

Training Course
Linux Fundamentals



Software Management

- Linux uses software called a **package manager** to manage the software installed on the Linux system.
- **The package manager** will be responsible for installing, upgrading, configuring and removing previously installed software on the Linux system.

Software Management

- Software for Linux operating systems will now be packaged into packages for the purpose of easy distribution and storage. Each package will include:
 - Executable file (binary)
 - Software-related information (metadata). For example: software name, software description, version.
 - List of software or support libraries necessary for the operation of the software (dependencies)

Software Management

- Different Linux operating systems have created different **package formats**. Eg:
 - ❖ .deb: For Linux Debian operating systems such as: Kali Linux, Ubuntu, Parrot OS, Mint, etc.
 - ❖ .rpm: For Red Hat Linux operating systems such as: Red Hat, CentOS, Fedora, etc.

Software Management

- Every Linux operating system will have a list of software repositories.
- Software repositories are places where you can download software online to your computer.
- On Kali Linux and Ubuntu, the list of software repositories has the path **`/etc/apt/sources.list`**.

Software Management

- On Debian Linux operating systems, users are provided with many options for managing packages. For example we have:
 - ✓ **dpkg**: manage, install, and remove software from Linux systems. The drawback of dpkg is that it does not install the dependencies that come with the software, resulting in faulty and inoperable software.
 - ✓ To install the software, use the command: **dpkg -i <software-name>**
 - ✓ To remove software, use the command: **dpkg --remove <software-name>**
 - ✓ To list installed software, use the command: **dpkg -l**

Software Management

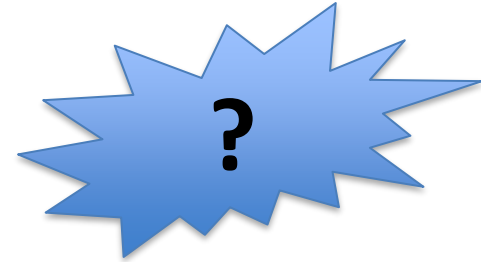
- On Debian Linux operating systems, users are provided with many options for managing packages. For example we have:
 - ✓ **apt or apt-get:** install not only the package, but also the dependencies that the software needs to run properly.
 - ✓ In fact, when user uses apt or apt-get to install a package, it will use dpkg to install the software and apt or apt-get will take care of the dependencies.
 - ✓ This is also the most commonly used command to manage packages on Linux Debian operating systems.

Software Management

❖ apt or apt-get

- ✓ To install the software, use the command: **apt install <software-name>**
- ✓ To remove software, use the command: **apt remove <software-name>**
- ✓ To delete all packages used as dependencies of the software to be deleted, use the command: **apt autoremove <software-name>**
- ✓ To delete everything related to the software to be deleted, use the command: **apt purge <software-name>**
- ✓ To list the installed packages we use the command we use the command: **apt list**

Software Management Question?



Difference between apt and apt-get?

Software Management

- Use the following 3 commands to update and upgrade the software installed in the Linux system:
 - **sudo apt update**
The apt update command will find and update the latest versions of the packages in the /etc/apt/sources.list list.
 - **sudo apt upgrade**
The apt upgrade command will rely on the updated /etc/apt/sources.list list to install the latest versions of the software inside the Linux system.

Software Management

- **sudo apt dist-upgrade**
 - The dist-upgrade command, besides performing the function of the upgrade command, also **updates the latest version for the dependencies** of the updated software.
 - Or if there are dependencies that conflict with each other, the dist-upgrade command **will remove these conflicting dependencies**.

Task Management

Linux provides us with several tools to manage the tasks running on the system similar to the Task Manager

ps <options-flag>

- **PID (Process ID):** The identifier of the process in the system. Each process will carry a PID and this number is unique. That is, there will never be 2 processes with the same process at the same time
- **TTY (TeleTYpewriter):** The name of the terminal that executes the command
- **TIME:** CPU time needed to process the above process in minutes and seconds
- **CMD:** Name of the command that started the processs operating system

Task Management

Linux provides us with several tools to manage the tasks running on the system similar to the Task Manager

- **To print out all processes running in the system: `ps -e`**
- **To print the task with the PID of the task parent and the UID running the task: `ps -ef`**
 - UID: Username running the task
 - PPID (Parent PID): ID of the task's parent
 - C: Number of CPU cycles used by each task
 - STIME: The time the process starts

Task Management

Linux provides us with several tools to manage the tasks running on the system similar to the Task Manager

