



Module 3

Linux Basics

Ansh Bhawnani

Command Line

1. Command Shell Basics

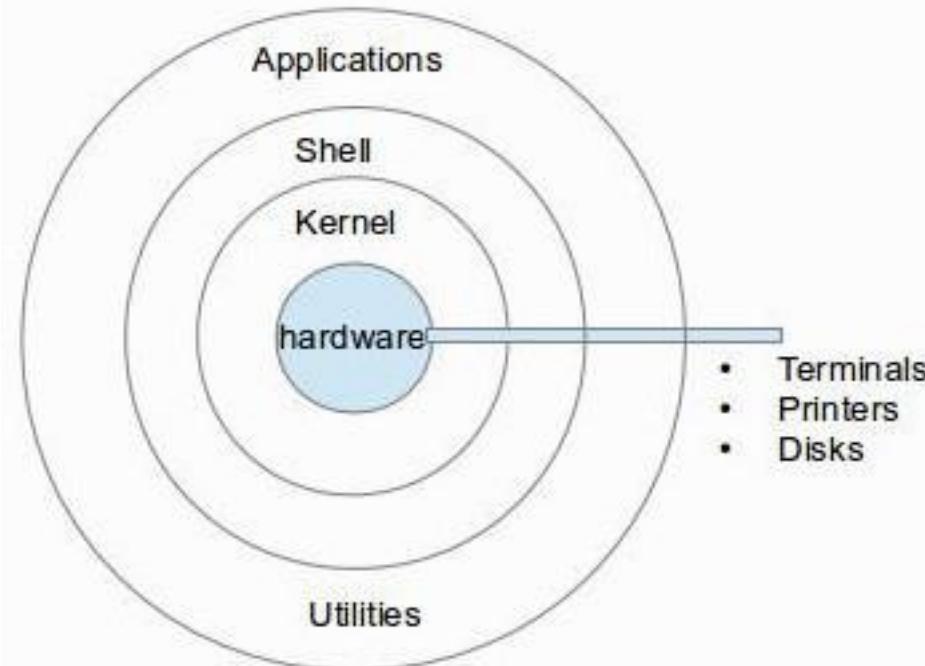


Command Shell Basics

- Text-based application for **viewing, handling, and manipulating** files on your computer
- Other names: *cmd, CLI, prompt, console* or *terminal*.
- User to Kernel interface
- Interface to use operating system services
- **Read** from input devices such as **keyboards** or from **files**
- The shell gets **started** when the user **logs in** or start the terminal.



Command Shell Basics





Command Shell Basics

```
override@Atul-HP: ~
override@Atul-HP:~$ ls -l
total 212
drwxrwxr-x  5 override override  4096 May 19  03:45 acadenv
drwxrwxr-x  4 override override  4096 May 27 18:20 acadview_demo
drwxrwxr-x 12 override override  4096 May  3 15:14 anaconda3
drwxr-xr-x  6 override override  4096 May 31 16:49 Desktop
drwxr-xr-x  2 override override  4096 Oct 21  2016 Documents
drwxr-xr-x  7 override override 40960 Jun  1 13:09 Downloads
-rw-r--r--  1 override override  8980 Aug  8  2016 examples.desktop
-rw-rw-r--  1 override override 45005 May 28 01:40 hs_err_pid1971.log
-rw-rw-r--  1 override override 45147 Jun  1 03:24 hs_err_pid2006.log
drwxr-xr-x  2 override override  4096 Mar  2 18:22 Music
drwxrwxr-x 21 override override  4096 Dec 25 00:13 Mydata
drwxrwxr-x  2 override override  4096 Sep 20  2016 newbin
drwxrwxr-x  5 override override  4096 Dec 20 22:44 nltk_data
drwxr-xr-x  4 override override  4096 May 31 20:46 Pictures
drwxr-xr-x  2 override override  4096 Aug  8  2016 Public
drwxrwxr-x  2 override override  4096 May 31 19:49 scripts
drwxr-xr-x  2 override override  4096 Aug  8  2016 Templates
drwxrwxr-x  2 override override  4096 Feb 14 11:22 test
drwxr-xr-x  2 override override  4096 Mar 11 13:27 Videos
drwxrwxr-x  2 override override  4096 Sep  1  2016 xdm-helper
override@Atul-HP:~$
```

