



Module 3

Linux Basics

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Command Line



1. Command Shell Basics

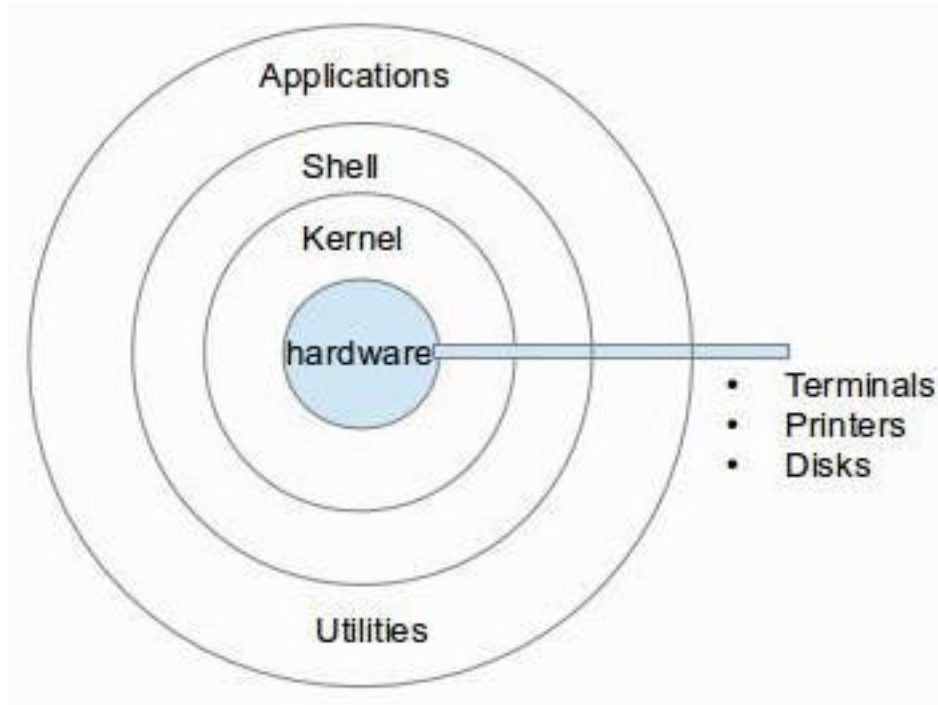


Command Shell Basics

- 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

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Mrhope>
```



Windows Command Line

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 10.0.14393.16]
(c) 2017 Microsoft Corporation. All rights reserved.
C:\Windows\system32>cd C:\
C:\>

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 (**cs**) such as command line editing, command history

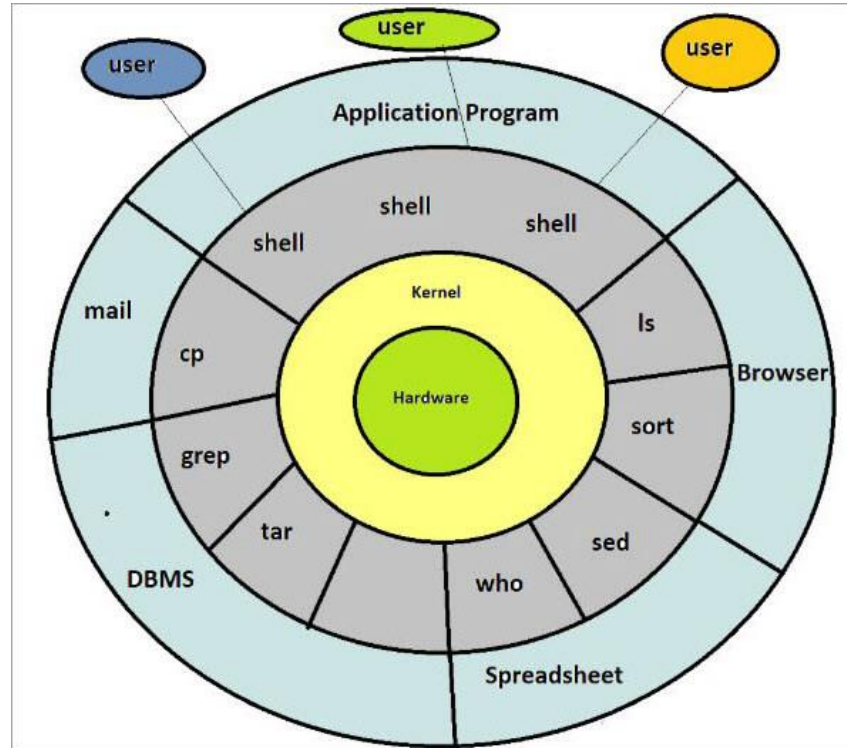


Linux Command Line

```
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

Module 3



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.

