1. Linux Introduction

What is Open Source?

- Open source: software and source code available to all
- The Free Software Foundation specifies four freedoms
  - The freedom to run the program for any purpose.
  - The freedom to study and modify the source code
  - The freedom to redistribute the program
  - The freedom to create derivative programs
- Many open-source licenses exist, each with different particulars

Linux Origins

- 1984: The GNU Project and the Free Software Foundation
  - Creates open source version of UNIX utilities
  - Creates the General Public License (GPL)
    - Software license enforcing open source principles
- 1991: Linus Torvalds
  - Creates open source, UNIX-like kernel, released under the GPL
  - Ports some GNU utilities, solicits assistance online
- Today:
  - Linux kernel + GNU utilities = complete, open source, UNIX-like operating system
    - Packaged for targeted audiences as *distributions*

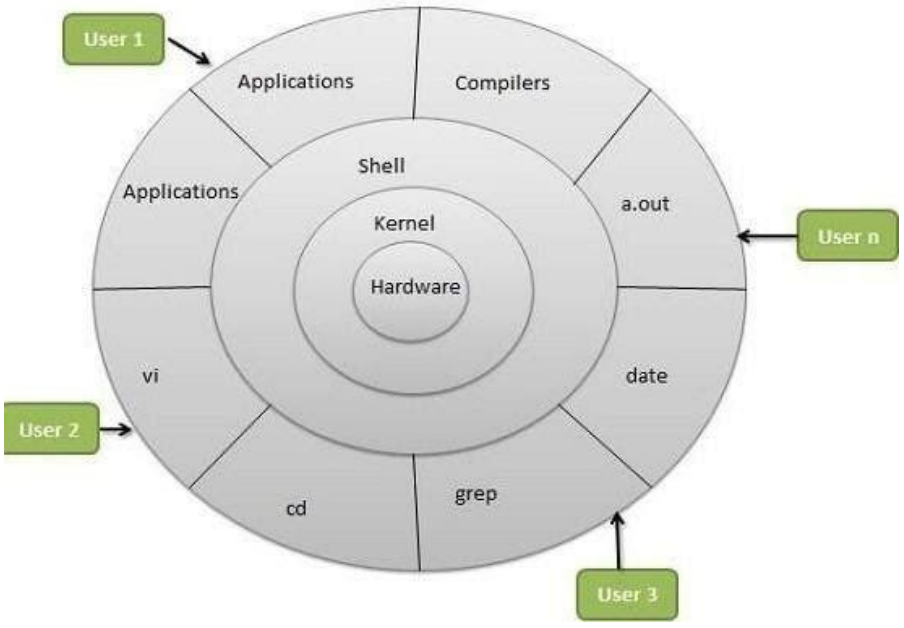
Linux principles

- Everything is a file (including hardware)
- Small, single-purpose programs
- Ability to chain programs together to perform complex tasks
- Avoid captive user interfaces
- Configuration data stored in text

Why Linux?

- OpenSource.
- Community support.
- Heavily customizable.
- Most Servers runs on Linux.
- DevOps most of the tools implements on Linux only.
- Automation
- Secure.

Architecture of Linux



Some Important Directories

- Home Directories: `/root`,`/home/`*`username`*
- User Executable: `/bin`, `/usr/bin`, `/usr/local/bin`
- System Executables: `/sbin`, `/usr/sbin`, `/usr/local/sbin`
- Other Mountpoints: `/media`, `/mnt`
- Configuration: `/etc`
- Temporary Files: `/tmp`
- Kernels and Bootloader: `/boot`
- Server Data: `/var`, `/srv`
- System Information: `/proc`, `/sys`
- Shared Libraries: `/lib`, `/usr/lib`, `/usr/local/lib`

Diffrent Linux distros

➔ Popular Desktop Linux OS

- Ubuntu Linux
- Linux Mint
- Arch Linux
- Fedora
- Debian
- OpenSuse

➔ Popular Server Linux OS

- Red Hat Enterprise Linux
- Ubuntu Server
- Centos
- SUSE Enterprise Linux

Most used Linux distros currently in IT industry.

RPM based:- RHEL & Centos

Debian based :- Ubuntu Server

Diffrence between RPM based and Debian based.

From user's point of view, there isn't much difference in these tools. The RPM and DEB formats are both just archive files, with some metadata attached to them. They are both equally arcane, have hardcoded install paths and only differ in subtle details. DEB files are installation files for Debian based distributions. RPM files are installation files for Red Hat based distributions. Ubuntu is based on Debian's package manage based on APT and DPKG. Red Hat, CentOS and Fedora are based on the old Red Hat Linux package management system, RPM.

