

# What is Operating System?

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# OS is an interface between user and the computer hardware

#### How It Works



# **Operating Systems** chnologies

- Windows ullet
- OS X (MAC OS) ullet
- **IBM-AIX** ullet
- HP-UX ullet
- Solaris igodol
- Linux  $\bullet$
- 18181 RedHat, Ubuntu, fedora, Suse, Debian, cent, etc...



#### How to get a Linux system

- Install Linux OS directly in Laptop or Desktop
- Install VMware and create a VM
- Install Virtual Box and Create VM
- Provision a Linux VM on Cloud (AWS/Azure/GCP etc..)



- Free
- Stability
- Secure
- Community Support

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#### Linux Architecture





# Create An AWS Free Tier Account

# Creating an Linux EC2 Instance

# Connect to a Linux EC2 Instance

# Linux Filesystem Hierarchy lalan,

#### Linux Filesystem Hierarchy

Directory Name	Description
/	This is top level directory It is parent directory for all other directories It is called as ROOT directory It is represented by forward slash (/) C:\ of windows
/root	it is home directory for root user (super user) It provides working environment for root user C:\Documents and Settings\Administrator
/home	it is home directory for other users It provide working environment for other users (other than root) c:\Documents and Settings\username

#### Linux Filesystem Hierarchy

Directory Name	Description
/usr	by default softwares are installed in /usr directory (UNIX Sharable Resources) c:\program files
/bin	it contains commands used by all users (Binary files)
/sbin	it contains commands used by only Super User (root) (Super user's binary files)
/var	it is containing variable data like mails, log files



#### Linux Basic commands

Command	Description	
date	Show the current date and time	
cal	Show this month's calendar	
uptime	Show current uptime	
whoami	who you are logged in as	
finger	Display information about user	
users / id	Shows user information	
man command	Shows manual of command	
username	Shows your user name	
who / w	display who is online	

#### View files

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Command	Description	
ls	directory listing	
cat filename	view file content	
less	view a file page by page	
more	output the contents of <i>file</i>	
head	output the first 10 lines of <i>file</i>	
tail	output the last 10 lines of <i>file</i>	
page	display file page by page	

#### Create & Delete file/directory

Command	Description	
touch	create a 0 bites file	
cat > filename	create file and allow to write	
nano	create a file if filename doesn't exist	
vi	create a file if filename doesn't exist	
rm	remove a file	
mkdir	Create a directory	
rmdir	Remove a empty directory	
rm -rf	Remove a directory	

### Managing files or directories

Command	Description	
ср	Copy a file	
mv	Move a file	
find	Find a file	
grep	Search for a pattern in a file	
cd	Switch between directories	
diff	Find content difference in 2 files	
sed	search and replace particular pattern	
chmod	Change file permissions	
chown	Change Ownership of a file	
file	Show what kind of file it is	

## System Management

Command	Description	
history	list all commands executed by a user	
free	Free memory of a server	
/proc/meminfo	Displays memory information	
/proc/cpuinfo	Displays CPU information	
uname -a	show kernel information	
du	show directory space usage	
whereis	show possible locations of <i>app</i>	
which	show which <i>app</i> will be run by default	

### Networking

Command	Description	
hostname	lists host name of the server	
ping <ip></ip>	availability of destination server over the network	
wget	download packages/softwars onto Linux system	
ifconfig	lists IP address(es) of the server	
telnet	connect to remote host / check port availability status	
curl	acces the application as from browser	
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#### **Port Numbers**

	Port Number	Service	
	21	FTP	
	22	SSH	
	23	TELNET	
	25	SMTP	
	53	DNS	
	80	НТТР	
121	443	HTTPS	

### Software Management

yum is the primary tool for getting, installing, deleting, querying, and managing RedHat Enterprise Linux RPM software packages from official RedHat software repositories, as well as other third-party repositories.

#### **Commands:**

yum install <package name>
yum remove <package name>
yum update <package name>
yum info <package name>
yum list available
yum list installed



service - This controls the starting and stopping of services

chkconfig - This controls which services are set to start on boot

#service <name of the service> status --- To check the status of the service #service <name of the service> start --- To start the service #service <name of the service > stop --- To stop a service #service <name of the service> reload --- To reload the service #service <name of the service> restart --- To restart the service

#chkconfig --list --- To check the availability of service
#chkconfig <service> on --- To make the service available after restart
#chkconfig <service> off --- To make the service unavailable after restart

### **Process Management**

- When you start a program or running an application in Linux, it actually run as a process.
- A Linux process (a daemon), running in foreground or in the background, uses memory and CPU resources.

Command	Description	
ps -ef	list the process which are running in the system	
kill / kill -9	kill a process or service	
fg	run the program in the foreground	
bg	Run the service in the back group	
top	List top 20 process which are consuming more CPU	

### Networking

**IP Address:** An IP address can be thought of as being similar to a phone number. Just as every person who communicates with a telephone is using a phone with a unique phone number, every computer that is on the Internet has a unique IP address. Not only on internet but within an organization every computer is assigned an IP address so that they can communicate with each other.

Command:

ifconfig -a ip addr

#### Runlevels

Looks at the /etc/inittab file to decide the Linux run level.

