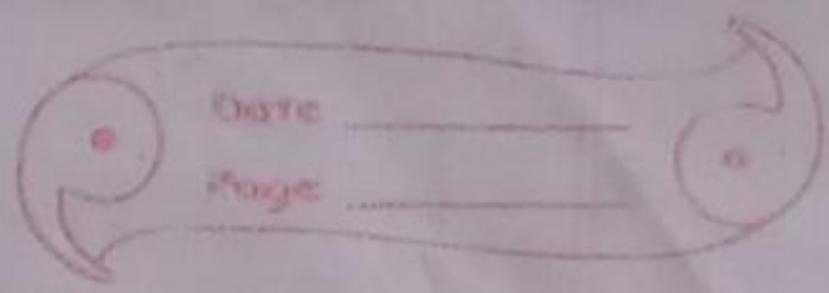


Linux



* What is an Operating System?

→ In computer screen we use perform different activities like write, browse the Internet or catch the video. These all things makes a computer hardware work like that how does the processor on our computer knows that you are asking it to run an mp3 file.

* What is kernel? (Intermediate between User Command & Hardware)

→ It is part of program or a program inbuilt into the O.S. so that whatever commands user gives it's generally take those commands and make our hardware work. (User enters Input or O.S. takes action.)

Kernel is the program at the heart of any O.S. that take care of fundamental stuff like letting hardware communicate with software so to work on your computer you need O.S.

* What is Linux?

→ Linux is an O.S. based on UNIX and was first introduced by Linus Torvalds.

→ Linux is O.S. or a kernel distributed under open-source license.

→ Open source aspect of the Linux operating system made it more robust.

→ Main advantage of Linux is programmers were able to use Linux Kernel in order to design their own custom O.S.

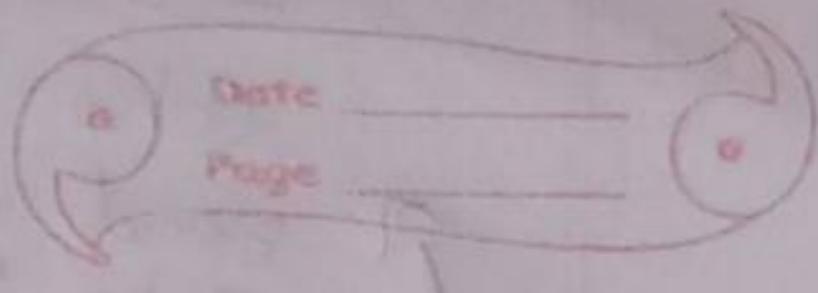
Teacher's Signature _____



Advantages of Linux

- Linux is Open Source O.S. So, Source code is easily available for everyone.
- Various distributions are available, it's also called distros of Linux. It is provide various choices or flavours to the users. We can select any distro as per our needs.
- Linux is freely available on the web to download and use. You do not need to buy licence for it.
- Linux provide stability, i.e. It does not need to reboot after a short period of time. Your Linux system rarely slows down or freezes. But, in Windows you need to reboot after installing or updating application or software.
- Provide high performance. It allows a large # of users to work together.
- Linux runs or execute all possible file format.
- Linux is multitasking O.S. as it can perform many tasks simultaneously without any decrease ~~in~~ in its speed.

different fash bash shell activate S2



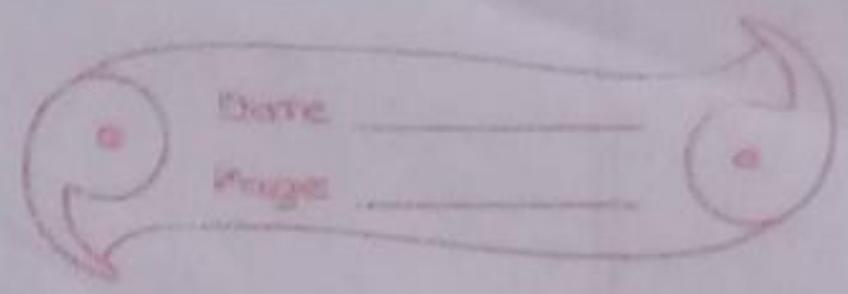
* Difference Between Unix and Linux.

