

# **WELCOME TO: MODULE 3**

## **SYSTEM ACCESS AND FILE SYSTEM**

# Important Things to Remember in Linux

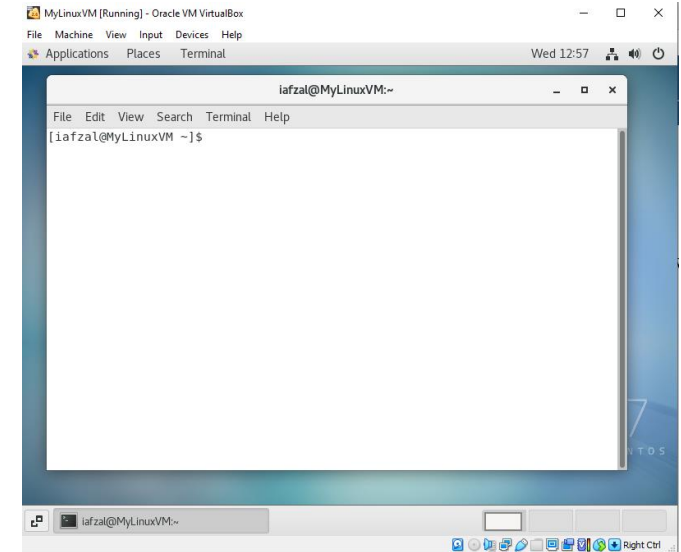
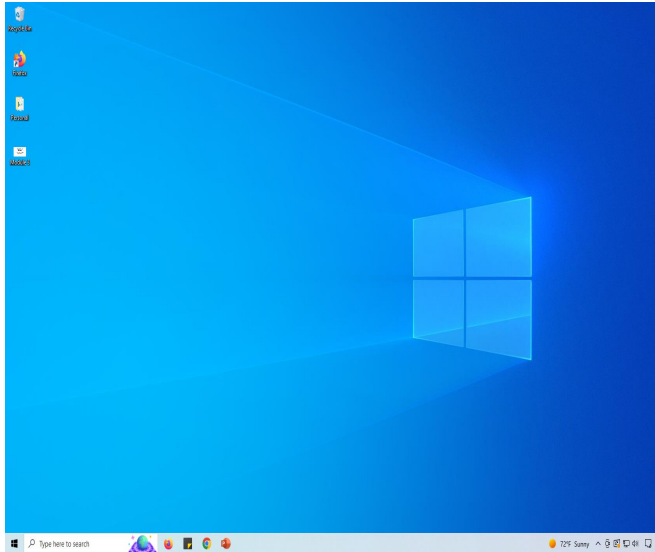
- Linux has super-user account called root
  - root is the most powerful account that can create, modify, delete accounts and make changes to system configuration files
- Linux is case-sensitive system
  - **ABC** is **NOT** same as **abc**
- Avoid using spaces when creating files and directories
- Linux kernel is not an operating system. It is a small software within Linux operating system that takes commands from users and pass them to system hardware or peripherals
- Linux is mostly CLI not GUI
- Linux is very flexible as compared to other operating systems.