- To print all processes running in the system will be displayed as follows: **top**
- To print all information of all columns: **press “f”**
- Tick or untick: **press “space”**
- Quit: **press “q” or “ECS”**

Editor: Nano & Vim

Editor basic command: **echo "Hello World" > Hello.txt**

Very difficult to:

- **Edit a long text**
- **Change**
- **Storage**
- **Work with other**
- **Take time**

Editor: Nano & Vim

Nano

- Nano is a command-line text editor that comes pre-installed on many Linux distri.
- Nano is very suitable for those who are just getting started with the command line interface on Linux.
 - **Create a file: nano "filename"**
 - **Save and exit: Ctrl + x > Y**
 - **Practice with create a file personal and introduce yourself!!!**

Editor: Nano & Vim

Vim

- Like Nano, Vim is also a pre-installed text editor on many Linux distri
- Vim is somewhat more difficult to use than Nano because you will have to learn a lot of keyboard shortcuts to be able to manipulate easily on vim.
- Vim is somewhat more popular than Nano
 - **Create a file: vi “filename” + insert**
 - **Save and exit: esc + wq!**
 - ✓ w: Short for write – Writes content to memory
 - ✓ q: Short for quit – Quit the Vim program
 - ✓ ! : Used to force Vim to perform w and q

Editor: Nano & Vim

Bash Scripting

- A Bash scripting is a program written in Bash that is used to perform a certain task on a Linux system.
- In other words, when you write Bash scripting, you are creating new software for the Linux system.
- Sometime support Crontab

Editor: Nano & Vim

Bash Scripting

- Simple bash scripting
- Start with `#!/bin/bash`
- The ending is `.sh`
- **Remember** chmod for scripting
- **Let's Practice!!!**

```
#!/bin/bash
```

```
name="Micheal"
```

```
echo "My name is $name"
```

find command in Linux with examples

- The **find** command in UNIX is a command line utility for walking a file hierarchy.
- It can be used to find files and directories and perform subsequent operations on them.
- It supports searching by file, folder, name, creation date, modification date, owner and permissions.
- By using the '-exec' other UNIX commands can be executed on files or folders found.

find command in Linux with examples

- View folder by: **tree**
- Find a file or folder: **find + “foldername/filename”**

SSH

- The SSH protocol (also referred to as Secure Shell) is a method for secure remote login from one computer to another.
- It provides several alternative options for strong authentication and it protects the communications security and integrity with strong encryption.

Port Number	:	22
Daemon	:	sshd
Conf file	:	/etc/ssh/ssh_config

SSH

- SSH command: `ssh user@destination-ipaddress`
- Practice ssh to the ec2-instance (linux server) using Putty or Superputty

Copy file between servers

Windows to Linux

Mobaxterm or **winscp**

Linux to linux

SCP (secure copy) is a command –line utility that allows you to securely copy files and directories between two systems.

scp source_file_name username@destination_host:destination_folder

Example: **scp file1 root@10.20.30.40:/tmp**
scp root@10.20.30.40:/tmp /home/ec2-user/

Copy file between servers

Practice with WinSCP to transfer file between Window and Linux ec2-Instance (AWS)
Requirement

1. ec2-instance
2. Key pair to access ec2-instance
3. Winscp
4. Temporary-file

Now, Let's practice!!!