Linux	Unix
→ Linux is used by everyone like. developers, computer enthusiasts.	→ Unix can be used in internet server, workstation.
→ The source is available to the general public	→ The source code is not available to anyone.
→ It is portable.	→ Unix is not portable
→ Linux default shell is BASH.	→ Unix shell is Bourne shell.
→ Linux threat detection and solution are very fast	→ Unix users require longer wait times to get proper bug fixing

* Linux Vs Windows

Linux	Windows
→ Opensource, developed by Red hat	→ Not open source, Developed by Microsoft
→ Linux Root user have full permission	→ Windows, <u>Administrator</u> user
→ Virus can't attack	→ Virus can attack
→ Licence free O.S.	→ Not Licence Free O.S
→ More <u>Secure</u>	→ Less <u>secure</u>
→ Reboot not require after install or remove any package	→ Reboot require, after install or remove any packages.
→ Developed by C language	→ Developed by C & C++ language
→ Not User friendly.	→ User friendly.
→ We can login <u>6 user</u> at a time	→ We can login <u>single user</u> at a time.

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* Commands

① ls - Listing files / Directories.

-l → Long listing

-a → All files including hidden files / directory

-d → Specific directory

-t → Order by time

-r → Reverse order | -R → Recursive

-i → inode number

-h → Human-readable Format

Syntax : ls [-options] directory-path

By default ls command shows file/directory name

→ When you do a long listing, it shows detailed info. about file / directory.

Files :

Starts with - : Normal file

Starts with d : Directory

Starts with l : Link / shortcut

* Screen clear :- clear / ctrl + l

-rw-r--r-- 1 root root 1828 Jul 6 08:53 anaconda-ks.cfg

file type , permissions , Link count , user / owners of the file , group owner of the file , size in bytes (only shows file size) , time stamp with date & time , file / directory name

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ls -lh

↳ file size shows in human readable format kb, Mb, Gb,

mb

⇒ ls -la

List all files including hidden files/directory

Any file/directory name start with . then hidden file/directory.

⇒ ls -lhr (Reverse order Z→a)

⇒ ls -lR First List all files/directory then in directory shows all files and directory (Recursive)

* ② cd - change directory

When we want to move from one directory to another directory.

/ = root file system directory

/ = This is also a directory separator when it comes middle of two directories

* Absolute path → starts from /
/data / common /

* Relative path → which is relative to any one directory
database / test /

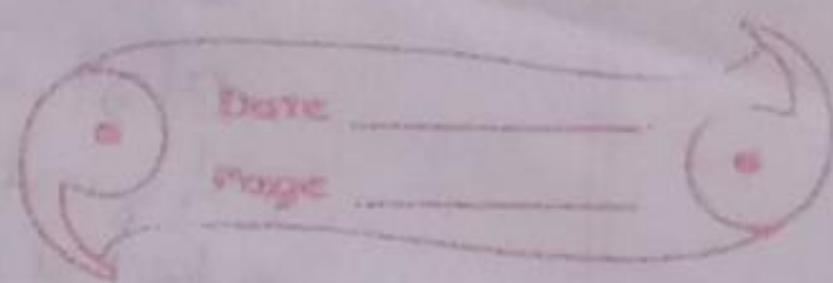
→ Pathname is absolute if described in relation to root, so
absolute pathname starts with /.

→ Relative If path is relative to your current working
directory then it is relative path. Never begin with
/.

Normal user → \$

Root user → #

~ → User home directory



→ only cd work as move to user home directory.

cd ~ / → ~~User's~~ Home directory or ~~user's~~ folder or user move with without sl. at cd them path.

→ User or home directory or user folder no move.

mkdir /data ⇒ directory create in /root

mkdir data ⇒ directory create in current directory

When we create new directory. always . and - directory are by default

ls -lq

- .. → Represent current directory
- .. → Represent parent directory.

cd /etc/ssh

cd .

ssh

cd ..

/etc

cd ..

/

cd ..