# Access to Linux System

There are 2 types of access

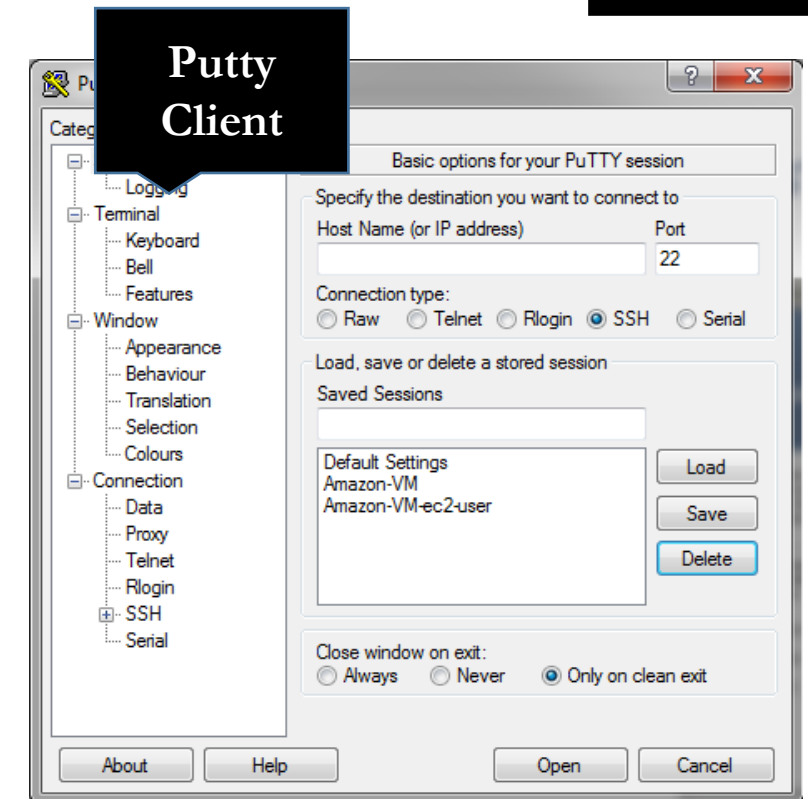
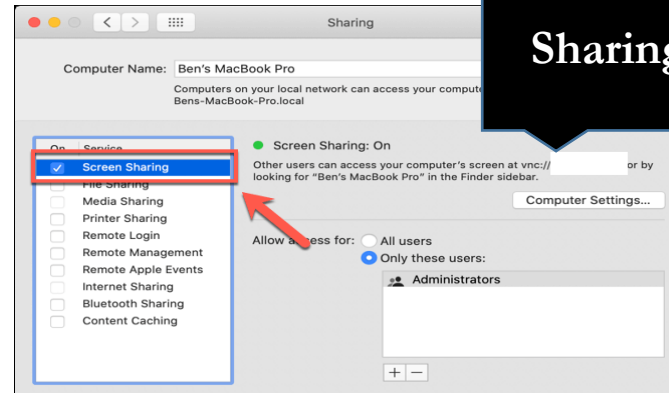
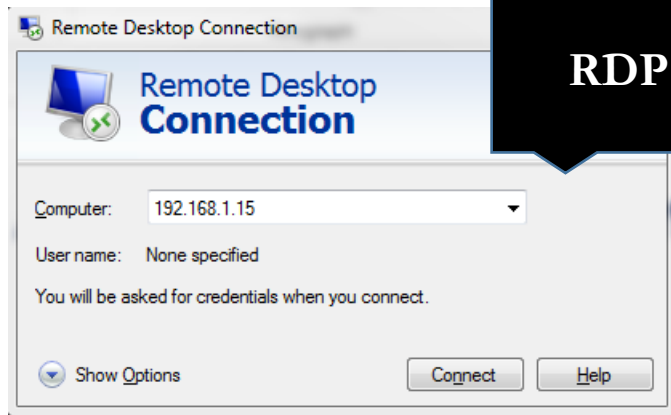
1. Console
2. Remote

The console is a direct access to an operating system when it is connected through VGA, HDMI, DVI etc.



# Access to Linux System

The 2<sup>nd</sup> type of access is remote where you connect to your operating system remotely over the network



Linux to Linux  
SSH 192.168.1.5

# Access to Linux System

Important:

Windows 10 or newer version

SSH built-in client



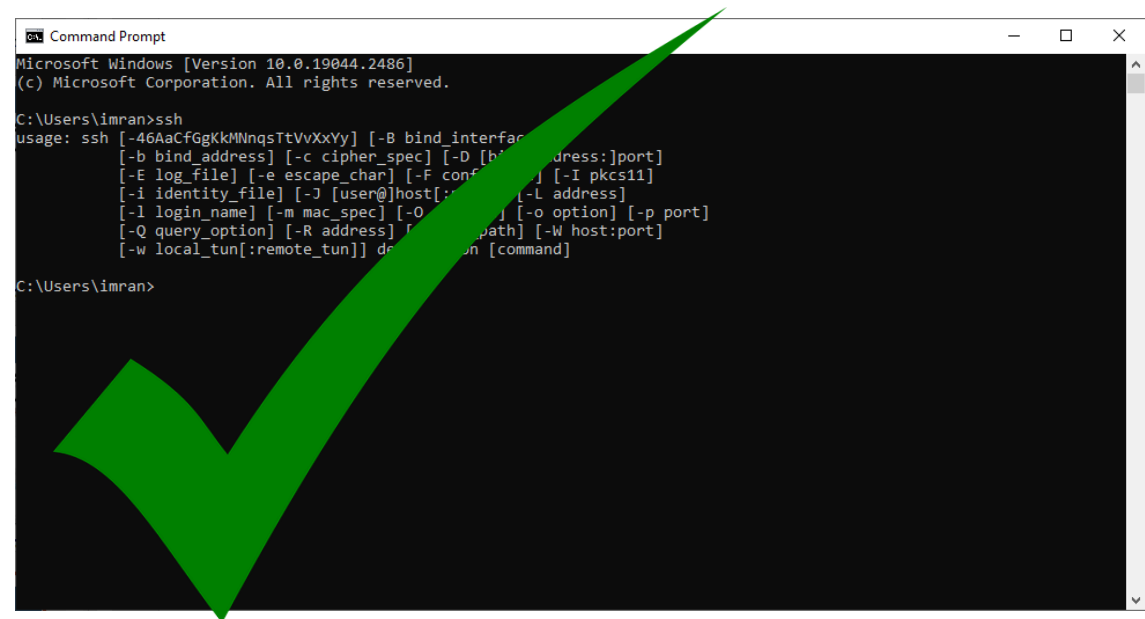
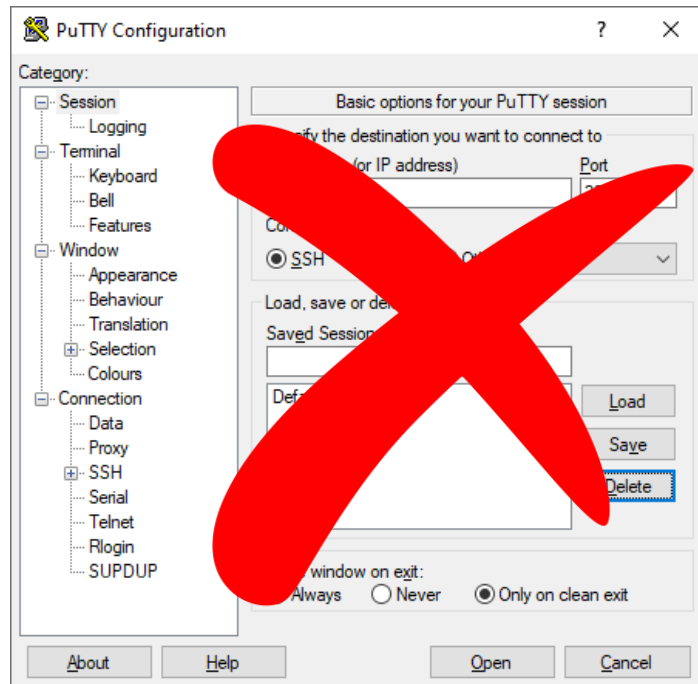
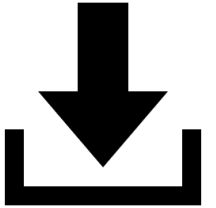
```
Command Prompt
Microsoft Windows [Version 10.0.19044.2486]
(c) Microsoft Corporation. All rights reserved.

C:\Users\imran>ssh
usage: ssh [-46AaCfGgKkMMNnqsTtVvXxYy] [-B bind_interface]
          [-b bind_address] [-c cipher_spec] [-D [bind_address:]port]
          [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11]
          [-i identity_file] [-J [user@]host[:port]] [-L address]
          [-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option] [-p port]
          [-Q query_option] [-R address] [-S ctl_path] [-W host:port]
          [-w local_tun[:remote_tun]] destination [command]
```