File Permissions

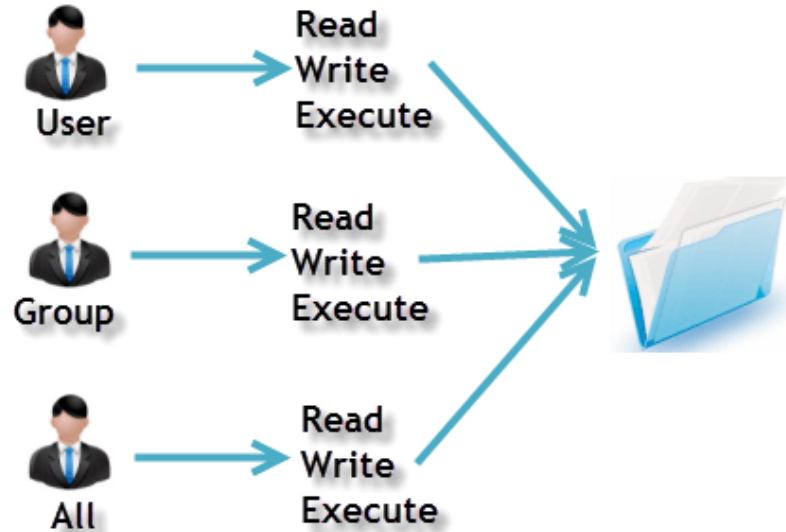
Permissions are applied at 3 level

- Owner or User level
- Group level
- Othes level

Permissions are applied in 3 days

- r – Read only
- w – Write/Edit/Append/Delete
- x - Execute/Run

Owners assigned Permission On Every File and Directory



File Permissions

Access modes are different on file and directory

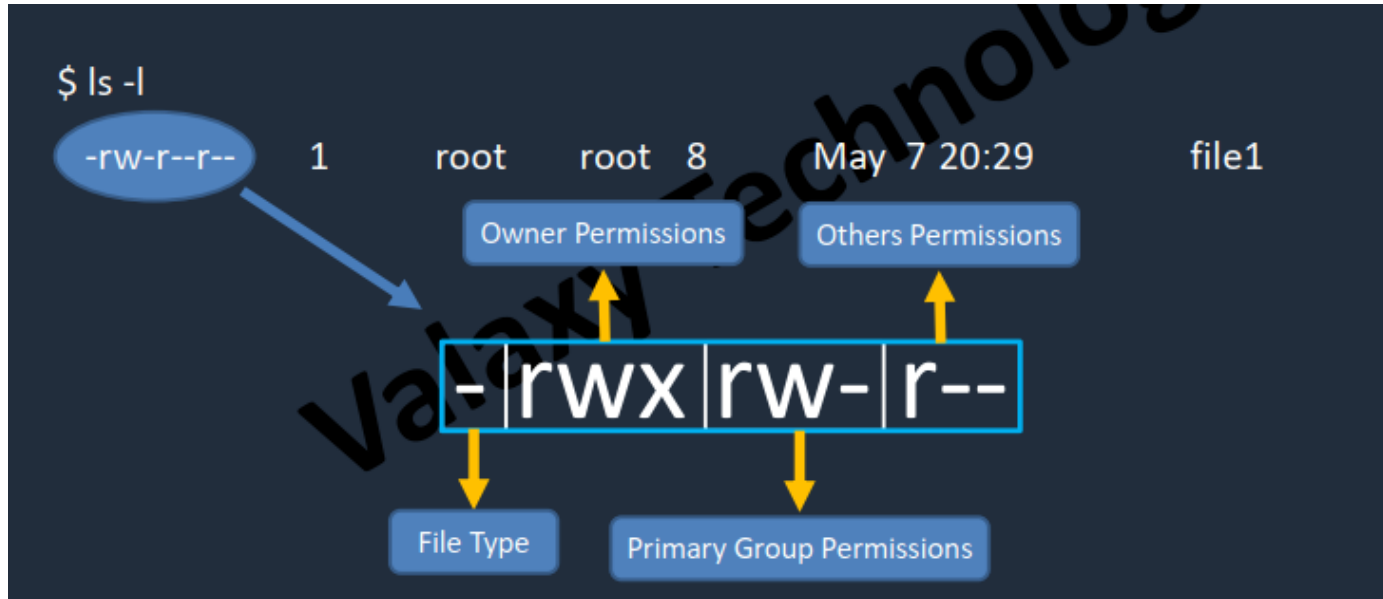
Permissions	File	Directory
R	Open the file	'ls' the contents of dir
W	Write, edit, append, delete file	Add/Del/Rename contents of dir
X	To run a command/shell script	To enter into dir using 'cd'

File types

Symbol	Type of file
-	Normal file
b	Block file (Harddisk, Floppy disk)
c	Character file (Keyboard, Mouse)
d	Directory
	Link files (short cut)