/

cd var

var

cd log/sumbe/fold/

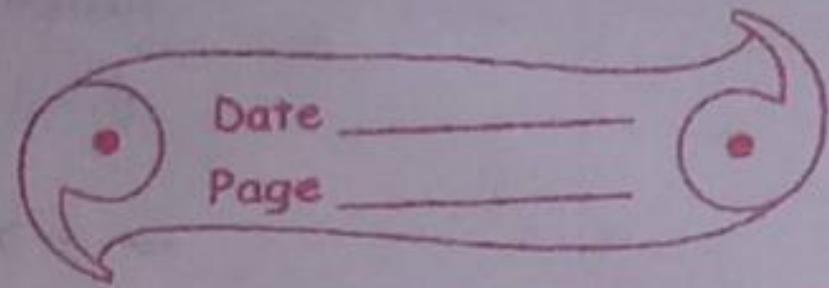
old

cd .. / ..

log.

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$\text{Ctrl} + \text{a}$ = beginning
 $\text{Ctrl} + \text{e}$ = End of command
 $\text{Ctrl} + \text{u}$ = Till that command clear
 $\text{Ctrl} + \text{k}$ = ~~After cursor~~ cursor clear



`cd -` \Rightarrow This command scatteh last current directory

* `passwd` \rightarrow Login User password change

File operation

- file Read
- * `cat` \Rightarrow reading file. Print whole content
 - * `less` \Rightarrow page wise (Need to exit)
 - * `more` \Rightarrow Automatic exit Show percentage wise

* `touch` \rightarrow create blank file

Terminal :- The program which provide us interface command line. Input from keyboard display output.

Shell :- command Line Utility.

`mkdir -P /web/domain/`

* Vi/Vim editor :- file edit

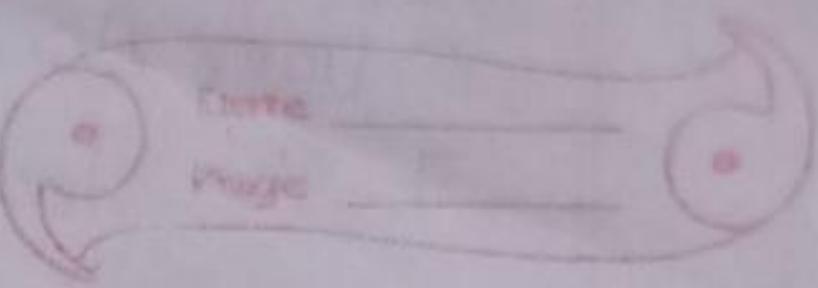
Modes of vim editor

- ✓ \rightarrow Command mode (Default mode) (Save, close)
- ✓ \rightarrow Edit / Insert mode
- \rightarrow Visual mode
- \rightarrow Visual Block mode

\rightarrow When we want to switch to edit (insert mode) we need to press `i, o` character

\rightarrow When we want return to default command mode from any other mode press Esc key

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* To install install

yum install vim -y

⇒ cd /etc/
touch file1
file1
vim file1

{ :w save file
:q quit / exit
:q! quit without saving
:wq save & exit

:n - It will directly go to the nth Line, n is number

:set number

:set nonumber

: /{string} This will search the keyword

yy This will copy the line on which your cursor

p This will paste the line

yy nth line

yy nth line paste

dd cut the line

gg Move the cursor to the first line of the

ctrl G Move " " to the last line of file

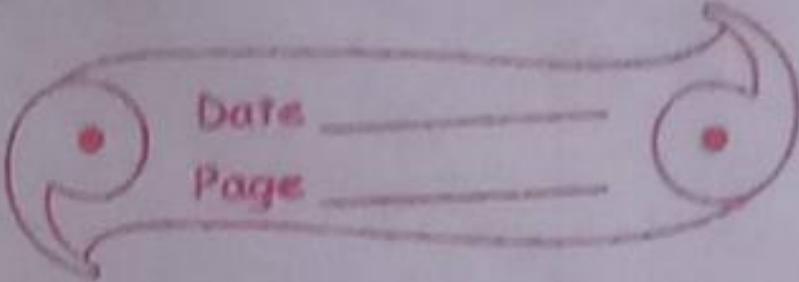
Find & Replace : /{Search} /{Replace}/

: ., 15s trick /dump

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5. User Full Name
6. Home Directory Path

7. This shows shell assigned to a user



* User management

① Administrators → root

② Normal user

③ Service Account (System users) → Restoration for particular service

↳ Work for particular service → Do not have Login capability

→ we can't login

* How we can identify users

Based on UID → User ID

UID 0 → Root User → 1-999 → Linux User

UID 1-999 → System User → 2-999 → other service system user.