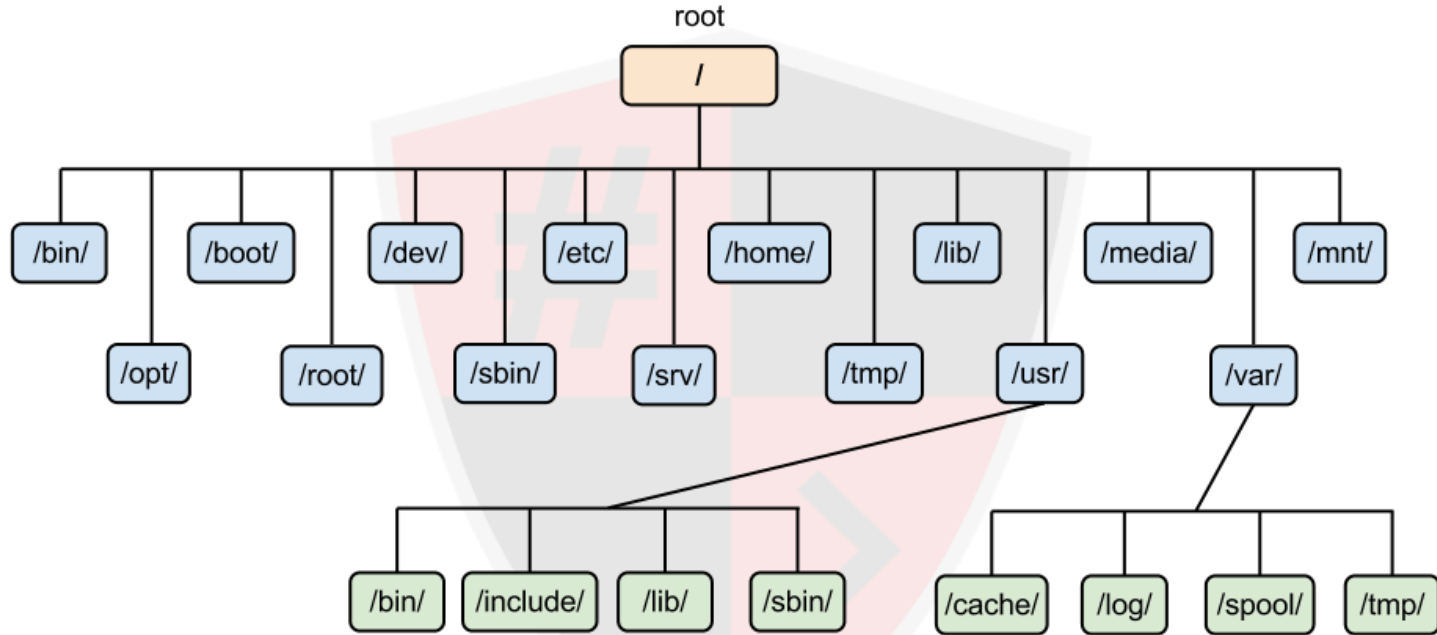


Linux File System

- **/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

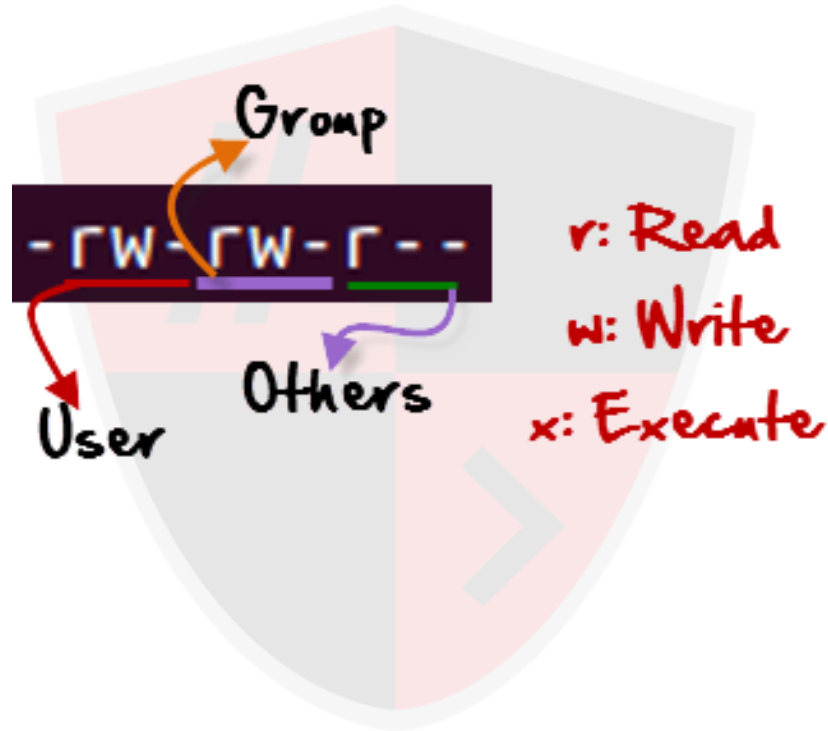
- ▷ Authority to **modify the contents** of a file
- ▷ Write on directory gives you the authority to **add, remove and rename** files stored

■ Execute

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



Permissions of Files

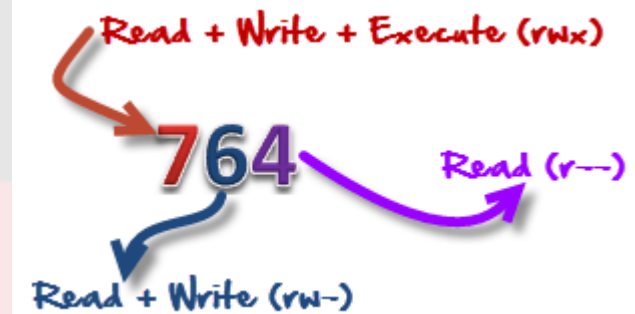




Changing File Permissions

Absolute (Numeric) Mode

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





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.