DEB or .deb (Debian based softwares)

DEB is the extension of the Debian software package format and the most often used name for such binary packages. DEB was developed by Bedian.

Example: Google chrome software

Package name: google-chrome-stable_current_amd64**.deb**

Installation: dpkg -i google-chrome-stable_current_amd64**.deb**

RPM or .rpm (Red Hat based softwares.)

It is a package management system. The name RPM variously refers to the .rpm file format, files in this format, software packaged in such files, and the package manager itself. RPM was intended primarily for Linux distributions; the file format is the baseline package format of the Linux Standard Base. RPM was developed by Community & **Red Hat**.

Example: Google chrome software

Package Name: google-chrome-stable-57.0.2987.133-1.x86_64.rpm

Installation: rpm -ivh google-chrome-stable-57.0.2987.133-1.x86_64.rpm

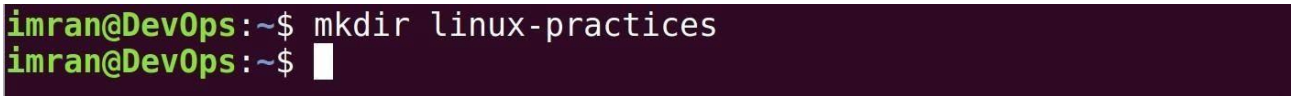
NOTE: You will also encounter diffrent commands, packages and service names while using both kinds of distros.

2. Basic Commands

➔ **Open Terminal**

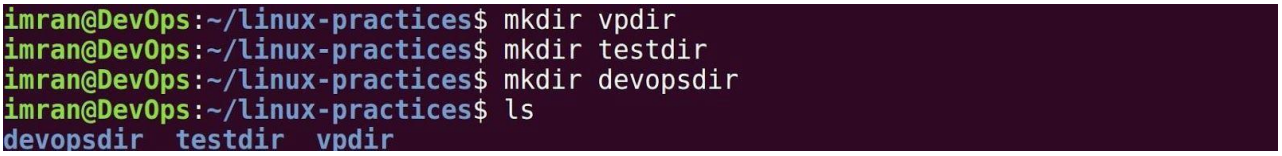
➔ **Know where you are? Present Working Directory**

➔ **Create a directory/folder in your home directory.**



➔ **Change your current working directory to linux-practices(Go to linux-practices folder).**

➔ **Create some more directories and list them with "ls" command.**



➔ **Create some empty files with "touch" command and list them.**

➔ **Reconfirm your location in your system.**

```
imran@DevOps:~/linux-practices$ pwd
/home/imran/linux-practices
imran@DevOps:~/linux-practices$ ls
devopsdir  file1  file2  file3  file4  testdir  vpdir
```

Absolute path and Relative path

What is a path?

A path is a unique location to a file or a folder in a file system of an OS. A path to a file is a combination of / and alpha-numeric characters.

What is an absolute path?

An absolute path is defined as the specifying the location of a file or directory from the root directory(/). In other words we can say absolute path is a complete path from start of actual filesystem from / directory.

Some examples of absolute path:

/home/imran/linux-practices/

/var/ftp/pub

/etc/samba.smb.conf

/boot/grub/grub.conf

If you see all these paths started from / directory which is a root directory for every Linux/Unix machines.

What is the relative path?

Relative path is defined as path related to the present working directory(pwd). Suppose I am located in /home/imran and I want to change directory to /home/imran/linux-practices. I can use relative path concept to change directory to linux-practices and also devopsdir directory.

