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What is Operating System ?
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- > Operating System is a software
- > It acts as a mediator between end user and computer hardware components
- > OS is mandatory is mandatory to use a computer
- > There are several Operating Systems available in the market

Ex: Windows, Linux, Unix, Solaris, Mac, Android, IOS etc...

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Windows
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- 1) Windows OS developed by Microsoft
- 2) Widows is Licensed OS
- 3) Windows is single user based OS (only one person can use at a time)
- 4) Security features are very less in windows OS
- 5) Windows OS is recommended for personal use

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Linux
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- 1) Linux OS is developed by Linus Torvalds
- 2) Linux is free & open source OS
- 3) Linux is Multi User based OS (multiple users can use Linux Machine at a time)
- 4) Security Features are very high in Linux OS
- 5) Linux OS is higly recommended for applications deployments & servers setup

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History of Linux
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- > Linus Torvalds identified few issues in Unix and told to Unix team to change the Unix OS
- > Unix team didnt accept Linus Torvalds changes
- > Linus Torvalds started developing his own Operating System by using 'Minux' OS

(Li)nus Toravalds + Mi(nux) ==> Linux OS

- > Linus Torvalds released Linux OS for free of cost
- > Linux Torvalds provided Linux OS source code also in the internet
- > People and companies downloaded source code of Linux OS and they modified according to their requirement and released into market with their brand names
- > As companies released their own Linux OS we can see several distributions for Linux OS

Ex:

Ubuntu
CentOS
RedHat
Fedora
SUSE
KALI
Debian etc....

Note: There are 200+ Linux Distributions available in the market

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Environment Setup
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- 1) Create Account in AWS (Free Tier)
- 2) Create Linux Virtual Machine in AWS using EC2 service
- 3) Connect to Linux Virtual Machine using MobaXterm / Putty

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Linux File System
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Everything will be represented as file in Linux

3 Types of Files

- 1) Normal Files
- 2) Directory Files (Folders)
- 3) Link Files

-> Normal file will start with '-'

-> Directory file will start with 'd'

-> Link file will start with 'l'

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Files creation
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touch : It is used to create empty files

Syntax:

touch <filename>

touch f1.txt

touch a1.txt a2.txt a3.txt

cat : It is used to create files with content & it is used to print file content

Syntax:

cat > filename : Create file with data (ctrl + d to close the file)

cat >> filename : Append data to existing file

cat filename : Print file content

cat filename1 > filename2 : Copy data from one file to another file

cat f1.txt f2.txt > f3.txt : Copy more than one file data into another file

mv : It is used to move/rename the files

Syntax:

mv present-name new-name

rm : It is used to remove the files

syntax:

rm filename

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Working with Directories
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mkdir : it is used to create/make directory

rmdir : it is used to remove only empty directory

rm -r <dirname> : It is used to delete non-empty directories

cd <dirname> : Change directory

cd .. : Come out from the directory

ls -l <dirname> : list the content of given directory

cat <filename> : It will display all the data available in the file

head : It will display first 10 lines of the file from top (10 is the default count)

head <filename> (it will give first 10 lines of data)
head -n 15 <filename> (it will give first 15 lines of data)
head -n 25 <filename> (it will give first 25 lines of data)

tail : It will display last 10 lines of the file from bottom (10 is the default count)

tail <filename> (it will give last 10 lines data)
tail -n 15 <filename> (it will give last 15 lines data)
tail -n 25 <filename> (it will give last 25 lines data)

tail -n 50 <filename> (it will give last 50 lines data)
tail -n +50 <filename> (it will give data from 50th line to till last line)

Note: To get latest data from file we need to use 'tail' command because latest data will be appended at bottom

grep : Global Regular Expression Print

-> Grep is used for searching

grep -i 'Linux' * (It will search for linux word in all the files)

`grep -i 'Linux' <filename>` (it will search for linux word in given filename)

`wc` : (word count) it is used to count no.of lines, words and no.of characters of given file

`wc <filename>`

`cp` : It is used for copy and paste

`cp <filename> <filename>`

Note: If we want to copy more than one file data then we should go for 'cat' command

