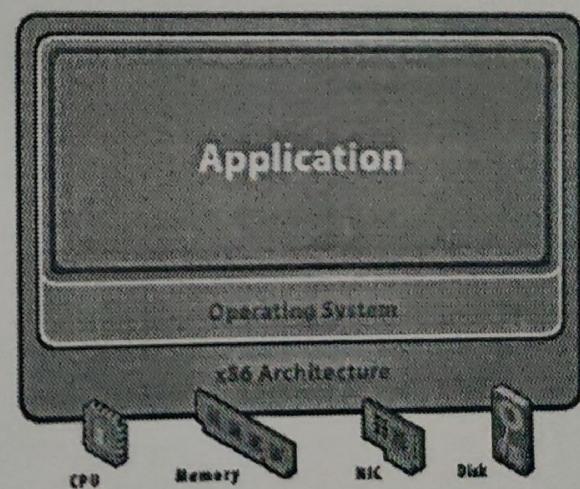


GUEST
VIRTUAL
MACHINE
DATA
PLATFORM
RESOURCES
MANAGER
HARDWARE
DESKTOP
COMPUTING
OS
NETWORK
HOST
PERFORMANCE
SCALABILITY
SNAPSHOT
STORAGE
FAILOVER
CONCEPT
SOFTWARE

VIRTUALIZATION

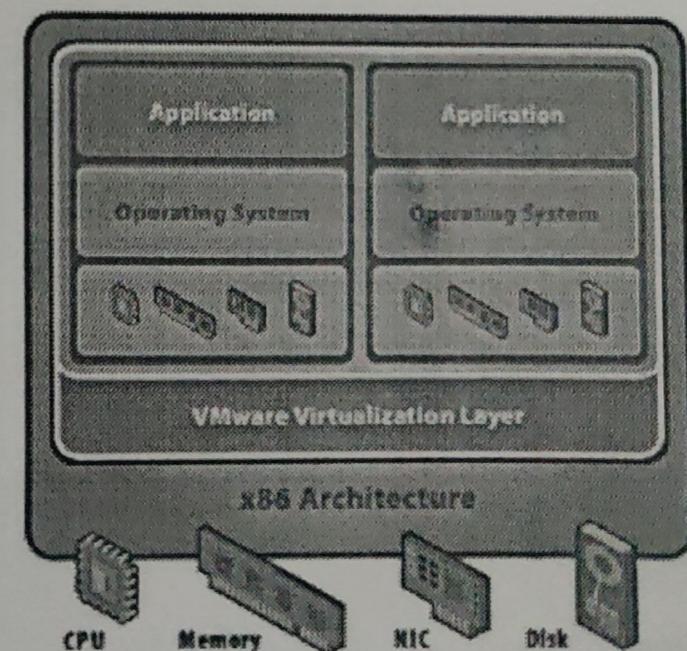
Before Virtualization

- Single OS image per machine
- Software and hardware tightly coupled
- Running multiple applications on same machine often creates conflict
- Underutilized resources
- Inflexible and costly infrastructure



After Virtualization

- Hardware-independence of operating system and applications
- Virtual machines can be provisioned to any system
- Can manage OS and application as a single unit by encapsulating them into virtual machines

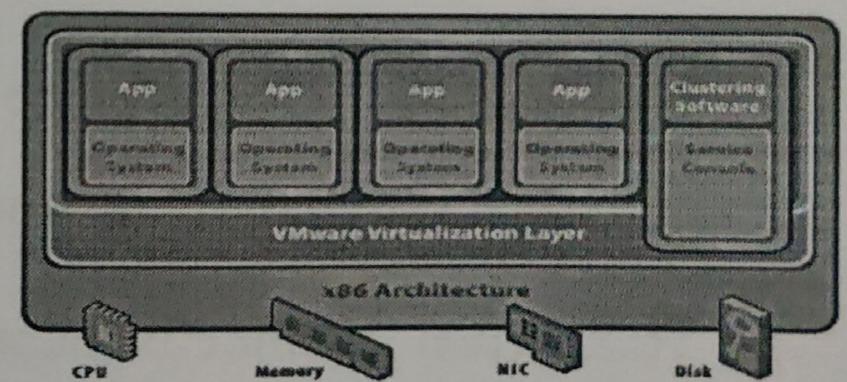


Virtualization approaches

- Two Types of Approaches
- Type 1 Hypervisors
 - Bare Metal (Hypervisor) Architecture
- Type 2 Hypervisors
 - Hosted Architecture

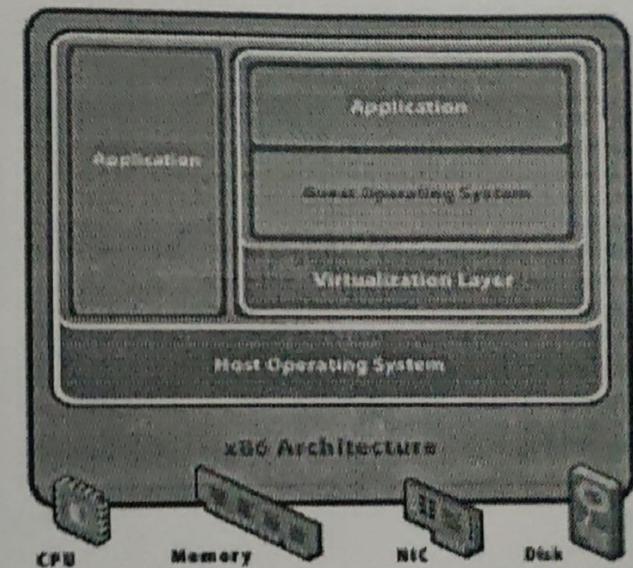
Type -1: Bare Metal (Hypervisor) Architecture

- It does not require admins to install a Host OS first.
- It has direct access to hardware resources,
- which results in better performance, scalability and stability
- The top 5 Hypervisors
 - VMware vSphere / ESXi.
 - Microsoft Windows Server 2012 Hyper-V
 - Xen / Citrix XenServer. ...
 - Red Hat Enterprise **Virtualization** (RHEV) ...
 - KVM