UID > 1000 → Normal user

* Users related files.

etc/passwd → This file has all info about user except password

etc/shadow → Use for protect User

etc/group → This file has all info about groups

etc/gshadow

Purpose of group is manage permission in single handed

⇒ Whenever we create user then with same name group is also created.

* /etc/passwd Information

root:x:0:0:root:/bin/bash

1. User login name

2. x= Password Info. and It will always be x which means its info. is not stored in this file

3. UID

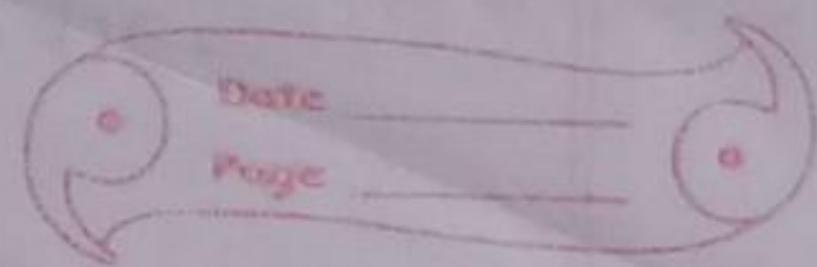
4. GID

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Chix - OS

Linux - Kernel

→ Ubuntu is Linux flavor



→ User giving input OS does what = kernel

User open file background in shell execute thru front end in UI shell through command give (Input) Format given words. Kernel in OS in GUI (Laptop) convert given kernel (in GUI) shell them format file.

Ex. ping 8.8.8.8 command given shell kernel user through (code) hexa code. kernel → OS.

OS (notebook interface part) ping packet device Kernel or more. kernel shell in show file



VI & touch Use case practical

stickbit X

switch user sudo command X 30sec

command alias X

Sudo permission X

Service Management ↴

Log management ↴

SSH

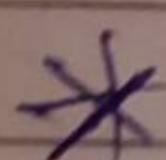
jvm --help

way to secure ↴

key based auth ↴

Bonnie Rits

Teacher's Signature



User management

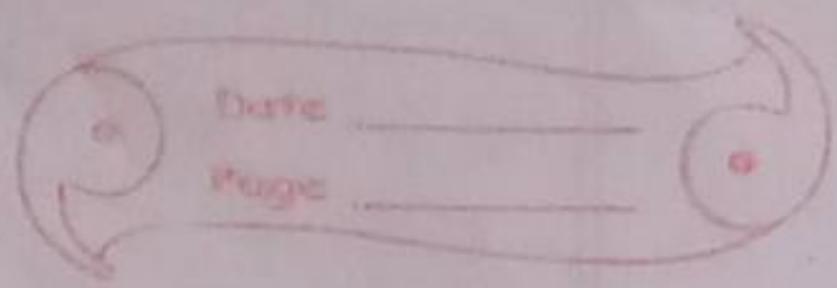
→ And User create set out a task performance.

- ① User file generate ~~new~~ ^{user entry, permission} All (4)
- ② User on ~~the~~ Home directory /home create ~~new~~
- ③ User mail id create . Under /var
- ④ User on Home directory in Users environment file copy new, and those are shell files. /etc/shell

* id Username \cong cat /etc/passwd
→ Show user Information

→ If we create user then default shell will be
/bin/bash.

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* options

- ① -c = comments /gecos => Full Name / Displayname / comments for the User
- ② -u = Used for defining any specific uid of the User
- ③ -s = Defining shell for the User.
- ④ -d = change the default home directory path.
- ⑤ -m = This is to create home directory for the user if not exist.
- ⑥ -k = Define the skel files path. This is used when you want to change the default home directory.
→ If we want to give User full name then
~~useradd~~ -c "Nishit Rajani" not useradd -c "Nishit Rajani"

- ⚡ ~~usermod~~: Modify user

* User Delete

→ ① ~~userdel~~ username

→ It will remove the user only. However, user data will not be deleted from its home directory.