`cat f1.txt f2.txt > f3.txt`

`mv` : it is used for renaming & moving

`mv <existing-file-name> <new-file-name>`

`mv <source> <destination>`

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Text Editor

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`vi` : Visual Editor

`vi <filename>` : It will open the file

press 'i' to enter into 'insert' mode

-> in insert mode we can change file data

press 'esc' to come out from insert mode

press :wq to save and quit the file

press :q! to close the file without saving

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SED : Stream Editor

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-> It is used to perform search, find, replace, insert and delete

-> This command is famous for substitution (replacement)

-> Using SED command we can perform operations without opening the file

`sed 's/Python/JAVA/' python.txt` (it will print output on console but original data will not modified in the file)

`sed -i 's/Python/JAVA/' python.txt` (it will make changes in original file)

`sed -i '5d' <filename>` (it will delete 5th line)

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Man command
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-> It will provide information about given command (documentation command)

man ls

man cat

man tac

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Find & Locate Commands
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-> find & locate commands are used for file search in linux machine

-> locate command will perform search operation in locate database (internal database in linux)

-> find command will perform search operation in entire linux file system (It will give accurate result)

locate apache (it will give all the files path which are having apache in the file name)

locate -c apache (it will give file count)

find /home -name python.txt (it will search for the file with name python.txt inside /home directory)

find /home -type f -empty (It will print all empty files available inside /home directory)

find /home -type d -empty (it will print all empty directories)

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history
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-> It will give commands execution history

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ls -ltr
touch
cat
tac
rm
mv
mkdir
rmdir
rm -r <dirname>
head <filename>
head -n 100 <filename>
tail <filename>
tail -n 50 <filename>
tail -n +25 <filename>
grep
wc
vi
sed
man
find

locate
history

```
#####  
Working with User Accounts in Linux  
#####
```

- > Linux is a multi-user operating system
- > With in one linux machine we can create multiple user accounts
- > Multiple users can access one linux vm at a time and they can perform Multi-tasking

Note: Every linux machine will have 'root' account (super user --> sudo)

- > When we launch a linux vm using 'Amazon Linux AMI' we will get 'ec2-user' account by default

whoami -> it will give currently logged in username

id <username> : It will give information about user account

pwd : It will display present working directory

Note: For every user account, one home directory will be created.

For ec2-user account the home directory is : /home/ec2-user

Switch to root user

\$ sudo su

Note: To perform admin activities we will use 'sudo' permission

```
#####  
Create user in linux  
#####
```

```
# create user  
$ sudo useradd <username>
```

```
# set password for user  
$ sudo passwd <username>
```

```
# verify user account details  
$ id <username>
```

```
# List all users in Linux  
$ cat /etc/passwd
```

```
# switch user account  
$ su <username>
```

Note: After swithcing username, change home directory also

```
# delete user  
$ sudo userdel <username>
```

```
# Display all groups
$ cat /etc/group

# Create a group
$ sudo groupadd <groupname>

# Add user to a group
$ sudo usermod -aG <group-name> <user-name>

# Remove user from the group
$ sudo gpasswd -d <username> <group-name>

# Delete group
$ sudo groupdel <group-name>

# print users who are belongs to particular group
$ sudo lid -g <group-name>
```

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File Permissions
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-> File Permissions will decide who can do what on that file

-> Every File will have 3 types of permissions

- 1) Read (r)
- 2) Write (w)
- 3) Execute (x)

-> In Linux, File Permissions are divided into 3 sections

- 1) User Permissions (first 3 characters)
- 2) Group Permissions (characters 4, 5, 6)
- 3) Others Permissions (characters 7, 8 & 9)

Ex: rwxrwxrwx

-> To change file permissions we have 'chmod' command

```
// add execute permission for user
$ chmod u+x <filename>

// add execute permission for group
$ chmod g+x <filename>

// remove write permission for group
$ chmod g-w <filename>

// add write & execute permissions for others
$ chmod o+wx <filename>

// add write permissions for others (2 files at a time)
$ chmod o+w <file1> <file2>
```

***** We can represent file permissions with Numeric Numbers also *****

0 - No Permission

1 - Execute

- 2 - Write
- 3 - Execute & Write
- 4 - Read
- 5 - Read & Execute
- 6 - Read & Write
- 7 - Read, Write & Execute

```
$ chmod 777 <filename>
```

```
$ chmod 765 <filename>
```

```
#####  
chown  
#####
```