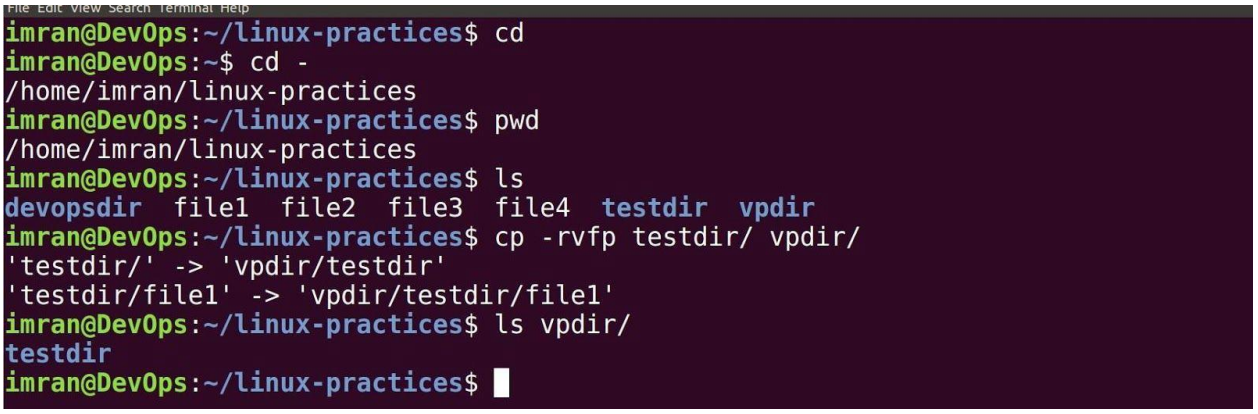
```
File Edit View Search Terminal Help
imran@DevOps:~$ pwd
/home/imran
imran@DevOps:~$ cd linux-practices/
imran@DevOps:~/linux-practices$ ls
devopsdir  file1  file2  file3  file4  testdir  vpdir
imran@DevOps:~/linux-practices$ pwd
/home/imran/linux-practices
imran@DevOps:~/linux-practices$ cd devopsdir/
imran@DevOps:~/.../devopsdir$ pwd
/home/imran/linux-practices/devopsdir
imran@DevOps:~/.../devopsdir$
```

If you see all these paths did not start with / directory.

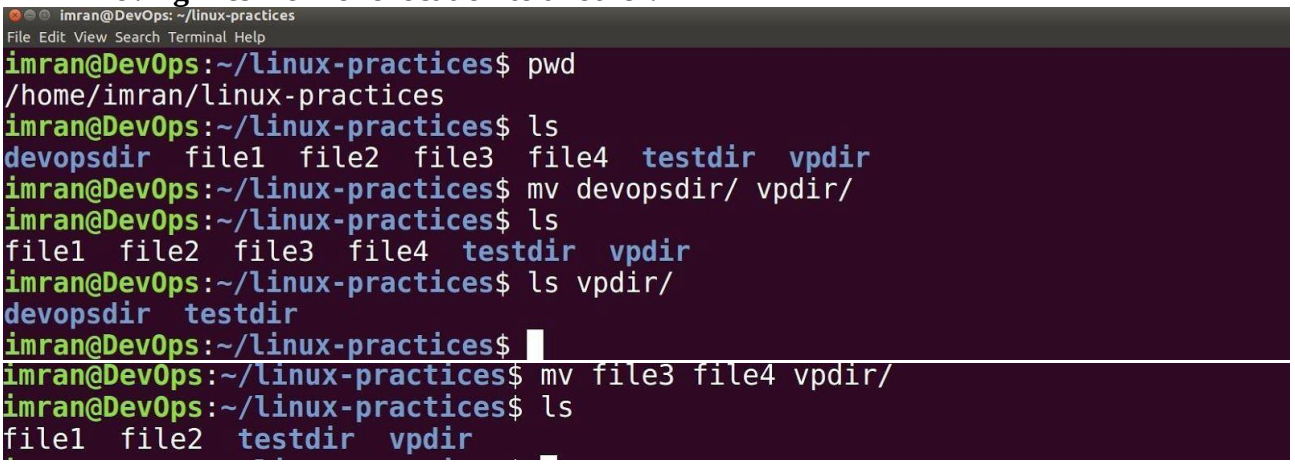
➔ **Creating directories in devopsdir directory with absolute and relative path.**

➔ **Copying files into directory.**

➔ **Copying directories from one location to another.**



➔ **Moving files from one location to another.**



➔ **Removing files and directories.**

VIM EDITOR

➔ **Install vim editor.**

```
imran@DevOps:~/linux-practices$ sudo apt-get install vim
[sudo] password for imran:
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

➔ **Open up a file in vim editor**

```
imran@DevOps:~/linux-practices$ vim firstfile.txt
```

➔ **Hit i to enter into insert mode**

```
imran@DevOps: ~/linux-practices
File  Edit  View  Search  Terminal  Help
~
~
~
~
~
~
~
-- INSERT --                                              0,1           All
```

=> type few lines => hit Esc