Following are the available run levels

- 0 halt
- 1 Single user mode
- 2 Multiuser, without NFS
- 3 Full multiuser mode
- 4 unused
- 5-X11
- 6 reboot

#### Archiving files or directories

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Command	Description
gzip	Create a compressed file
gunzip	Unzip a file
tar	extract tar file

#### Crontab

In any operating system, it is possible to create jobs that you want to reoccur. This process known as *job scheduling*, is usually done based on user-defined jobs. For RedHat or any other Linux, this process is handled by the cron service or a daemon called **crond**, which can be used to schedule tasks

#### **Commands**:

```
crontab -l
crontab -e
```

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Field	Description	Allowed Value
MIN	Minute field	0 to 59
HOUR	Hour field	0 to 23
DOM	Day of the month	1-31
MON	Month field	1-12
DOW	Day of the week	0-6
CMD		any command

#### **Crontab** examples

Execute a job at 8:30 on everyday morning 30 8 \* \* \* Command

Execute a job at 2:00 PM on every Saturday 00 14 \* \* 6 Command

Execute a job at 12:00 AM on 1st July 00 00 01 06 \* Command

Execute a job at 3:30 PM on Every month 25th 30 15 25 \* \* Command

## Copy file between servers

Windows to Linux

Mobaxterm or winscp

#### Linux to Linux

SCP (secure copy) is a command-line utility that allows you to securely copy files and directories between two systems.

scp source\_file\_name username@destination\_host:destination\_folder
Example: scp file1 root@10.20.30.40:/tmp

scp root@10.20.30.40:/tmp /home/ec2-user/

#### Link Files

There are 2 types of link files.	<u> </u>
Soft link and Hard link	005
Soft link	Hard link
SHORTCUT FILE	BACKUP FILE
Size of link file is equal to no. of characters in the name of original file	Size of both file is same
if original file is deleted, link is broken and data is lost	If original file is deleted then also link will contain data
Command: ln -s <src_file> <dest_file></dest_file></src_file>	Command: ln <src_file> <dest_file></dest_file></src_file>

#### **I/O Redirection**

Redirection is a process where we can copy the output of any command(s), file(s) into a

new file. There are two ways of redirecting the output into a file.

Using > or >> filename after the command, and

**Examples:** 

cat file1 > file2
cat file1 >> file2
cat file1 file2 > file3



The SSH protocol (also referred to as Secure Shell) is a method for secure remote login from one computer to another. It provides several alternative options for strong authentication, and it protects the communications security and integrity with strong encryption.

Port Number :	22
Daemon :	sshd
Conf file C:	/etc/ssh/sshd_config

#### HTTP

Port Number : 80

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- Daemon :
- Conf file

- httpd
- /etc/httpd/conf/httpd.conf

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Access modes are different on file and directory

odes are different on file and directory		
permission	Files	Directory
r	Open the file	'ls' the contents of dir
w	Write, edit, append, delete file	Add/Del/Rename contents of dir
x	To run a command/shell script	To enter into dir using 'cd'



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Symbol	Type of file	
-	Normal file	
b	Block file (Harddisk, Floppy disk)	
C	Character file (Keyboard, Mouse)	
d	Directory	
I	link files (short cut)	

#### Grep command

Grep stands for Global Regular Expression Print.

It is used to pick out the required expression from the file and print the output.

Syntax: grep <patron> filename

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#### Sed command

stands for stream editor, which is used to search a word in the file and replace it with the

word required to be in the output.

Note: it will only modify the output, but there will be no change in the original file.

#### **Examples:**

```
sed 's/old_text/new_text/' file_name
sed 's/old_text/new_text/g' file_name
sed -i 's/old_text/new_text/' file_name
sed -n '5,10p' file_name
sed '10,20d' file_name
```

#### find command

find command is used to find the files or directory's path, it is exactly like the find option in

windows where you can search for a file.

Syntax: find / -option filename

	Option	Usage
	-name	For searching a file with its name
13	-user	For files whose owner is a particular user
	-group	For files belonging to particular group

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Permissions are applied at 3 levels

- Owner or User level
- Group level
- Others level

#### Permissions are applied in 3 ways

- r Read only
- w Write/Edit/Append/Delete
- x Execute/Run

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Unix/Linux files have 8 attributes that can be seen with Is -I command.



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Permission can be set on any file/dir by using two methods:-

- Symbolic method (ugo)
- Absolute method (numbers)

#### Symbolic method

# chmod [who] [+/-/=] [permissions] file

Who: To whom the permissions to be assigned

Permissions: User/owner (u); group (g); others (o)

Example:

#chmod u=rwx,g=rw,o=r <file\_name>
#chmod ugo=rwx <file name>

#### Absolute method

we use numbers instead of using symbols
Read - 4
Write - 2
Execute - 1
chmod 764 <file\_name>
Chmod 777 <file\_name>

#### User Management

- In Linux there are three types of users.
- 1. Super or root user: User is the most powerful user. He is the administrator user.
- 2. System user: Users created by the softwares or applications.
- 3. Normal user: Normal users are the users created by root user.

Туре	Example	Home Directory	Shell
Super User	Root	/root	/bin/bash
System User	ftp, ssh, apache	/var/ftp, etc	/sbin/nologin
Normal user	visitor, ec2-user	/home/username	/bin/bash

#### **User Creation**

Whenever a user is created in Linux, below things happen by default.

- A home directory is created(/home/username)
- unique UID & GID are given to user

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• An entry in /etc/passwd

#### **User Creation**

The syntax for creating a user in Linux is #useradd <option> <username>

Options are:

- -u user id
- -G Secondary group id
- -g primary group id
- -d home directory
- -c comment
- -s shell

Example : during docker setup we

should add user to a docker group.