Type 2 - Hosted Architecture

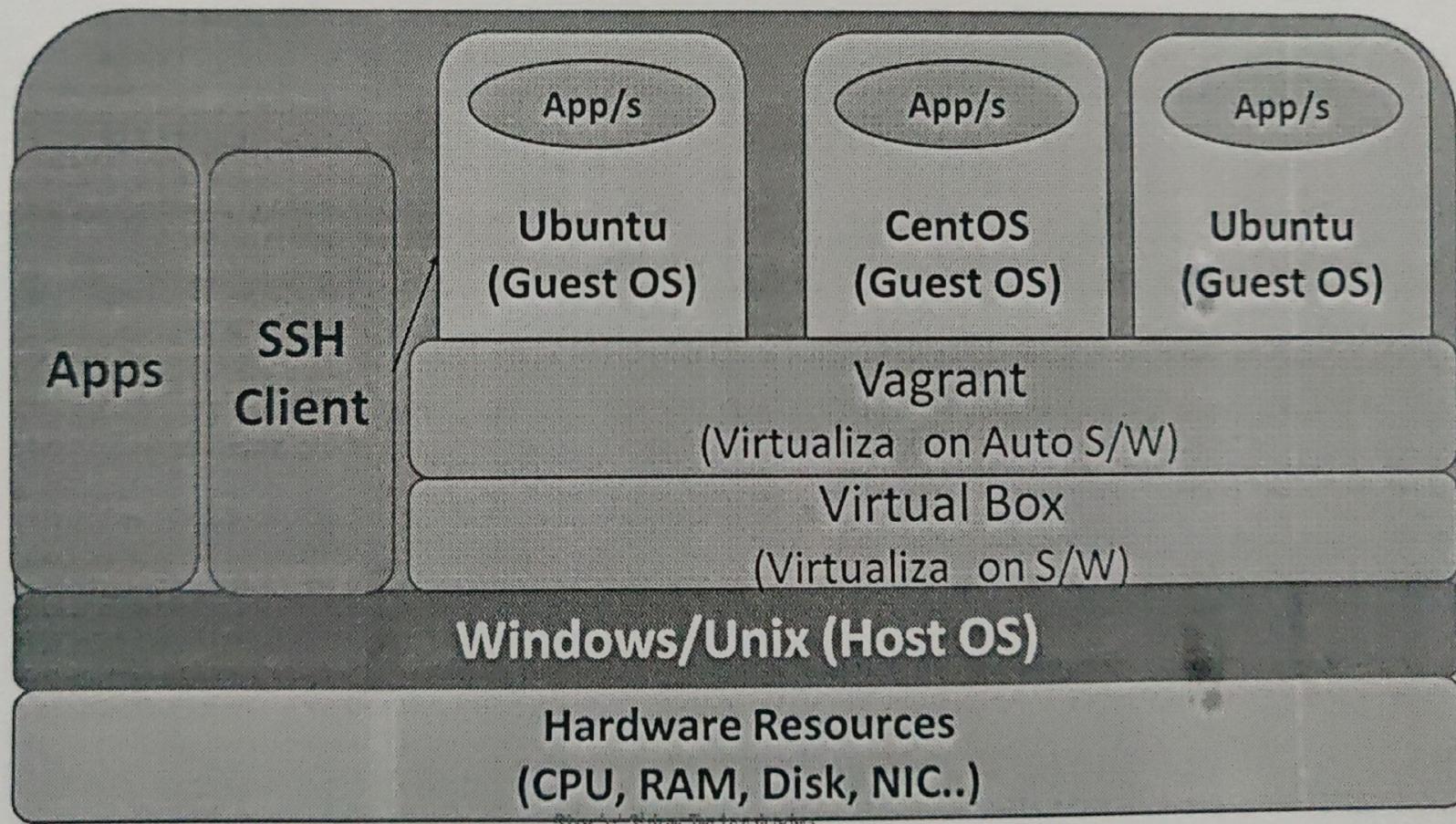
- Installs and runs as an application
- Relies on host OS for device support and physical resource management
- Type 2 Hypervisors:
 - VMware Workstation/Fusion/Player.
 - VMware Player is a free virtualization hypervisor.
 - VMware Server.
 - Microsoft Virtual PC. ...
 - Oracle VM VirtualBox. ...
 - Red Hat Enterprise Virtualization.



Virtualization Concept

- Creating a virtual machine over existing operating system and hardware is referred as Virtualization.
- Virtual Machines provide an environment that is logically separated from the underlying hardware.
- The machine on which the virtual machine is created is known as **host machine** and **virtual machine** is referred as a **guest machine**.
- This virtual machine is managed by a software or firmware which is known as **hypervisor**.

DevOps Solution on Virtualization Concept



Oracle VM VirtualBox

- Virtualization software from Oracle
 - Free
 - Runs on Windows, Mac, Linux
 - Runs as an application
 - Allows us to use local VMs
 - Easy to install
 - Works well with Vagrant
-
- <https://www.virtualbox.org/>

Vagrant

- Virtualization workflow software from HashiCorp
- Free, open-source
- Runs on Windows, Mac, Linux
- Easy to install
- Works well with Puppet, Chef, Shell
 - many other **provisioners**
- Works well with VirtualBox, VMware, Amazon Web Services
 - many other **providers**
- <https://www.vagrantup.com/>

What is a Vagrant Box?

- Vagrant boxes are just ‘Templates’
- Is a previously builted Vagrant virtual machine image,
- ready-to-run
- Available in a lot of platforms (Linux, Windows)
- Manage Boxes such as:
 - Vagrant box list
 - Vagrant box add
 - Vagrant box remove

Virtual Machine Setup using Vagrant:

By

Venkat

Rise ‘n’ Shine Technologies

Install the Softwares:

- Download the following software and install on windows:
 - Vagrant Software (Virtualization Automation Software)
 - <https://www.vagrantup.com/>
 - Oracle Virtual Box (Virtualization Software)
 - <https://www.virtualbox.org/wiki/Downloads>
 - Git Bash (Terminal)
 - <https://git-scm.com/downloads>

Steps to Launch the Virtual Machine:

1. Open Git Bash Terminal
2. Create a Directory
 1. \$ mkdir vml
 2. \$ cd vml
3. In the bash terminal run
 1. \$ vagrant init (It creates a VagrantFile in the current directory)
4. Open the Vagrantfile in text editor and modify the vagrant file to specify the vagrant box name
 1. config.vm.box = "centos/7"

Steps to Launch the Virtual Machine:

5. Run the following command to Start the VM

- \$ vagrant up –provider virtualbox

Note: while starting VM, if you face any issue make sure that ‘virtualization’ property is enabled during bootup process.

