- userdel – Delete a user account
- groupadd -Add a group
- groupdel – delete a group

Add User

- At the root shell, run useradd with user information
  - Example add user “batman” and set batman in group user

```
useradd -g users batman
```

  - For Ubunut use -m for auto create home directory
  - Set password for user with command 'passwd'

```
passwd batman
```

Group Operation

- Create group
  - groupadd staff
- Add user to group
  - usermod -G staff batman
- Delete group
  - groupdel staff

Userdel

- Delete user account with command '***userdel***'
  - Example – Delete account test

```
userdel -r batman
```

  - -r : remove home directory

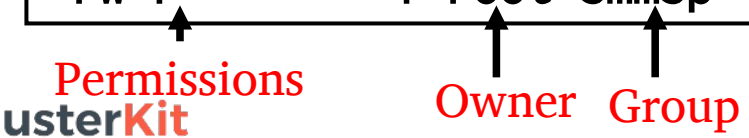
File Permission

- UNIX provides three kinds of permissions:
  - Read - users with read permission may read the file or list the directory
  - Write - users with write permission may write to the file or new files to the directory
  - Execute - users with execute permission may execute the file or lookup a specific file within a directory

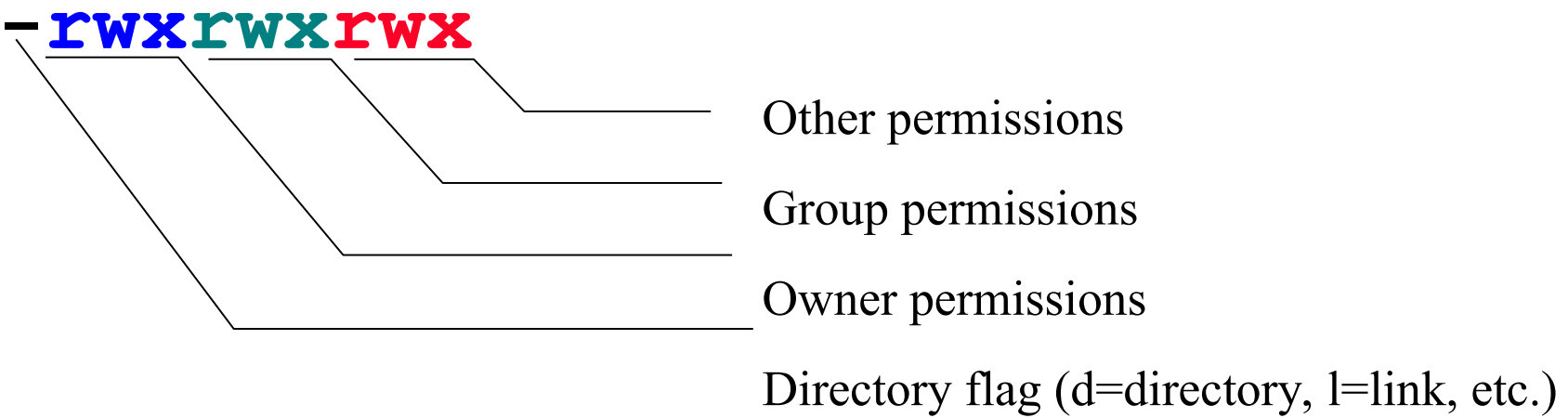
File Permission (cont'd)

- The long version of a file listing (ls -l) will display the file permissions:

```
drwxr-xr-x   2 root root     4096 Oct  9 14:25 411.d
drwxr-xr-x   2 root root     4096 Nov 22  2006 411-security
-rw-r--r--   1 root root    15276 Feb 18  2005 a2ps.cfg
-rw-r--r--   1 root root     2562 Feb 18  2005 a2ps-site.cfg
drwxr-xr-x   4 root root     4096 Nov 22  2006 acpi
-rw-r--r--   1 root root       44 Aug 13 13:49 adjtime
drwxr-xr-x   4 root root     4096 Feb 18  2005 alchemist
-rw-r--r--   1 root root     1574 Oct  8  2004 aliases
-rw-r-----   1 root smmsp   12288 Aug 13 13:57 aliases.db
```



Interpreting File Permissions



Change file permission : chmod

- Use chmod command to change a file permission

  Example:

```
$ chmod 755 file
```

Letter	Permission	Description
R	Read	4
W	Write	2
X	Execute	1

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The End.