

DEV BHOOMI INSTITUTE OF TECHNOLOGY

Department of Computer Science and Engineering

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Algorithm Lab-PCS-557

LAB MANUAL

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DEV BHOOMI INSTITUTE OF TECHNOLOGY


Department of Computer Science and Engineering

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 1	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: Installation of Linux operating system

Linux is the foundation of thousands of open source operating systems designed to replace Windows and Mac OS. It is free to download and install on any computer. Because it is open source, there are a variety of different versions, or distributions, available developed by different groups. Follow this guide for basic instructions on how to install any version of Linux, as well as specific instructions for some of the most popular ones.

1) Download the Linux distribution of your choice. Linux distributions (known as "distros") are typically available for free to download in ISO format. This format needs to be burned to a CD or USB stick. This will create a Live CD or Live USB. A Live CD or Live USB is a disk that you can boot into, and often contains a preview version of the operating system that can be run directly from the CD or USB stick. Install an image burning program, or use your system's built-in burning tool if you are using Windows 7, 8, or Mac OS X. Pen Drive Linux and UNetBootin are two popular tools for burning ISO files to USB sticks.

2) Boot into the Live CD or Live USB. Most computers are set to boot into the hard drive first, which means you will need to change some settings to boot from your newly-burned CD or USB. Start by rebooting the computer.

Once the computer reboots, press the key used to enter the boot menu.

If your computer doesn't give you direct access to the boot menu from the manufacturer's splash screen, it's most likely hidden in the BIOS menu. You can access the BIOS menu in the same way that you would get to the boot menu. Once you're in the boot menu, select your live CD or USB. Once you've changed the settings, save and exit the BIOS setup or boot menu. Your computer will continue with the boot process.

3) Try out the Linux distribution before installing. Most Live CDs and USBs can launch a "live environment", giving you the ability to test it out before making the switch. You won't be able to create files, but you can navigate around the interface and decide if it's right for you.

4) Start the installation process. If you're trying out the distro, you can launch the installation from the application on the desktop. If you decided not to try out the distribution, you can start the installation from the boot menu.

5) Create a username and password.

6) Set up the partition. Linux needs to be installed on a separate partition from any other operating systems on your computer if you intend dual booting Linux with another OS. If the installation process does not give you automatic partitions, make sure that the partition you create is formatted as Ext4. If the copy of Linux you are installing is the only operating system on the computer, you will most likely have to manually set your partition size.

7) Boot into Linux. Once the installation is finished, your computer will reboot. You will see a new screen when your computer boots up called "GNU GRUB". This is a boot loader that handles Linux installations. Pick your new Linux distro from the list. This screen may not show up if you only have one operating system on your computer. If this screen isn't being presented to you automatically, then you can get it back by hitting shift right after the manufacturer splash screen.

If you install multiple distros on your computer, they will all be listed here.

8) Check your hardware. Most hardware should work out of the box with your Linux distro, though you may need to download some additional drivers to get everything working.

Some hardware requires proprietary drivers to work correctly in Linux. This is most common with graphics cards. There is typically an open source driver that will work, but to get the most out of your graphics cards you will need to download the proprietary drivers from the manufacturer.

In Ubuntu, you can download proprietary drivers through the System Settings menu. Select the Additional Drivers option, and then select the graphics driver from the list. Other distros have specific methods for obtaining extra drivers.

You can find other drivers from this list as well, such as Wi-Fi drivers.


9) Start using Linux. Once your installation is complete and you've verified that your hardware is working, you're ready to start using Linux. Most distros come with several popular programs installed, and you can download many more from their respective file repositories.

Outcome:

To learn the installation process of Linux operating system

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 2	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: Installation of WINDOWS operating system

1. Enter your computer's BIOS. Turn off the computer that you want to install Windows on then turn it back on. When the BIOS screen appears or you are prompted to do so, press Del, Esc, F2, F10, or F9 (depending on your computer's motherboard) to enter the system BIOS. The key to enter the BIOS is usually shown on the screen.
2. Find your BIOS's boot options menu.
3. Select the CD-ROM drive as the first boot device of your computer. Although this method may vary among computers, the boot options menu is typically a menu of movable device names where you should set your CD-ROM drive as the first boot device.
4. Save the changes of the settings. Press the button indicated on the screen or select the save option from the BIOS menu to save your configuration.
5. Shut off your computer. Either turn off the computer by choosing the shut-down option in your current operating system, or hold the power button until the computer powers off.
6. Power on the PC and the insert the Windows 7 disc into your CD/DVD drive.
7. Start your computer from the disc. After you have placed the disc into the disc drive, start your computer. When the computer starts, press a key if you are asked if you would like to boot from the disc by pressing any key. After you choose to start from the disc, Windows Setup will begin loading.
8. Choose your Windows Setup options. Once Windows Setup loads, you'll be presented with a window. Select your preferred language, keyboard type, and time/currency format, then click Next.