C:\Users\imran> **ssh 192.168.1.5**

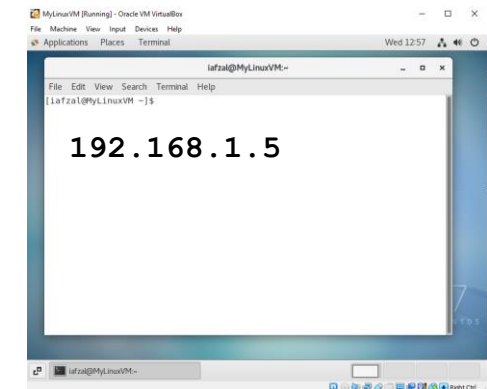
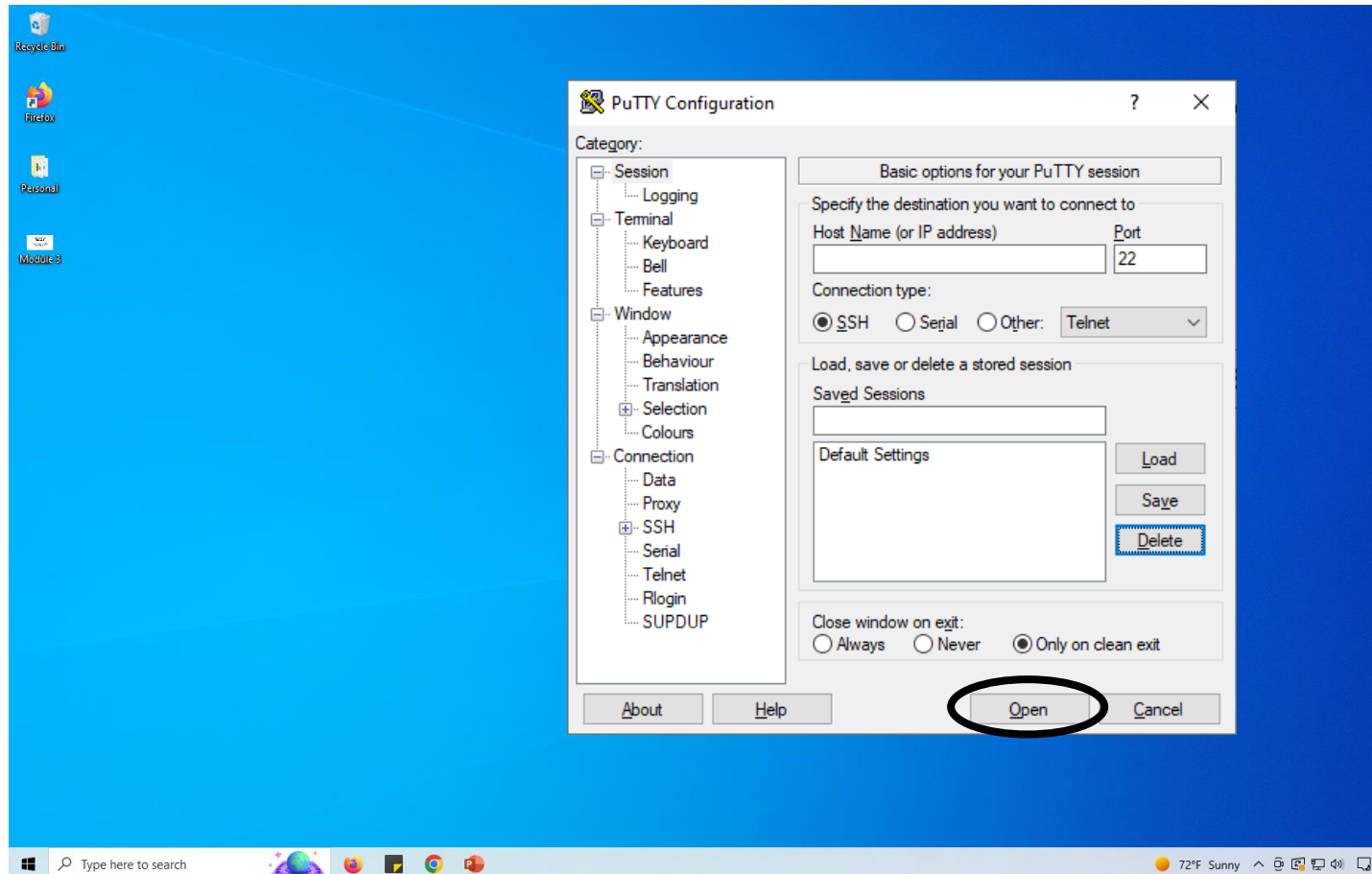
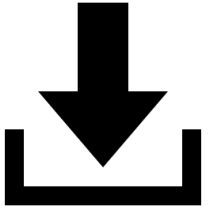
# Download and Install Putty

If you are using Windows 10 or newer version  
then you do **NOT** have to download or install Putty

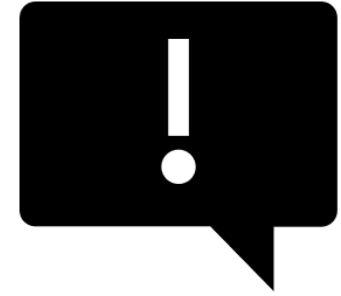


# Download and Install Putty

Putty is a software which allows you to connect from a Windows system to Linux system remotely