6. Run the following command to connect the VM

- \$ vagrant ssh

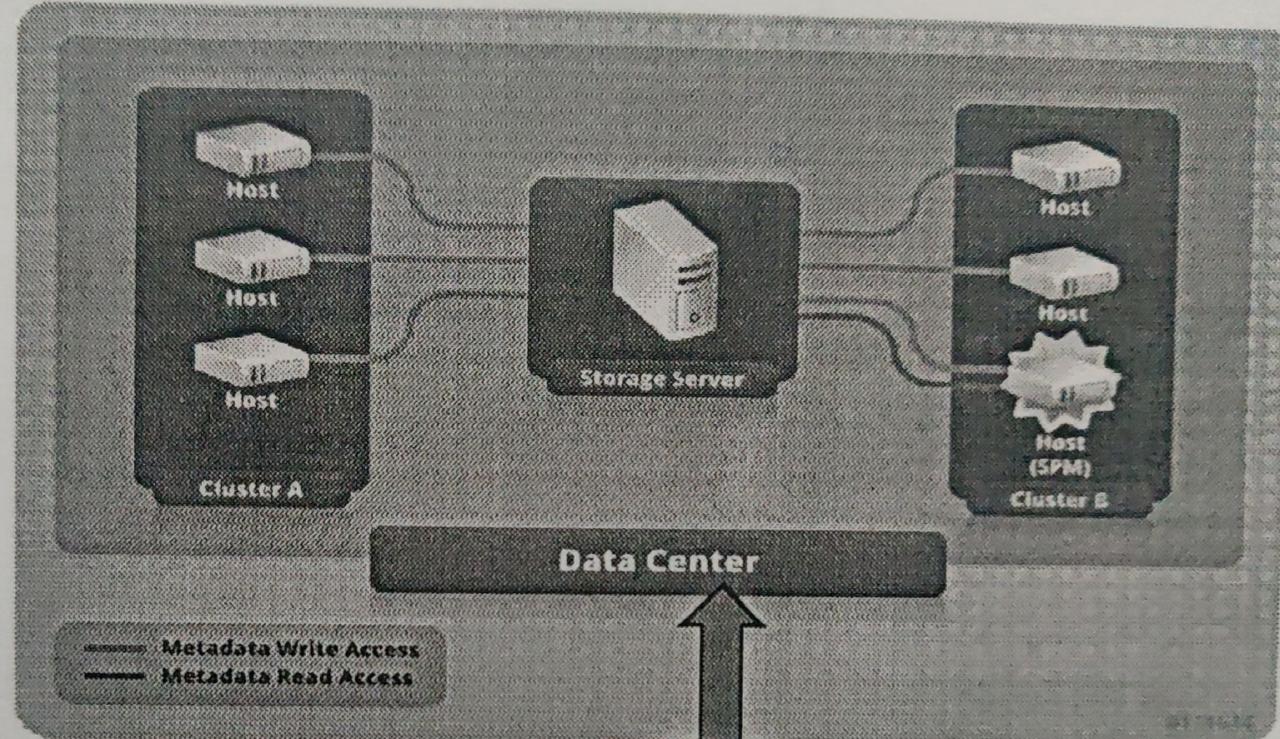
Steps to Launch the Virtual Machine:

7. Now the system is ready. You can switch to root user by using command
 \$ sudo su -
 \$ exit (root user exits)
 \$ exit (vagrant user exits)
 8. Shut down and Destroy the VM
 \$ vagrant halt
 \$ vagrant destroy
-
- Note: the default user name and password for vagrant box is vagrant/vagrant.

Introduction to Unix:

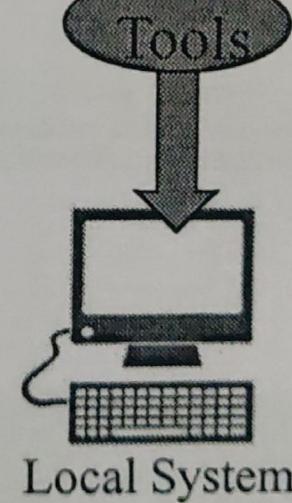
Remote Server:

- IP / Hostname
- User Name
- Password



Tools:

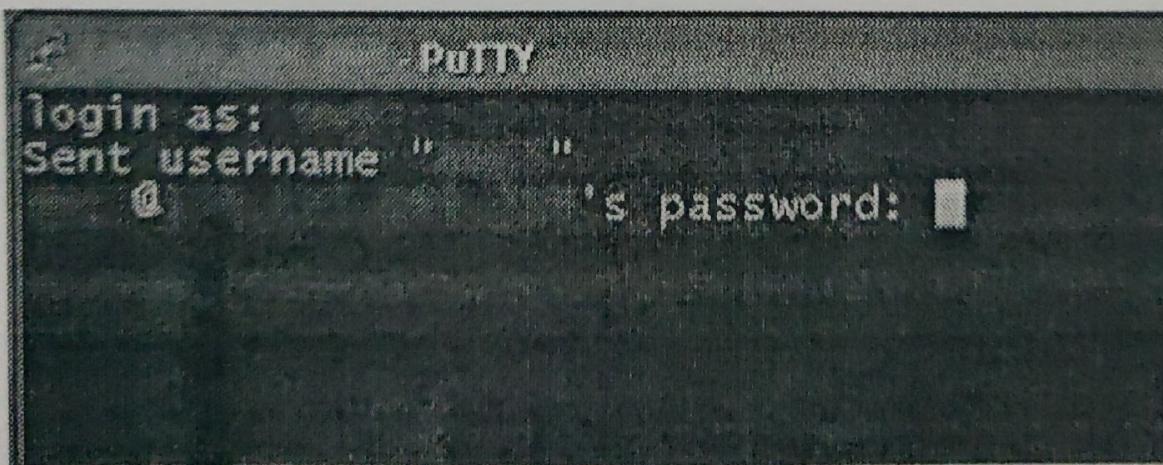
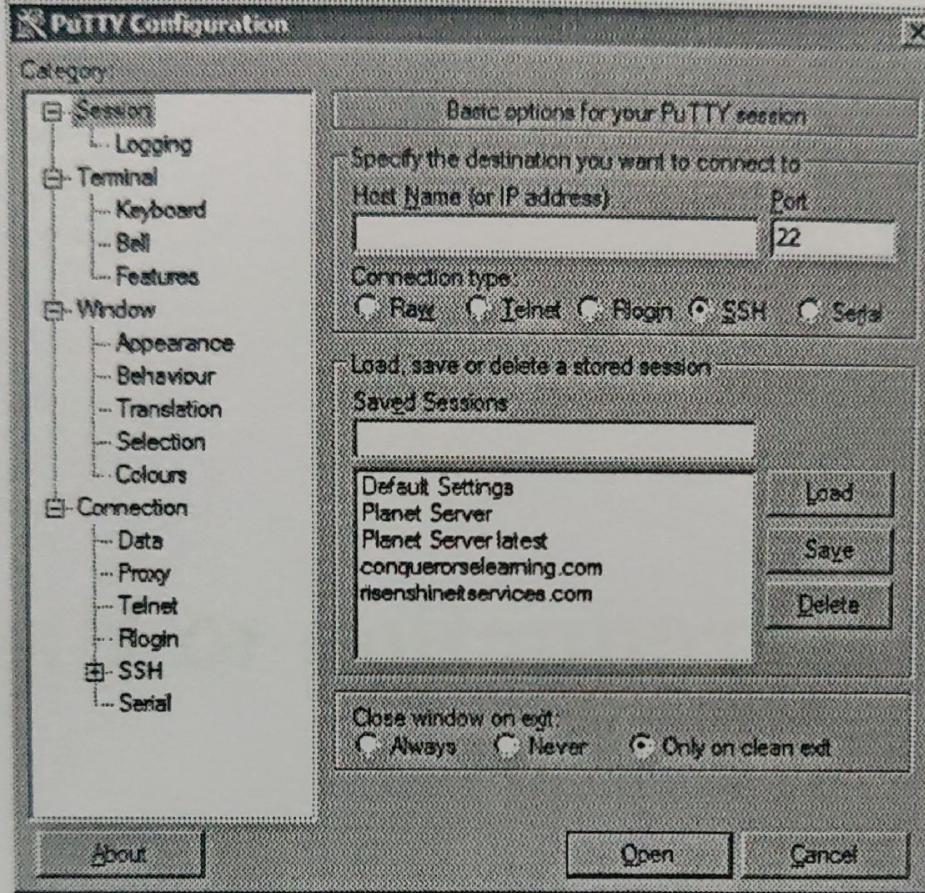
- Putty/Git Bash (SSH Client)
- WinScp



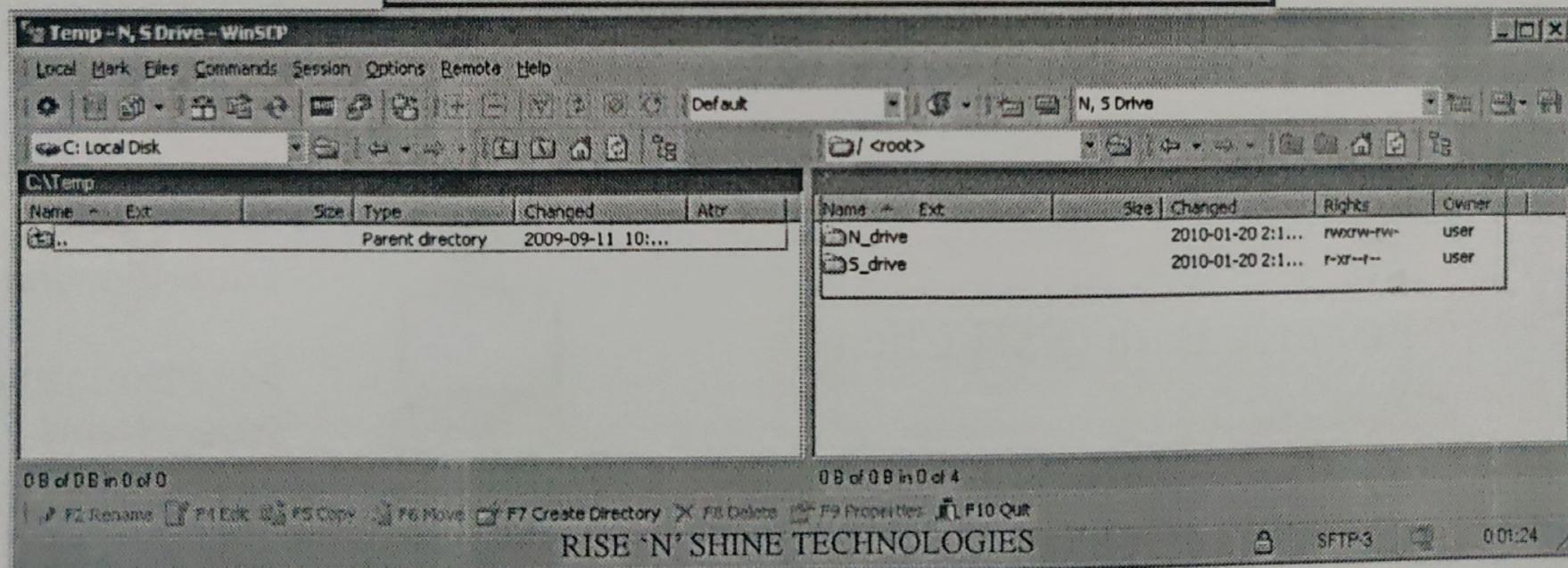
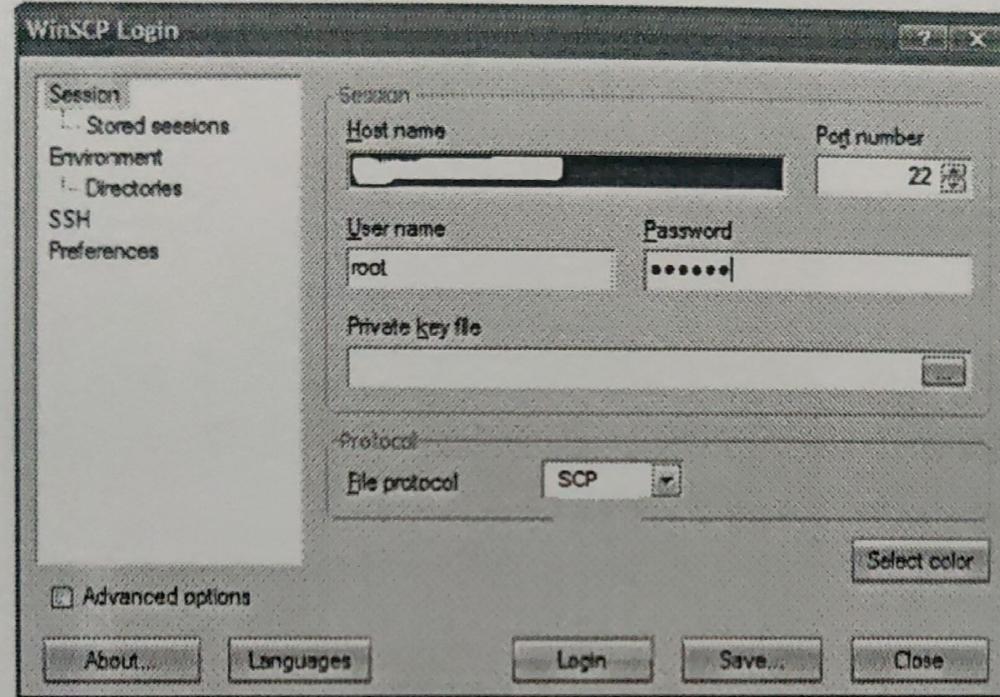
Local System:

- IP / Hostname
- User Name
- Password

Putty:



Win Scp:

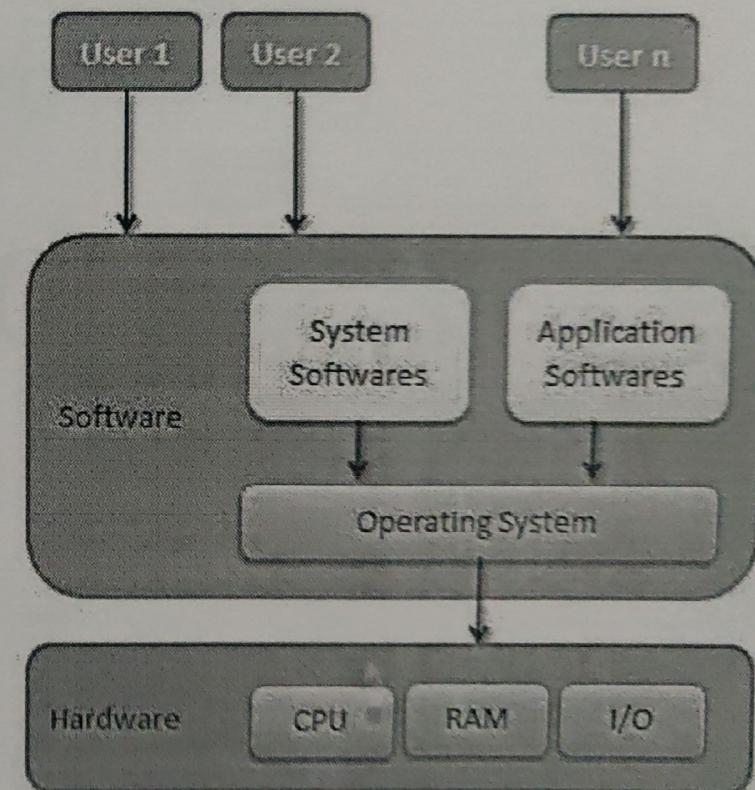


Linux Distributions

Rise 'n' Shine Technologies

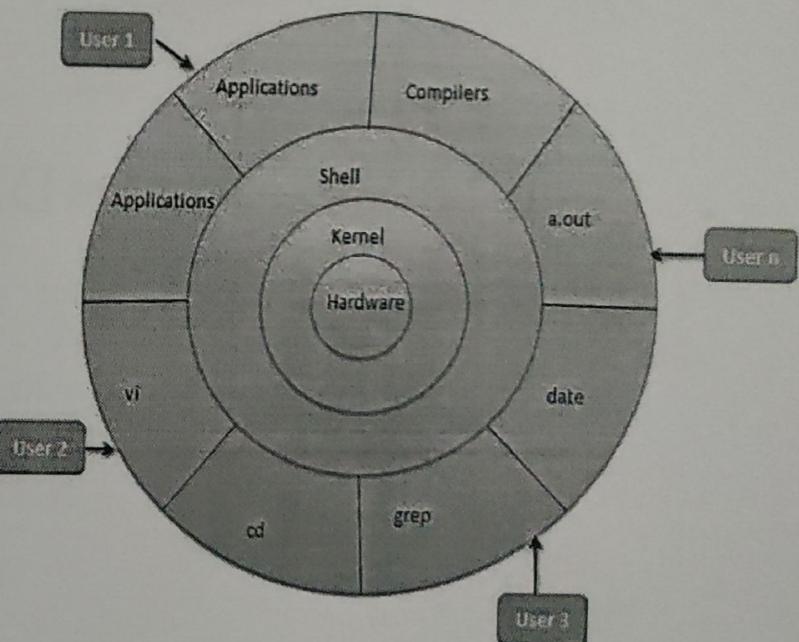
Linux

- Linux is an Operating System
 - a collection of software
- Linux OS = Linux Distribution
- Distro / Flavor = Distribution