② userdel -r username

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* Create Group (Supplementary Group)

groupadd name

* Primary group

→ User create secondary & group create user of primary group.

* Add User in Supplementary Group in useradd command
Group

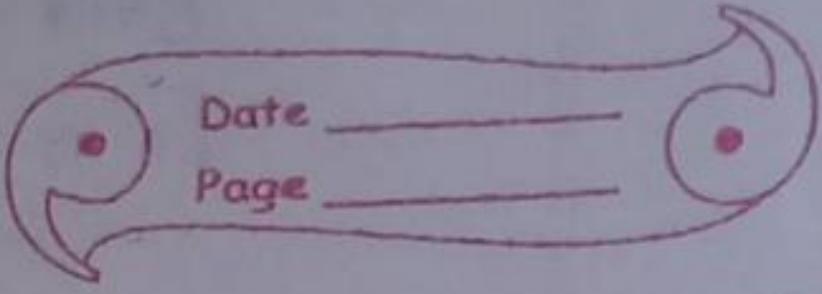
useradd -G name username

→ To check user is added in group or not
id username

* When we want to add user into multiple groups
then,

useradd -G IT user3
useradd -G marketing user3

Without license we use APP Free
→ clone of Unix with advanced features.



* Kernel :- It is part of program or a program inbuilt into the O.S. so that whatever command user gives it's generally take those commands and make our hardware to work.
→ It is intermediate between user commands & hardware

* Permission

① Owner permission

→ Create, delete, modify the file/directory

② Group permission

→ Owners decide which are the users can be added into the group. and also assign permission

③ Other permission (public)

→ For public we can set permission

* File Access Modes

① Read → View content of the file

② Write → Create, delete & Modify file / directory

③ Execute → Access the data

File Permission :

-	rw-	rwx	rx-	rx-
---	-----	-----	-----	-----

Directory Permission:-

d	drwx	rwx	rx-
---	------	-----	-----

↑ ↑ ↑ ↑
File owner Group Others
or
Directory

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* Changing Permission → chmod

① Symbolic Permission

- (i) + → Adding Permission to file
- (ii) - → Removes permission
- (iii) = → ~~Set~~ change the complete permission

u → owner

g → group

o → others

Syntax : chmod u+x filename
 chmod u-w,g+e filename
 chmod u=rx,g=rwx,o= filename
 chmod a=rwx filename
 ↗
 owner, group, others

* Octal Permission

Number	Octal permission representation	Ref
0	No permission	---
1	Execute	---x
2	Write	-rw-
3	1(execute) + 2(write) = 3	-rwx
4	Read	r--
5	read(4) + execute(1) = 5	r-x
6	read(4) + write(2) = 6	rwe-
7	read(4) + write(2) + execute(1) = 7	rwx

* Daemons

→ They are utility programs that ~~take~~ run in background to monitor and take care of certain subsystem to ensure O.S. work properly.

Ex:-

chmod 654 filename

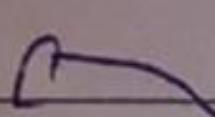
chmod -R 750 .

Date _____

Page _____

* Service Management

Service manager



- Systemd :- This is the very first process/service which runs when kernel is loaded.
 - Process ID of this service is 1.
 - This service keeps on running until our server is running.

→ Purpose is boot time up and running system & also systemserver resource ad. and manage server daemons manage other processes.

* Daemons :- Ending with 'd'

→ It is processes that run in background

Ex. sshd = ssh service daemon

performing various tasks.

→ Systemd is managed through the command Line utility called systemctl.

→ Systemctl manage units of systemd object called units.

Units

→ .service

→ .socket

→ .path

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Scanned by TapScanner

* Service status check

systemctl status systemd-units

Ex systemctl status sshd.service

* Check for the object (Unit)

~~stem~~

systemctl list-units

temporary

permanent

systemctl stop sshd.service

systemctl disable sshd.

systemctl start

systemctl enable .