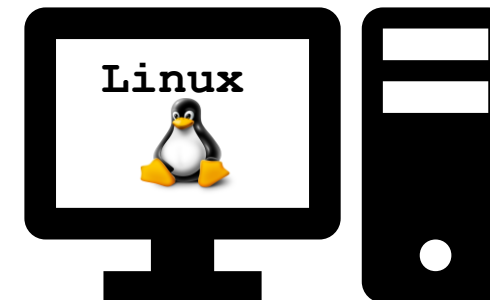
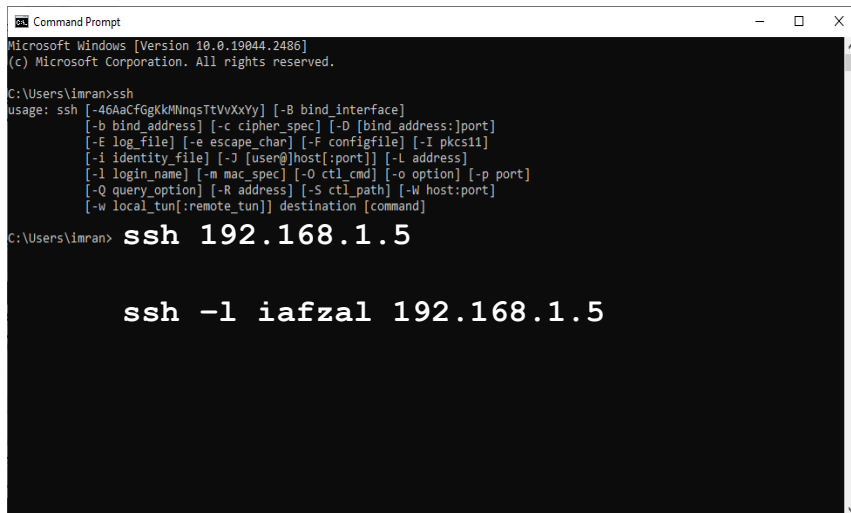
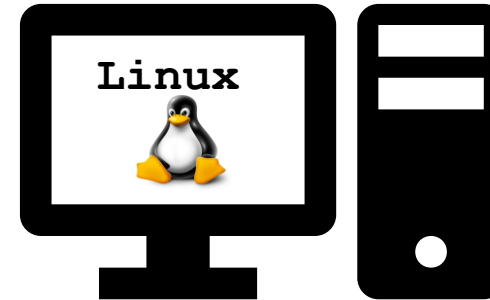
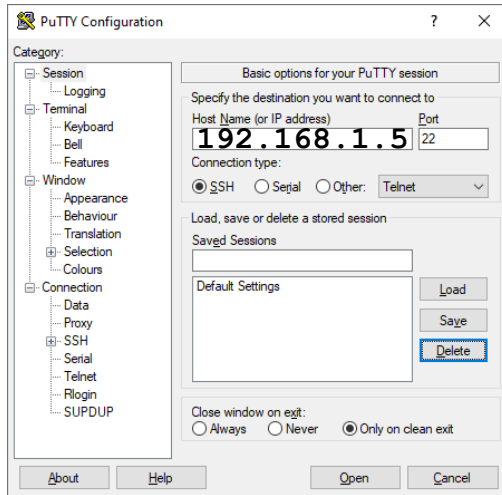
# Access to Linux from MAC