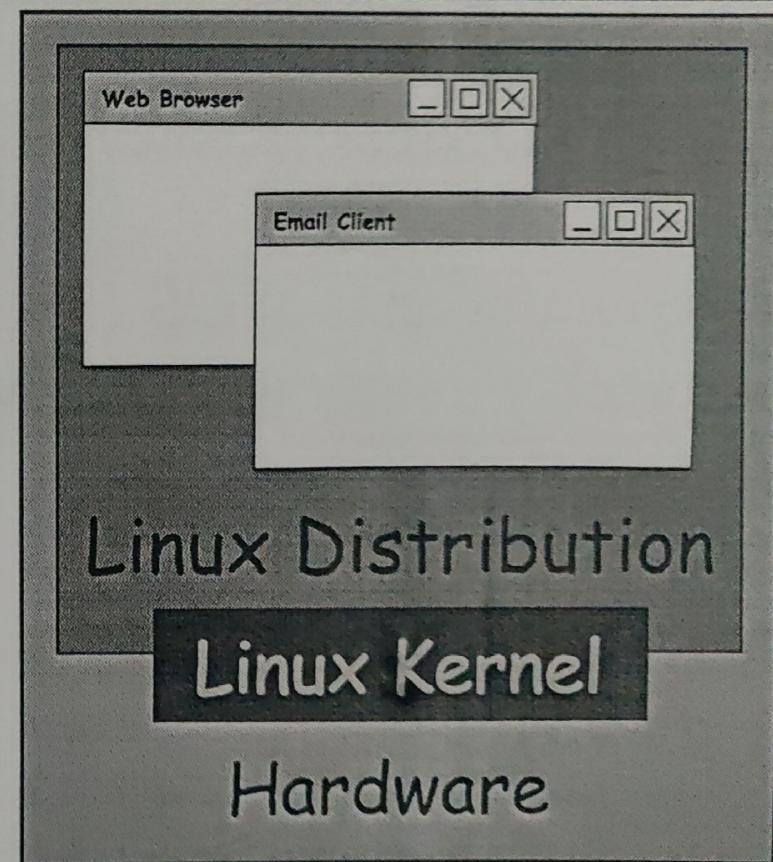
Linux Architecture:

- **Hardware layer:**
 - all H/W devices (RAM/ HDD/ CPU...)
- **Kernel:**
 - core component of OS
 - interacts directly with hardware
- **Shell:**
 - An interface to kernel
 - takes cmd's from the user and executes kernel's functions.
- **Utilities –**
 - functionalities of an OS.



Linux Kernel

- The kernel is the core.
- Linux Kernel + Apps = Distro



Types of Distro:

RPM Based Linux Distro:

RedHat Enterprise Linux (RHEL)

CentOS

Fedora

OpenSuse

Mageia



redhat.

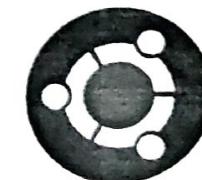
Debian Based Linux Distro:

Debian

Ubuntu

Linux Mint

SteamOS



ubuntu



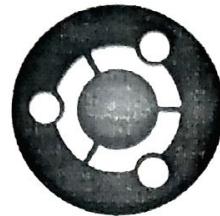
redhat.[®]

Popular in:

- Banks
- Airlines
- Telecoms
- Healthcare



Rise 'n' Shine Technologies



ubuntu

Popular in:

- Startups
- SaaS
- Social Networks
- Cloud Based

Linux is Linux

- Linux concepts are universal.
- Each distro is slightly different.
- You can accomplish the same goals on most Linux distros.

Summary

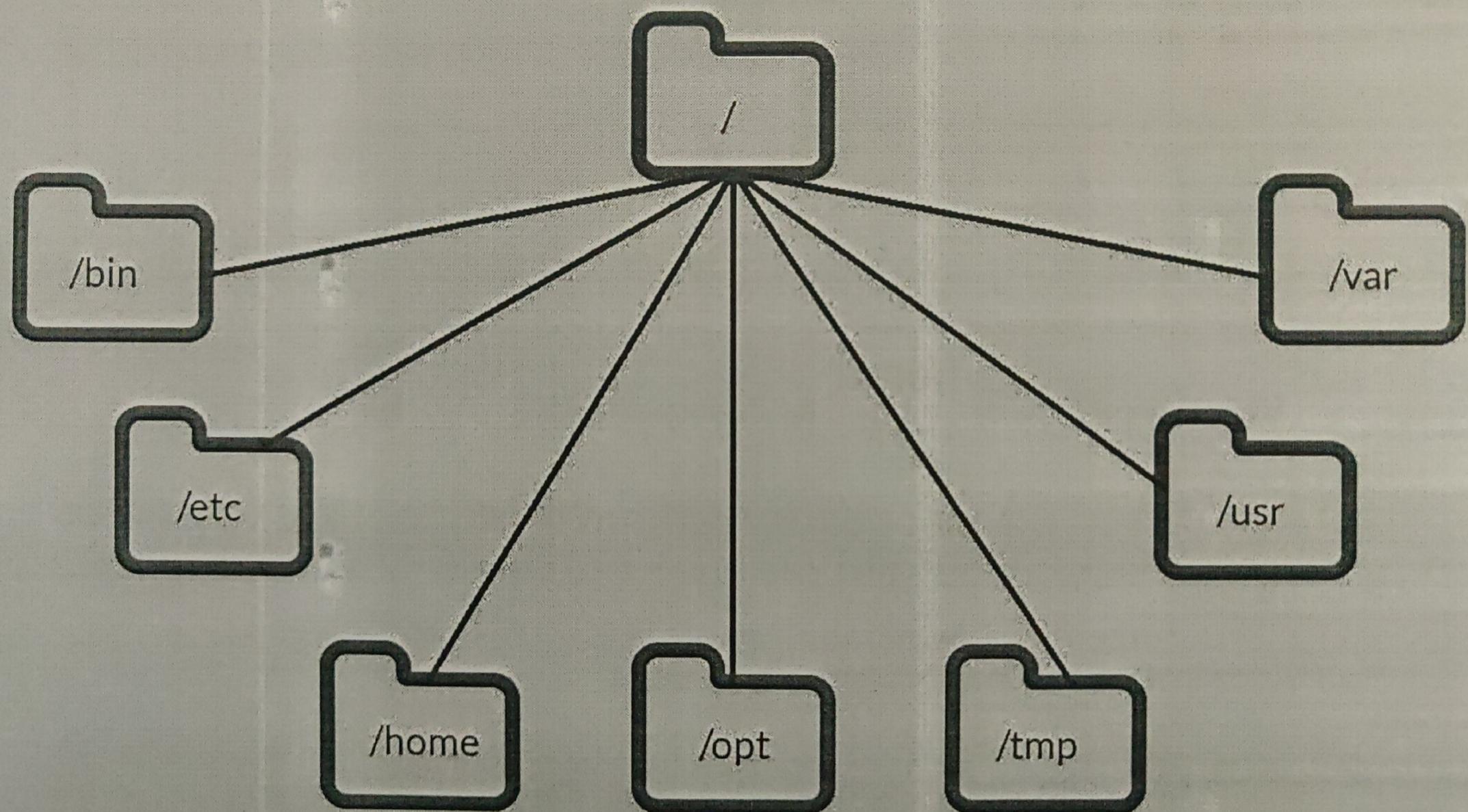
- Linux Distro = kernel + software
- RHEL and Ubuntu
- CentOS = RHEL - branding/logos