2. Windows Command Line

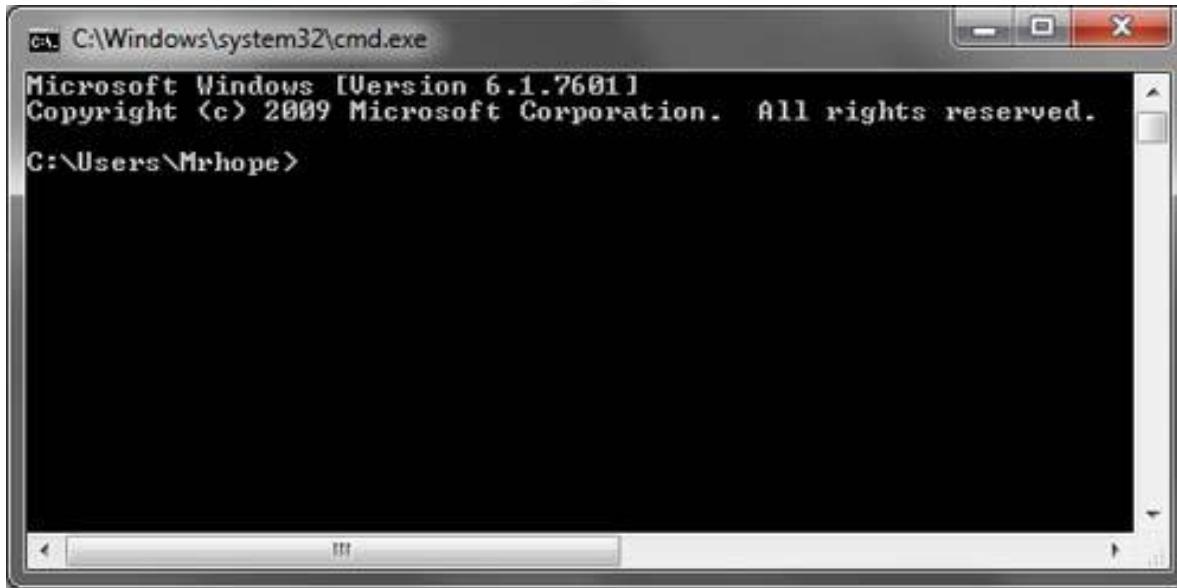


Windows Command Line

- Windows has **two** command shells: The **Command shell** and **PowerShell**
- Officially called **Windows Command Processor**, but also sometimes referred to as the command shell or cmd prompt, or cmd.exe.
- Sometimes called '**DOS prompt**', incorrectly.
- PowerShell was designed to **extend** the **capabilities** of the Command shell to run PowerShell commands called **cmdlets**
- You can run Windows Commands and PowerShell cmdlets in Powershell, but the Command shell can only run Windows Commands and not PowerShell cmdlets.



Windows Command Line





Windows Command Line

The screenshot shows two windows side-by-side. The left window is a Microsoft Windows Command Prompt (cmd.exe) with a purple title bar. It displays the following text:

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.14393]
(c) 2017 Microsoft Corporation. All rights reserved.

C:\Windows\system32>cd C:\

C:\>
```

The right window is a Windows PowerShell window with a blue title bar. It displays the following text:

```
> Windows PowerShell
Windows PowerShell
Copyright (C) 2016 Microsoft Corporation. All rights reserved.

PS C:\Users\wjgle> Set-Location C:\

PS C:\>
```

3. Linux Command Line



Linux Command Line

- Kali Linux uses the **Bourne Again** or **Bash** shell, created for use in the GNU project, as a successor to the **Bourne** shell
- Bash can also read and execute commands from a **file**, called a **shell script**.
- Bash command syntax includes ideas drawn from the **Korn** shell (**ksh**) and the **C** shell (**csh**) such as command line editing, command history



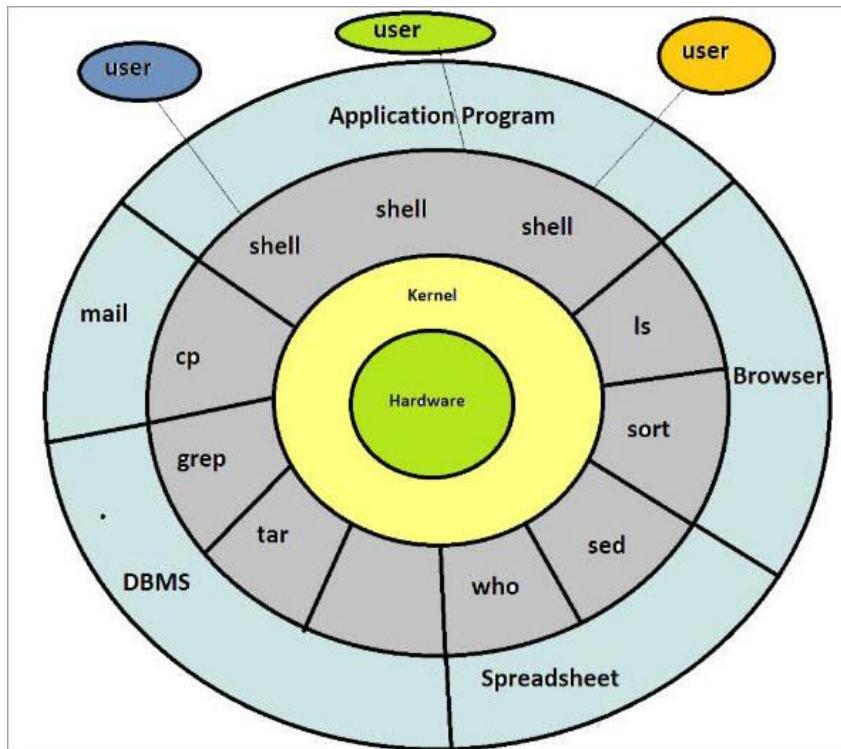
Linux Command Line