```
imran@DevOps: ~/linux-practices
File  Edit  View  Search  Terminal  Help
This is first line in vim editor.
This one's second
So on
and
So forth.
~
                                                         6,0-1         All
```

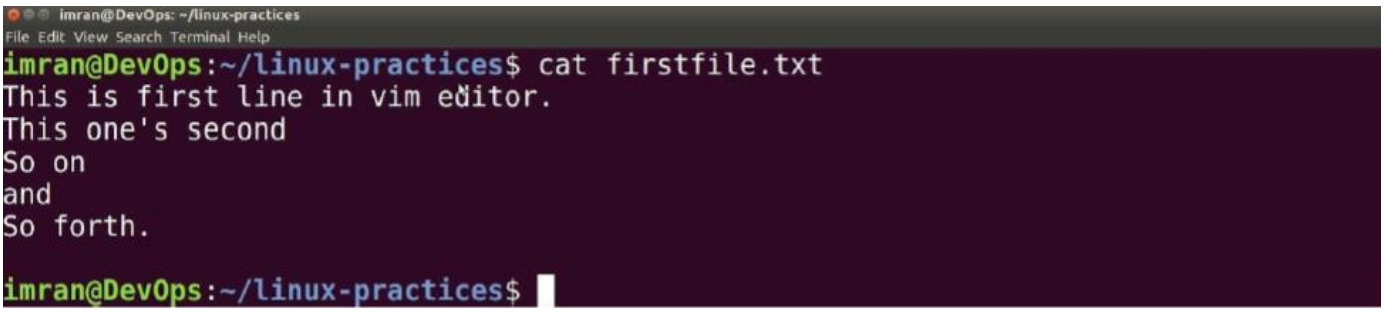
=> type :wq

```
imran@DevOps: ~/linux-practices
File  Edit  View  Search  Terminal  Help
This is first line in vim editor.
This one's second
So on
and
So forth.

~
:wq
```

=> Enter.

➔ **Read file with cat command.**



VIM EDITOR

VI Visual display editor
VIM Visual display editor improved

This is command mode editor for files. Other editors in Linux are emacs, gedit vi editor is most popular

It has 3 modes:
1 Command Mode
2 Insert mode (edit mode)
3 extended command mode

Note: When you open the vim editor, it will be in the command mode by default.

Command Mode:

gg	To go to the beginning of the page
G	To go to end of the page
w	To move the cursor forward, word by word
b	To move the cursor backward, word by word
nw	To move the cursor forward to n words **(SW)**
nb	To move the cursor backward to n words **{SB)**
u	To undo last change (word)

U	To undo the previous changes (entire line)
Ctrl+R	To redo the changes
VY	To copy a line
nyy	To copy n lines (Syy or 4yy)
p	To paste line below the cursor position
p	To paste line above the cursor position
dw	To delete the word letter by letter {like Backspace}
x	To delete the world letter by letter (like DEL Key)
dd	To delete entire line
ndd	To delete n no. of lines from cursor position{Sdd)
I	To search a word in the file

Extended Mode: (Colon Mode)

Extended Mode is used for save and quit or save without quit using "Esc" Key with":"

Esc+:w	To Save the changes
Esc+:q	To quit (Without saving)
Esc+:wq	To save and quit
Esc+:w!	To save forcefully
Esc+wq!	To save and quit forcefully
Esc+:x	To save and quit
Esc+:X	To give passw or d to the file and r emove password
Esc+:20(n)	To go to line no 20 or n
Esc+: se nu	To set the line numbers to the file
Esc+:se nonu	To Remove the set line numbers

Is command options

Options	Description
-l	Long listing format of files and directories, one per line
-a	List all hidden files and directories started with '.'
-F	Add a '/' classification at the end of each Directory
-g	List all files and directories with the group name
-i	Print index number of each files and directories
-m	List all file and directories separated by comma ','
-n	List numeric UID and GID of Owner and Groups
-r	List all files and directories in reverse order
-R	Short list all directories
-t	Sorted by modified time, started with the newest file

Types of files in linux.

File Type	First Character in File Listing	Description
Regular file	-	Normal files such as text, data, or executable files
Directory	d	Files that are lists of other files
Link	l	A shortcut that points to the location of the actual file
Special file	c	Mechanism used for input and output, such as files in /dev
Socket	s	A special file that provides inter-process networking protected by the file system's access control
Pipe	p	A special file that allows processes to communicate with each other without using network socket semantics

Symbolic links

Symbolic links are like desktop shortcuts we use in windows.

Create a soft link for /var/log directory in our current working directory.