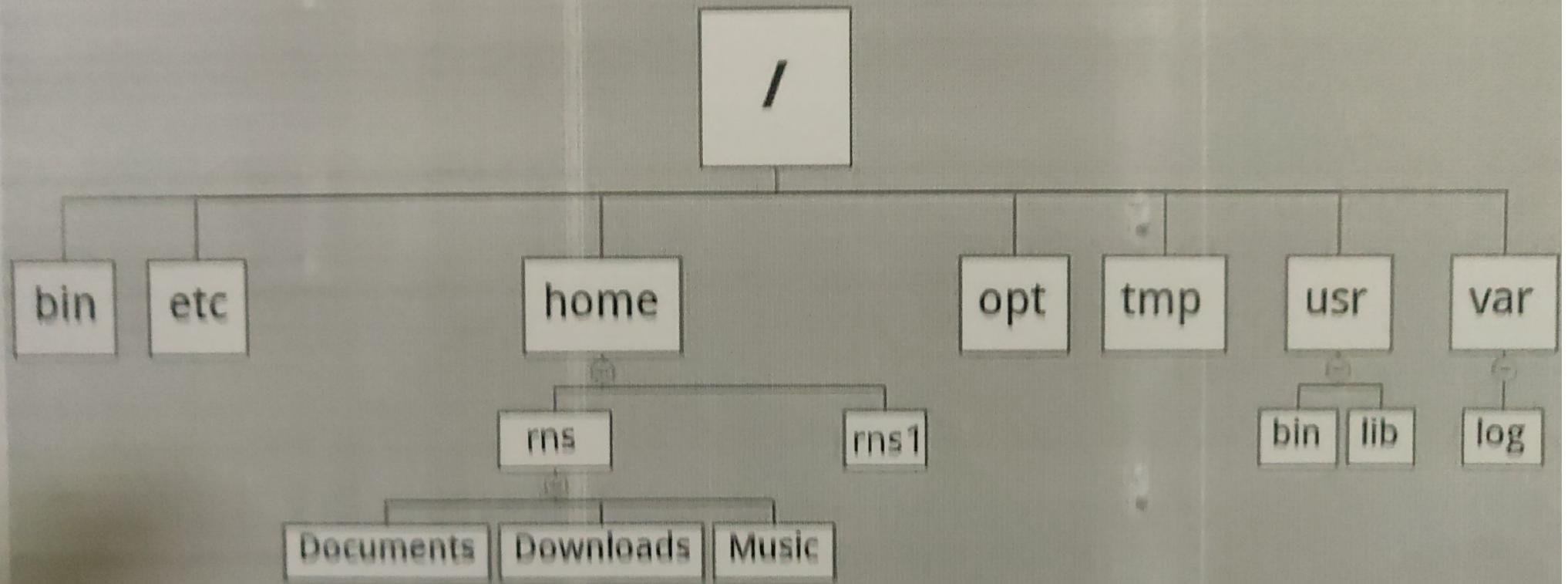
Linux Directory Structure

The Filesystem Hierarchy

Common Directories

- / “Root,” the top of the file system hierarchy.
- /bin Binaries and other executable programs.
- /etc System configuration files.
- /home User Home directories.
- /opt Optional or third party software.
- /tmp Temporary space, typically cleared on reboot.
- /usr User related programs.
- /var Variable data, most notably log files.





Comprehensive Directory Listing

- /boot Files needed to boot the operating system.
- /proc Provides info about running processes.
- /root The home directory for the root account.
- /sbin System administration binaries.
- /lib System Libraries.
- /lib64 System Libraries, 64 bit.
- /lost+found Used by the file system to store recovered files after a file system check been performed.

Comprehensive Directory Listing

- /usr User related programs, libraries, and docs.
- /usr/local Locally installed software that is not part of the base operating system.
- /usr/sbin System administration binaries.
- /var Variable data, most notably log files.
- /var/log Log files.

Application Directory Structures

Type 1:

- /usr/local/crashplan/bin
- /usr/local/crashplan/etc
- /usr/local/crashplan/lib
- /usr/local/crashplan/log

Application Directory Structures

Type 2:

- /opt/avg/bin
- /opt/avg/etc
- /opt/avg/lib
- /opt/avg/log

Summary

- The most common directories:
 - /
 - /bin
 - /etc
 - /home
 - /opt
 - /tmp
 - /usr
 - /var
- Applications that are not part of the base OS can be installed in:
 - /usr/local
 - /opt

Welcome to Shell

The Command Line Interface to the Linux OS

What Is the Shell?

- The default interface to Linux
- A program that accepts your commands and executes those commands
- Also called a command line interpreter

The Prompt

[vagrant@localhost ~]\$

[root@localhost:~]#

Command Line Interface vs a GUI

- The command line is more powerful.
- There will always be a command line.
- Server distributions do not include GUIs.
- Desktop distributions have GUIs and CLIs.

Root, the Superuser

- Root is all powerful.
- Normal accounts can only do a subset of the things root can do.
- Root access is typically restricted to system administrators.
- Root access may be required to install, start, or stop an application.
- Day to day activities will be performed using a normal account.