```
chris@ubuntu: ~
chris@ubuntu:~$ bash --version
GNU bash, version 4.3.46(1)-release (x86_64-pc-linux-gnu)
Copyright (C) 2013 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.

This is free software; you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
chris@ubuntu:~$
```



Linux Command Line



File Systems

1. Linux File System



Linux File System

- A file system is basically **a set of rules** used to **decide how data is stored** and **fetched** in a **storage device**, be it a hard drive, flash drive, or something else.
- The **entire** Linux directory structure **starting** at the top (/) **root** directory.
- A specific type of **data storage format**, such as EXT3, EXT4, BTRFS, XFS, and so on
- **Mounting:** A mount point is simply a **directory**, like any other, that is created as **part** of the **root filesystem**. The Linux root filesystem is mounted on the **root directory** (/)



Linux File System

	Windows	Linux
Partition	Disk1	/dev/sda1
Filesystem type	NTFS/FAT32	EXT3/EXT4/XFS...
Mounting Parameters	DriveLetter	MountPoint
Base Folder where OS is stored	C drive	/



Linux File System

■ / (root filesystem)

- ▷ Top-level directory of the filesystem
- ▷ Contains all of the files required to boot the Linux system before other filesystems are mounted
- ▷ Includes all of the required executables and libraries required to boot the remaining filesystems



Linux File System

- **/bin:** The /bin directory contains **user executable** files.
- **/boot:** Contains the **static bootloader** and **kernel executable** and configuration files required to **boot** a Linux computer.
- **/dev:** This directory contains the **device files** for every **hardware** device attached to the system
- **/etc:** Contains the local **system configuration** files for the host computer.
- **/home:** **Home** directory storage for **user** files. **Each user** has a **subdirectory** in /home.

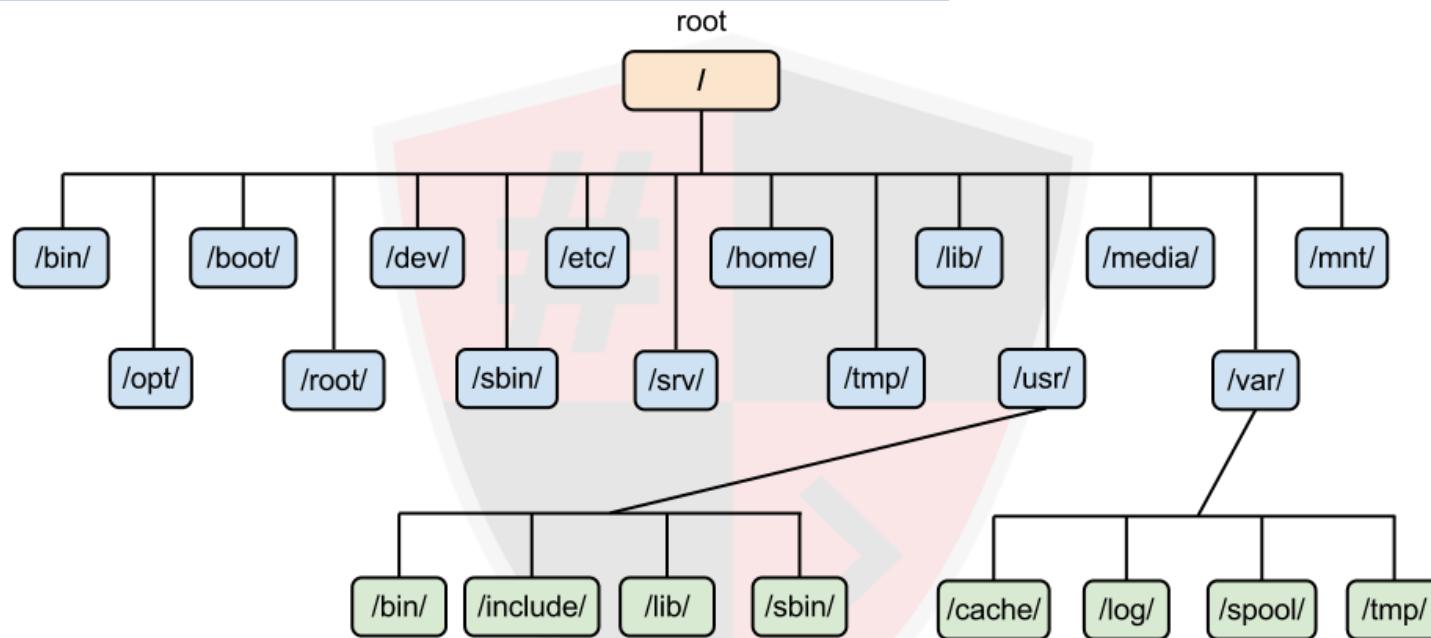


Linux File System

- **/lib:** Contains **shared library** files that are required to boot the system.
- **/media:** A place to **mount external removable media** devices such as USB thumb drives that may be connected to the host.
- **/mnt:** A **temporary mountpoint** for regular filesystems
- **/root:** It is the **home** directory for the **root** user.