* System log

→ It creates a report of whatever the process done happening into a Linux OS.

→ Logs are the files that contain messages about system, kernel, services. & APP. running on it.

These are diff. log files to store various info.

① System logs

② Security logs

③ Con job logs.

→ Log file important for troubleshooting

syslog

Syslog-ng

osslog

Teacher's Signature _____

Windows :- RDP
S/Device to most location of machine
to manage control by another device

Date _____
Page _____

① Syslog

→ support UDP

Log is send to remot server it will not
guarantee of delivery of message

② Syslog-ng

→ TCP (more secure)

→ Logging directly to DB.

descriptive

③ ~~Syslog~~ (Filtering) path of Log store

→ C|Relp protocol

→ used by industry where they can't afford
to loss message bank, financial sector

④ Bufferless operation support



SSH (secure shell)

→ It is provide secure connection to another computer

→ It is protocol for remote connection for any Linux

→ It is works on openSSH protocol

① OpenSSH (SSH client)

② OpenSSH server

→ SSH server and run it from remotely access

(2 system comm.)

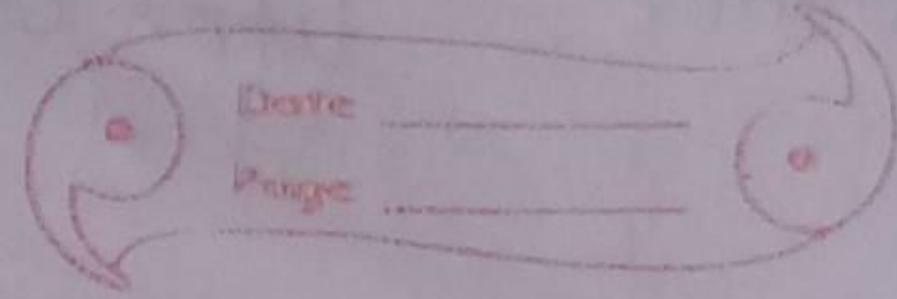
→ Secure shell means the communication happens over the
network in encrypted form

Telnet :- It is command to get remote access

→ Telnet is not secure.

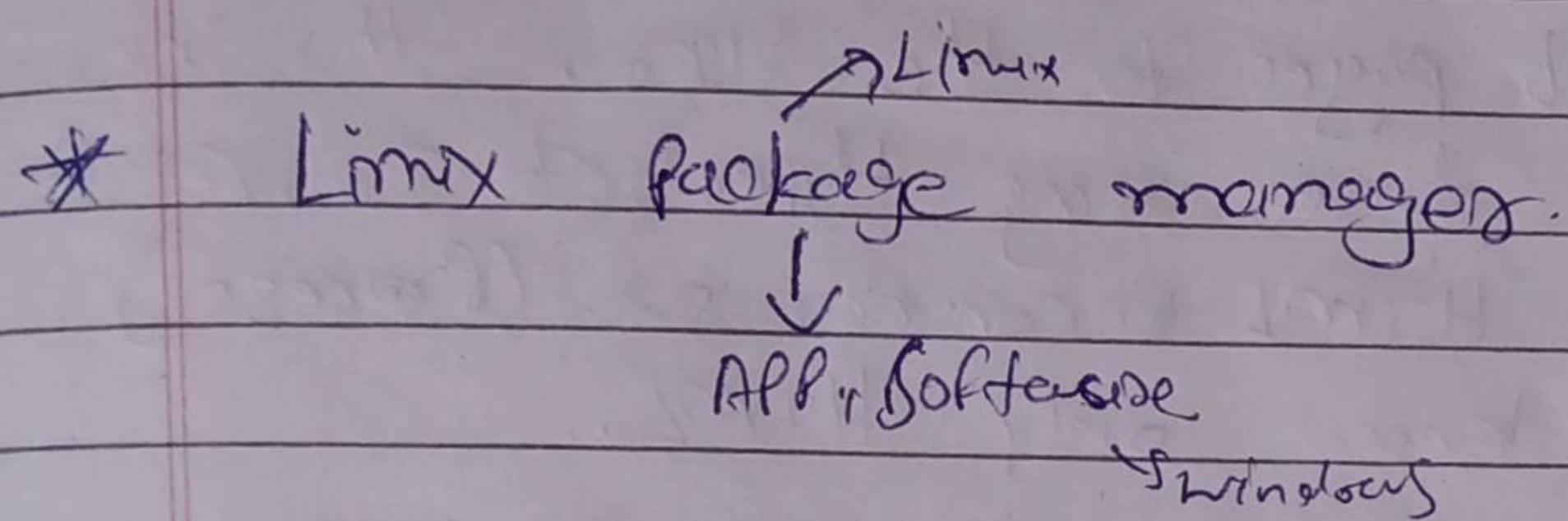
Telnet in 2 system comm. in not
encrypted plain text ..