The Prompt

- vagrant@localhost \$
- [vagrant@localhost /tmp]\$
- localhost:/home/vagrant>
- vagrant@localhost:~>
- [16:45:51 localhost ~]\$
- \$
- %
- >

Tilde Expansion

- \sim vagrant = /home/vagrant
- \sim rns = /home/rns
- \sim root = /root
- \sim ftp = /srv/ftp

Summary

- The shell is the default user interface.
- Use the terminal application to get to the CLI.
- Shell prompts can vary greatly in appearance.
- Root is the superuser.

Basic Linux Commands

Basic Linux Commands

- \$ ls # Lists directory contents.
- \$ cd # Changes the current directory.
- \$ pwd # Displays the present working directory.
- \$ cat # Concatenates and displays files.
- \$ echo # Displays arguments to the screen.
- \$ man # Displays the online manual.
- \$ exit # Exits the shell or your current session.
- \$ clear # Clears the screen.

1 - System Information

```
$ uname -a          # Display Linux system information  
$ uname -r          # Display kernel release information  
$ uname -i          # Display bit processor information  
$ cat /etc/*release # Show which version of os installed  
$ uptime            # Show how long the system has been running  
$ hostname          # Show system host name  
$ hostname -I        # Display the IP addresses of the host
```

1 - System Information

\$ last reboot	# Show system reboot history
\$ date	# Show the current date and time
\$ cal	# Show this month's calendar
\$ who	# Display who is online
\$ whoami	# Who you are logged in as

2 - Directory Navigation

- Directories Are Containers for other files and directories.
- Provide a tree like structure.
- Can be accessed by name or shortcut.

.

This directory

..

The parent directory

\$ cd -

Change to the previous directory

\$ cd ..

To go up one level of the directory tree.

\$ cd

Go to the \$HOME directory

\$ cd /etc

Change to the /etc directory

3 - File and Directory Commands

\$ ls -lrth	# List all files in a long listing format
\$ ls -al	# List all files in a long listing format and hidden
\$ mkdir directory	# Create a directory
\$ mkdir [-p] dir/dir/	# Create a directory with path
\$ touch file	# Create an empty file or update the access and modification times of file.
\$ cat file	# View the contents of file

3 - File and Directory Commands

```
$ less file      # Browse through a text file  
$ more file     # view the content of the file page by page  
$ head file     # Display the first 10 lines of file  
$ head -20 file # Display the first 20 lines of file  
$ tail file     # Display the last 10 lines of file  
$ tail -20 file # Display the last 20 lines of file  
$ tail -f file   # Display last 10 lines of file and "follow" file as it grows.  
$ head -50 file | tail -10    # Display lines from 40 to 50
```

3 - File and Directory Commands

\$ rm file	# Remove (delete) file
\$ rm -r directory	# Remove directory and its contents recursively
\$ rm -f file	# Force removal of file
\$ rm -rf directory	# Forcefully remove directory recursively
\$ rmdir [-p] directory	# Remove a directory.

Listing Files

Understanding ls Output

Rise 'n' Shine Technologies

What You Will Learn:

- What the long listing format components are.
- How to see hidden files and directories.
- How to list files by type.
- How to list files sorted by time.
- How to handle spaces in file names.
- What symbolic links are.

Decoding ls -l Output:

\$ ls -l

-rw-rw-r-- 1 root root 10400 Sep 27 08:52 sales.data

Permissions	-rw-rw-r--
Number of links	1
Owner name	root
Group name	root
Number of bytes in the file	10400
Last modification time	Sep 27 08:52
File name	sales.data

Listing All Files, Including Hidden Files:

- Hidden files begin with a period.
 - Sometimes called “dot files.”
- Hidden files are not displayed by default.
- To show hidden files with ls, use ls -a.
- Command options can be combined.
 - ls -l -a is the same as ls -la and ls -al.

Listing Files by Type:

Use ls -F to reveal file types.

/	Directory
@	Link
*	Executable

Symbolic Links:

- A link is a points to the actual file or directory.
- Use the link as if it were the file.
- A link can be used to create a shortcut.
 - Use for long file or directory names.
 - Use to indicate the current version of software.

`ln -s src_file dest_dir`

Listing Files by Time and in Reverse:

ls -t List files by time.

ls -r Reverse order.

ls -latr Long listing including all files reverse sorted by time.

ls -R Lists files recursively

ls --color Colorize the output.

The tree Command:

Similar to ls -R, but creates visual output.

tree -d List directories only.

tree -C Colorize output.

Working with Spaces in Names:

- Just say no to spaces!
- Alternatives:
 - Hyphens (-)
 - Underscores (_)
 - CamelCase

Working with Spaces in Names:

- Encapsulate the entire file name in quotes.
- Use a backslash (\) to escape spaces.

ls Options:

- a List all files, including hidden files.
- color List files with colorized output.
- l Use the long listing format.
- r Reverse the order.
- R List files recursively.
- t Sort by time, most recent first.

Copying, Moving & Renaming Files

Rise 'n' Shine Technologies

What You Will Learn:

- Copying files
- Moving files
- Renaming files
- Compressing files
- Creating archives

Copying Files:

```
$ cp source_file destination_file
```

Copy source_file to destination_file.

```
$ cp src_file1 [src_fileN ...] dest_dir
```

Copy source_files to destination_directory.

cp Options:

\$ cp -i

Run in interactive mode.

\$ cp -r source_directory destination

Copy src_directory recursively to destination.

Moving and Renaming Files:

mv - Move or rename files and directories.

\$ mv source destination

\$ mv -i source destination

Sorting Data:

sort file -

Sort text in file.

sort Options:

-k F # Sort by key. F is the field number.

-r # Sort in reverse order.

-u # Sort unique.

Creating a Collection of Files:

-- tar [-] c|x|t f tarfile [pattern]

Create, extract or list contents of a tar archive using pattern, if supplied.

- c Create a tar archive.
- x Extract files from the archive.
- t Display the table of contents (list).
- v Be verbose.
- z Use compression.
- f file Use this file.

Compressing Files To Save Space:

-- gzip

Compress files.

-- gunzip

Uncompress files.

Disk Usage:

du Estimates file usage.

du -k Display sizes in Kilobytes.

du -hs Display sizes in human readable format.

Disk Free:

df -h Disk free information