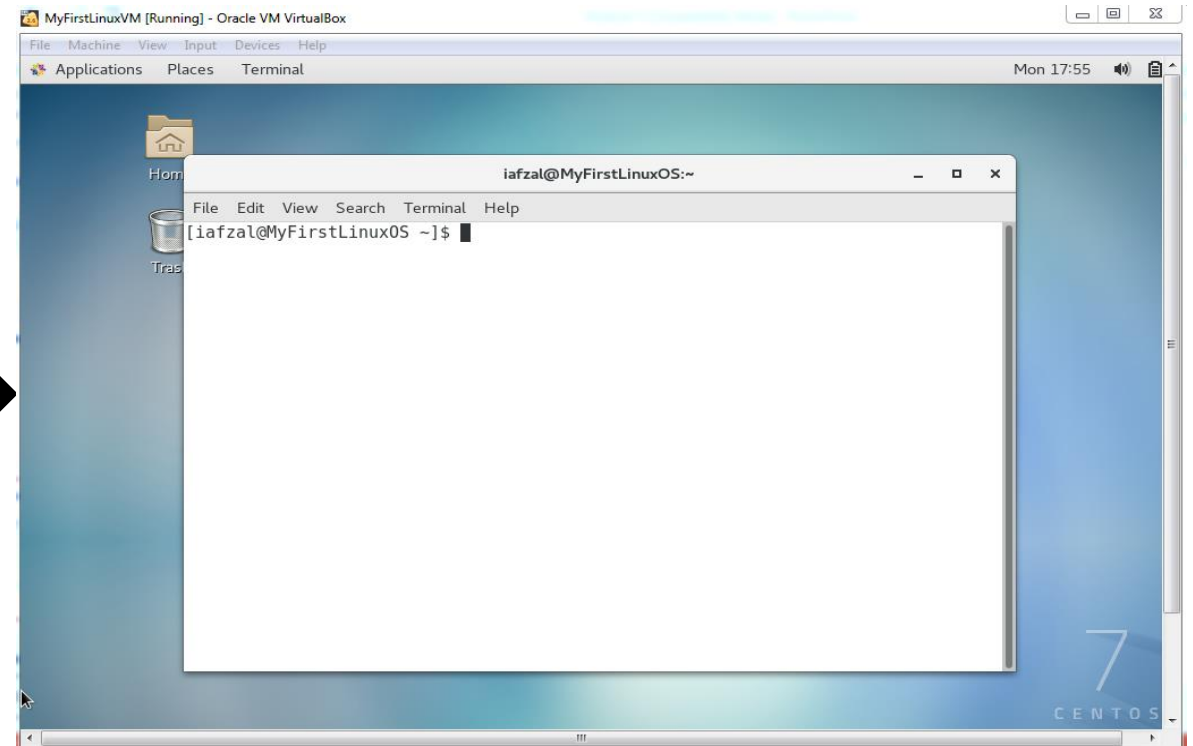
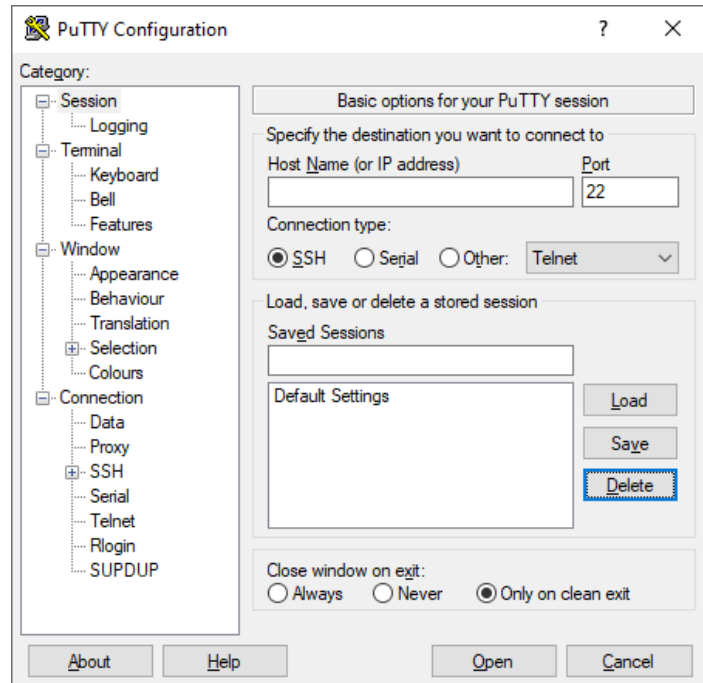
- Open a terminal on your MAC
- Run the following command
  - **# ssh -l iafzal 192.168.1.5**



# Access Linux via Putty or SSH



# Access to Linux via Putty

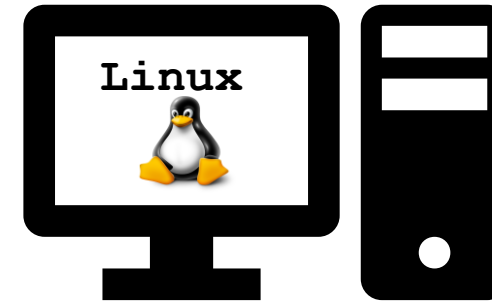


- The newer version of CentOS might not have the **ifconfig** command, therefore, use “**ip addr**” command instead
- To use **ifconfig** in 7.5 or later version then run = “**yum install net-tools**”

# Access to Linux via SSH

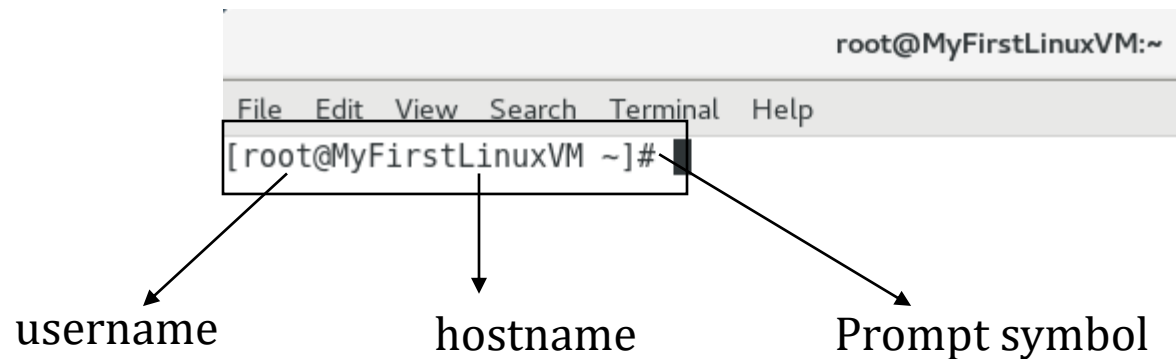
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Command Prompt
Microsoft Windows [Version 10.0.19044.2486]
(c) Microsoft Corporation. All rights reserved.