-> 'chown' command is used to change file ownership

-> We can see owner of the file using 'ls -l' command

changing owner of a file

```
$ sudo chown <uname> <filename>
```

-> We can change file owner using userID also

```
$ sudo chown <UID> <filename>
```

Note: We can get UID for username using 'id uname' command

```
$ id ramesh
```

change group of a file

```
$ sudo chown :groupName <fileName>
```

Q) What is the difference between 'chmod' and 'chown' commands ?

chmod ---> it is used for managing file permissions

chown ---> it is used for managing file ownership

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Networking Commands  
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ifconfig : This command is used to get ip address of our machine

ping : It is used to check connectivity

```
$ ping <ip>
```

-> 0% packet loss means our ping is succesful (we got response from server)

-> 100% packet loss means our ping is failure (no response from server)

wget : It is used to download a resource from internet using URL

```
$ wget <url>
```

```
$ wget https://dlcdn.apache.org/maven/maven-3/3.8.6/binaries/apache-maven-3.8.6-bin.zip
```

Note: We can extract that zip file using 'unzip' command

```
$ unzip <zip-file-name>
```

curl : It is used to send http request to a server

```
$ curl <url>
```

```
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Softwares Installation In Linux
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-> To install softwares in Linux we will use Package Manager

-> There are several package managers available for Linux

- 1) yum
- 2) apt
- 3) deb
- 4) RHEL

-> Based on Linux distribution we need to choose package manager

Amazon Linux / Cent OS / Red Hat -----> yum

Ubuntu / Debian ---> apt

```
# update existing packages
$ sudo yum update -y
```

```
# install git client software in linux
$ sudo yum install git
```

```
# check git version
$ git --version
```

```
# install java
$ sudo yum install java
```

```
# install java 1.8 version
$ sudo yum install java-1.8.0-openjdk
```

```
# check java version
$ java -version
```

```
# install maven
$ sudo yum install maven
```

```
# check maven version
$ mvn -version
```

```
# Un-install software
$ sudo yum remove maven
```

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Hosting Static website in Webserver

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-> Website nothing but collection of web pages

-> Websites are 2 types

- 1) static website
- 2) dynamic website

-> static website will give same response for everybody (fixed content)

-> dynamic website means content will display based on user action

-> To run the website we need to deploy that website inside a server

install webserver

```
$ sudo yum install httpd
```

Note: httpd is a web server package and it is used for static websites hosting

start webserver

```
$ sudo service httpd start
```

Note: HTTPD webserver runs on HTTP protocol with 80 port number (enable that in security group inbound rules)

modify webpage content

```
$ cd /var/www/html
```

```
$ sudo vi index.html
```

Note: write content in index.html file then save and close

Access website using EC2 VM public ip in your browser

URL : <http://13.233.129.51/>

URL : <http://13.233.129.51:80/>

***** Note: To deploy & run dynamic websites we will use below servers *****

- 1) Apache Tomcat
- 2) JBOSS
- 3) Weblogic
- 4) WebSphere
- 5) Glassfish etc....

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Linux Architecture

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-> Linux Architecture works based on 4 layers

- 1) Applications

- 2) Shell
- 3) Kernel
- 4) Hardware Components

Hardware â Hardware consists of all physical devices attached to the System.
For example: Hard disk drive, RAM, Motherboard, CPU etc.

Kernel â Kernel is the core component for any (Linux) operating system which directly interacts with the hardware.

Shell â Shell is the interface which takes input from Users and sends instructions to the Kernel, Also takes the output from Kernel and send the result back to output shell.

Applications â These are the utility programs which runs on Shell. This can be any application like Your web browser, media player, text editor etc.

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Q) How to find machine running time ?

\$ uptime : It is used to find from how many hours our machine is running

Q) How to find free space available in linux machine

\$ df -h : It is used to find out how much free space available in our machine

Q) how to change password of user ?

\$ sudo passwd username

Q) How to display list of users available in linux ?

\$ cat /etc/passwd : It will print all users available in linux

Q) How to display all groups available in Linux ?

\$ cat /etc/group : It will print all groups available in linux

Q) How to assign an user for a group ?

\$ sudo usermod -aG <groupName> <uname>

Q) What is sudo in linux ?

-> Super user (administrator permissions)