- **/tmp:** Used by the **operating system** and many programs to store **temporary** files.
- **/usr:** Shareable, **read-only** files, including executable **binaries** and libraries, man files, and other types of documentation.



Linux File System



2. NTFS, FAT, EXT



NTFS, FAT, EXT

FAT32 (File Allocation Table)

- Increases the number of bits used to address clusters and reduces the size of each cluster.
- Supports larger disks (up to 2 terabytes) and better storage efficiency, 4 GB Max file size

NTFS (New Technology File System)

- Windows NT operating system uses for storing and retrieving files on a hard disk
- Linux and BSD have a free and open-source NTFS driver
- macOS comes with read-only support for NTFS.
- 16 TB max file size, 4KB cluster size



NTFS, FAT, EXT

■ Ext4 (Extended File System 4)

- ▷ Ext4 supports file-based encryption
- ▷ File contents, filenames, and symbolic link targets are all encrypted.
- ▷ Being used by Linux kernel

Linux User Administration

Module 3





Ownership of Files

User

- ▷ A user is the **owner** of the file
- ▷ The person who **created** the file

Group

- ▷ A user- group can contain **multiple users**.
- ▷ **All** users belonging to a group will have the **same access permissions** to the file

Others

- ▷ **Everybody else**
- ▷ **Neither created** the file, nor he **belongs** to a usergroup who could own the file



Permissions of Files

■ Read

- ▷ Authority to **open and read** a file
- ▷ Read on **directory** gives you the ability to lists its content.

■ Write

- ▷ Authority to **modify the contents** of a file
- ▷ Write on directory gives you the authority to **add, remove** and **rename** files stored

■ Execute

- ▷ You cannot **run** a program unless the execute permission is **set**



Permissions of Files



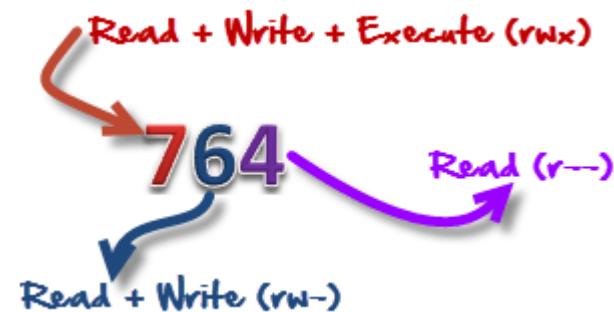


Changing File Permissions

Absolute (Numeric) Mode

- ▷ 0 for no permission
- ▷ 1 for execute
- ▷ 2 for write
- ▷ 4 for read

764



Read + Write + Execute (rwx)

Read (r--)

Read + Write (rw-)



Changing File Permissions

Symbolic Mode (for all 3 user types)

- ▷ + for **adding** permission
- ▷ - for **removing** permission
- ▷ = **sets** and **overrides** permissions

- ▷ **u** user/owner
- ▷ **g** group
- ▷ **o** other
- ▷ **a** all

HACKING

Is an art, practised through a creative mind.