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          [-Q query_option] [-R address] [-S ctl_path] [-W host:port]
          [-w local_tun[:remote_tun]] destination [command]
```



# Command Prompts and Getting Prompts Back

- What are command prompts?
  - A command prompt, also referred to simply as a prompt, is a short text at the start of the command line followed by prompt symbol on a command line interface



- To get your prompt back
  - **Ctrl + c**

# Introduction to Filesystem

- What is a Filesystem?
  - It is a system used by an operating system to manage files. The system controls how data is saved or retrieved



# Introduction to Filesystem

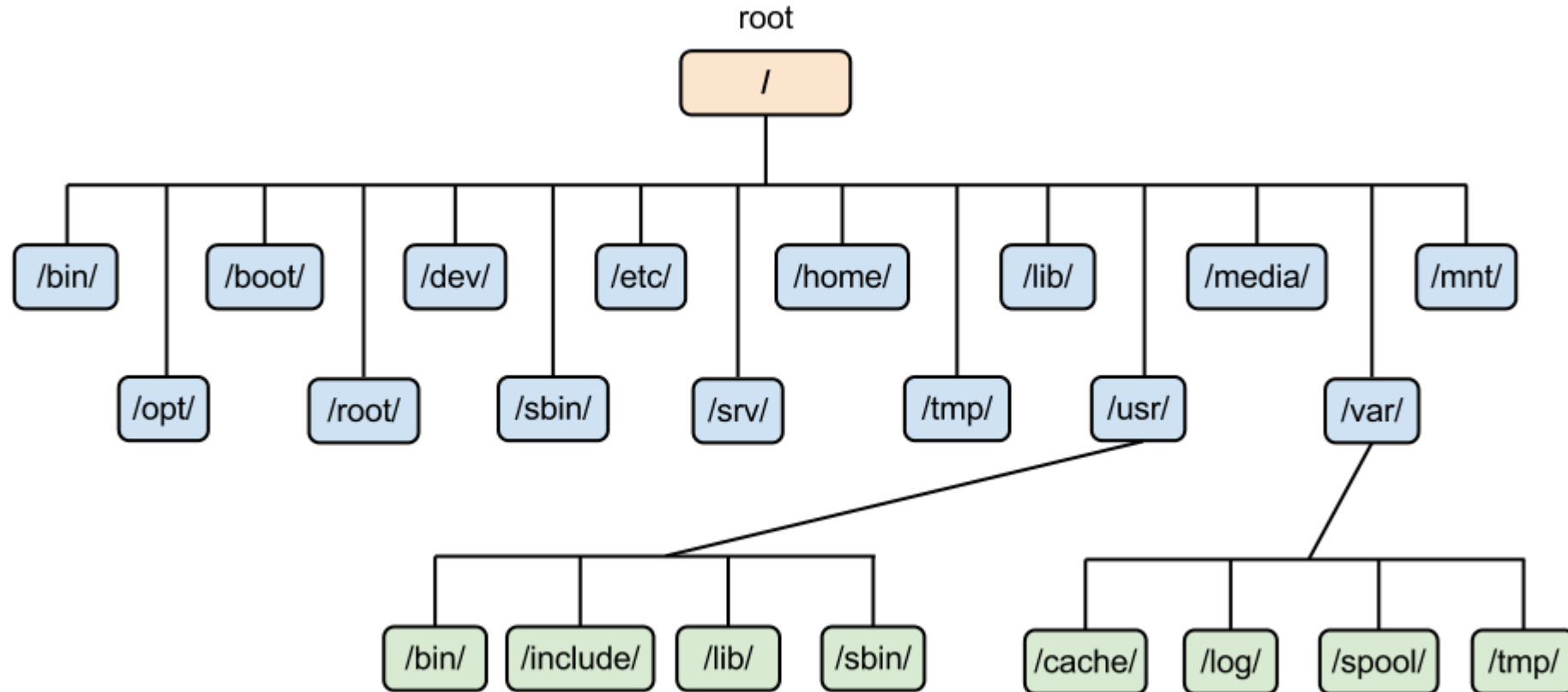
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# Introduction to Filesystem

- Operating system stores files and directories in an organized and structured way
  - System configuration file = Folder A
  - User files = Folder B
  - Log files = Folder C
  - Commands or scripts = Folder D and so on
- There are many different types of filesystems. In general, improvements have been made to filesystems with new releases of operating systems and each new filesystem has been given a different name
  - e.g. **ext3, ext4, xfs, NTFS, FAT etc.**

# FILE SYSTEM STRUCTURE





# File System Structure and its Description

/boot	Contains file that is used by the boot loader (grub.cfg)
/root	root user home directory. It is not same as /
/dev	System devices (e.g. disk, cdrom, speakers, flashdrive, keyboard etc.)
/etc	Configuration files
/bin → /usr/bin	Everyday user commands
/sbin → /usr/sbin	System/filesystem commands
/opt	Optional add-on applications (Not part of OS apps)
/proc	Running processes (Only exist in Memory)
/lib → usr/lib	C programming library files needed by commands and apps
	<b>strace -e open pwd</b>
/tmp	Directory for temporary files
/home	Directory for user
/var	System logs
/run	System daemons that start very early (e.g. systemd and udev) to store temporary runtime files like PID files
/mnt	To mount external filesystem. (e.g. NFS)
/media	For cdrom mounts.

# Navigating File System

- When navigating a UNIX filesystem, there are a few important commands:

**"cd"**

**"pwd"**

**"ls"**

- "cd" stands for change directory. It is the primary command for moving you around the filesystem.
- "pwd" stands for print working directory. It tells you where you current location is.
- "ls" stands for list. It lists all the directories/files within a current working directory
- Using of TAB key to auto-complete

# Linux File or Directory Properties

Each file or directory in Linux has detail information or properties

Type	# of Links	Owner	Group	Size	Month	Day	Time	Name
<code>drwxr-xr-x.</code>	21	root	root	4096	Feb	27	13:33	var
<code>lrwxrwxrwx.</code>	1	root	root	7	Feb	27	13:15	bin
<code>-rw-r-r--</code>	1	root	root	0	Mar	2	11:15	testfile



The second column is the number of hard links to the file. For a directory, the number of hard links is the number of immediate subdirectories it has plus its parent directory and itself

# Linux File Types

File Symbol	Meaning
-	Regular file
d	Directory
l	link
c	Special file or device file
s	socket
p	Named pipe
b	Block device

# What is Root?

- There are 3 types of root on Linux system
  1. Root account: root is an account or a username on Linux machine and it is the most powerful account which has access to all commands and files
  2. Root as /: the very first directory in Linux is also referred as root directory
  3. Root home directory: the root user account also has a directory located in /root which is called root home directory

# Changing Password

- You should change your initial password as soon as you login

Command = **passwd userid**

**Old password:** - enter your current password

**New password:** - enter your new password

**Retype new password:** - re-enter your new password

# File System Paths

- There are two paths to navigate to a filesystem
  - ✓ Absolute Path
  - ✓ Relative Path
- An absolute path always begins with a "/". This indicates that the path starts at the root directory. An example of an absolute path is