Teacher's Signature



-> SSH → Port 22

> SSH config file is under /etc/ssh/sshd-config.
↳ servers



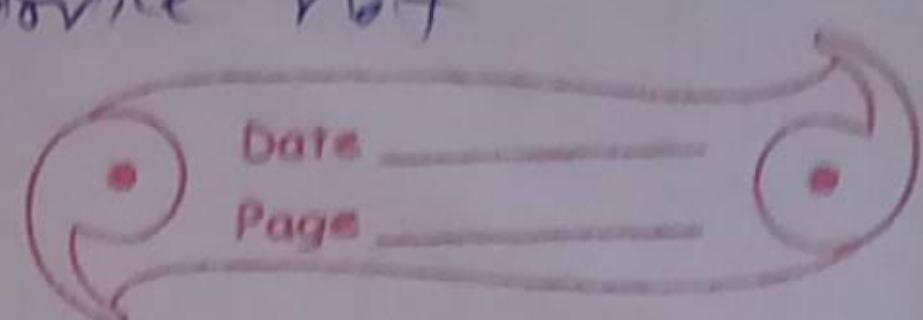
① RPM (Redhat Package Manager)

→ - can't install automatic dependencies of any package
DHCP → if 1st 5 package are dependent
package → if 1st 5 package installed
then 6th package.

② YUM (Yellowdog Updater Mediator)

→ Automatic install dependencies of any package.

Disable :- When we reboot the server service not start automatically.



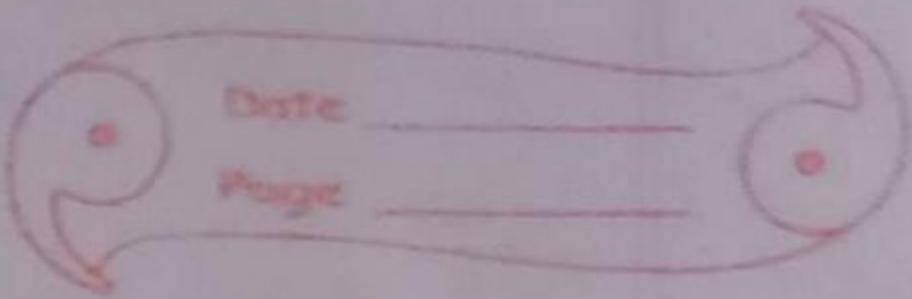
Web Server

- It is a computer that runs websites.
- Basic objective of web servers is to store, process and deliver web pages to the user. This inter-communication is done using Hypertext Transfer Protocol.
- User will request HTML & convert it. (Process) Because browser knows only HTML.

Apache - 70-80% website running on Apache.

- Apache service is called as httpd.

Package Managers



- * .rpm (Redhat Package Manager) Fedora, CentOS, Redhat
- * .deb (Debian) Ubuntu, debian, suse, mint

* Format of .rpm

httpd-2.04-27-x86_64.rpm
↑ ↑ ↑ ↑
Package Version Release Architecture
Name (which o.s.
clock)

→ RPM does not handle dependencies automatically

Suppose, we need to install httpd.rpm package so,
this package is depend on 2 more packages

abc.rpm - No Dependency

xyz.rpm - Dependant on 1 more package (abc)

cde.rpm - No Dependency.