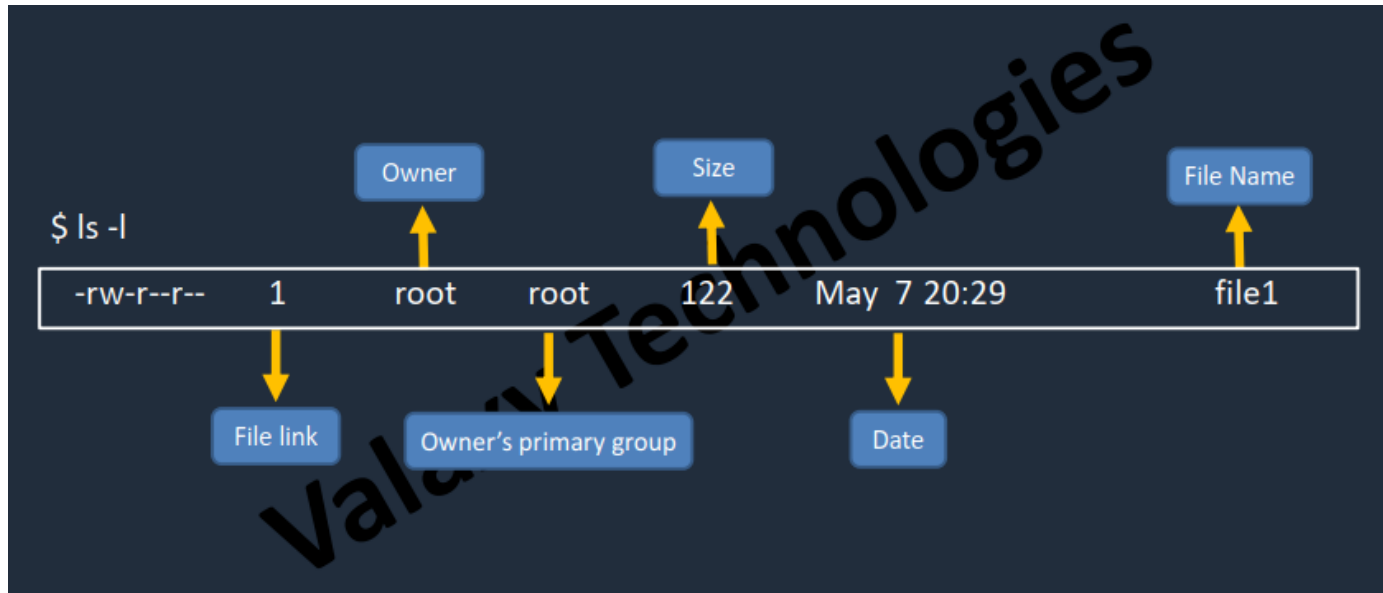
File Permissions

Unix/Linux files have 8 attributes that can be seen with `ls -l` command



File Permissions

Unix/Linux files have 8 attributes that can be seen with `ls -l` command



File Permissions

Permission can be set on any file/dir by using two methods:

- Symbolic method (ugo)
- Absolute method (number)

Symbolic method	Absolute method
<pre># chmod [who][+/-/=[permissions] file</pre> <p>Who: To whom the permissions to be assigned Permissions: User/owner (u); group (g); others (o) Example: <pre>#chmod u=rwx,g=rw,o=r <file_name></pre><pre>#chmod ugo=rwx <file_name></pre></p>	<p>We use numbers instead of using symbols Read – 4 Write – 2 Execute – 1 <pre>#chmod 764 <file_name></pre><pre>#chmod 777 <file_name></pre></p>

File Permissions

Permission can be set on any file/dir by using two methods:

- **Absolute method (number)**

drwxrwxrwx

d = Directory
r = Read
w = Write
x = Execute

chmod 777

rwX | rwX | rwX
Owner | Group | Others

7	rwX	111
6	rw-	110
5	r-X	101
4	r--	100
3	-wX	011
2	-w-	010
1	--X	001
0	---	000

User Management

In Linux there are three types of users.

1. **Super or root user:** User is the most powerful user. He is the administrator user.
2. **System user:** User created by the softwares or applications.
3. **Normal user:** Normal users are the users created by root user.

Type	Example	Home Directory	Shell
Super User	Root	/root	/bin/bash
System User	ftp, ssh, apache	/var/ftp, etc	/sbin/nologin
Normal User	Visitor, ec2-user	/home/username	/bin/bash

SELF-STUDY!!!

Link Files

There are 2 types of link files

Soft link and **Hard link**

Soft link	Hard link
SHORTCUT FILE	BACKUP FILE
Size of link file is equal to no. of characters in the name of original file	Size of both file is same
If original file is deleted, link is broken and data is lost	If original file is deleted then also link will contain data
Command: <code>ln -s <src_file> <dest_file></code>	Command: <code>ln <src_file> <dest_file></code>

Sed command (Extend)

Stand for **stream editor**, which is used to search a word in the file and replace it with the word required to be in the output.

Note: it will only modify the output, but there will be no change in the origin file.

Example:

```
sed 's/old_text/new_text/' file_name  
sed 's/old_text/new_text/g' file_name  
sed -l 's/old_text/new_text/' file_name  
sed -n '5,10p' file_name  
sed '10,20d' file_name
```

Wget in Linux

- Wget developed by GNU helps you to download the content of a web page or download files.
- It can be downloaded via FTP, SFTP, HTTP, and HTTPS, it can be used on any platform like Linux, Windows, MacOS.

Thank you