```
cd /var/log/httpd
```

- A relative path does not begin with a "/". It identifies a location relative to your current position. An example of a relative path is:

```
cd /var
```

```
cd log
```

```
cd httpd
```

# Creating Files and Directories

- Creating Files
  - ✓ **touch**
  - ✓ **cp**
  - ✓ **vi**
- Creating Directories
  - ✓ **mkdir**



# Copying Directories

- Command to copy a directory
  - **cp**
- To copy a directory on Linux, you have to execute the “cp” command with the “-R” option for recursive and specify the source and destination directories to be copied
  - **cp -R <source\_folder> <destination\_folder>**

# Find Files and Directories

- Two main commands are used to find files/directories
  - find
  - locate

# Difference Between find and locate

- **locate** uses a prebuilt database, which should be regularly updated, while **find** iterates over a filesystem to locate files. Thus, locate is much faster than find , but can be inaccurate if the database (can be seen as a cache) is not updated
- To update locate database run **updatedb**

# WildCards

- A wildcard is a character that can be used as a substitute for any of a class of characters in a search
  - \* - represents zero or more characters
  - ? - represents a single character
  - [] - represents a range of characters

# Soft and Hard Links

- inode = Pointer or number of a file on the hard disk
- Soft Link = Link will be removed if file is removed or renamed
- Hard Link = Deleting renaming or moving the original file will not affect the hard link

- `ln`
- `ln -s`