9. Click the Install Now button.
10. Accept the License Terms. Read over the Microsoft Software License Terms, check I accept the license terms, and click Next.
11. Select the Custom installation.
12. Decide on which hard drive and partition you want to install Windows on. A hard drive is a physical part of your computer that stores data, and partitions "divide" hard drives into separate parts.
13. Install Windows on your preferred hard drive and partition. Once you've decided on where to install Windows, select it and click Next. Windows will begin installing.

Outcome:

To learn the Installation of WINDOWS operating system.

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 3	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: Install MS Office


- 1) Visit the Office Setup page. Open office.com/setup in your web browser.
- 2) Enter your Office product key. This can be found on the card that came with your retail purchase or in your confirmation email or Microsoft Account page if you purchased online.
- 3) Sign in with your Microsoft Account.
- 4) Click the "Install" button.
- 5) Click on Run to start the installation.
- 6) Follow the prompts in the installer. You can click Next to move through the installer.
- 7) Stay online while Office installs.
- 8) Finish the installation. Click All done! to close the installer.

Outcome:

To learn the Installation process of MS Office.

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 4	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: User Management

- User management includes everything from creating a user to deleting a user on your system.
- Users can be people, meaning accounts tied to physical users or accounts which exist for specific applications to use.
- Each user has a unique numerical identification number called a userid (UID)
- The user who creates a file is assigned as the owner. The file is also assigned separate read, write, and execute permissions for the owner, the group, and everyone else. The owner of a file can be changed only by the root user.

User Management Tools

User management can be done in three ways on a Linux system:

- **Graphical tools** are easy and suitable for new users, as it makes sure you'll not run into any trouble.
- **Command line tools** include commands like useradd, userdel, passwd, etc. These are mostly used by the server administrators.
- Third and very rare tool is to **edit the local configuration files** directly using vi.

There are some important user administration files:-

1. /etc/passwd:- Keeps user account and password information.

2. /etc/shadow:-Holds the encrypted password of corresponding account.

The following command line tools can also be used to manage users:

1. **useradd**

With useradd commands you can add a user.

Syntax: useradd -m -d /home/<userName> -c "<userName>" <userName>

2. **userdel**

To delete a user account userdel command is used.

Syntax: userdel -r <userName>

3. **usermod**

The command usermod is used to modify the properties of an existing user.

Syntax: usermod -c '<newName>' <oldName>

4. **Deleting Home Directories**

By using **userdel -r** option, you can delete home directory along with user account.


Syntax: userdel -r <userName>

Outcome:

To understand the concept and importance of User Management.

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 5	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: Write a syntax and usage the directory management commands with all options.

Apparatus Required:

Hardware Requirements – Intel core II CPU

Software Requirements – Red-hat Linux

Procedure:

Command: ls

Usage :It is used to display the files in the current working directory.

Syntax :ls [Options]

[Options] :

- l - list the files in the long format
- a - list all entries, including the hidden files
- d - list the directory files instead of its contents
- t - lists in order of last modification time

Examples : \$ls

Output: list all files in specified directory.

Command: cd

Usage : It is used to Change from the current Working directory to any other directory Specified.

Syntax :cd [DIRECTORY]

Command: pwd

Usage :It is used to display the full path for the Current working directory.

Syntax :pwd

Example :\$pwd

Output :To view the directory path.

Command: mkdir

Usage : It is used to create a new directory.

Syntax :mkdir<directory name>

Example :\$mkdirnewdir

Output :Creates directory newDir

Command :rmdir

Usage : It is used to remove a directory specified in the command line. It requires the specified directory to be empty before removing it.

Syntax :rmdir<directory name>

Example: \$rmdirnewdir

Output :deletes the directory newDir. newDir should be empty

Result:


Thus the above Commands have been executed and checked the output successfully

Outcome:

To learn the syntax and usage the directory management commands with all options.

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 6	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: Start-up and shutdown scripts on Linux.

Start-up and shutdown scripts are used to manually start up or shut down Couchbase Server.

On Linux, Couchbase Server is installed as a standalone application with support for running as a background (daemon) process during start-up through the use of a standard control script, which is located in `/etc/init.d/couchbase-server`.

The startup script is automatically installed during installation from one of the Linux packaged releases (Debian/Ubuntu or Red Hat/CentOS). By default, Couchbase Server is configured to be started automatically at run levels 2, 3, 4, and 5, and explicitly shut down at run levels 0, 1 and 6.

To manually start Couchbase Server using the startup/shutdown script:

```
>>sudo /etc/init.d/couchbase-server start
```

To manually stop Couchbase Server using the startup/shutdown script:

```
>sudo /etc/init.d/couchbase-server stop
```

.....
.....

Booting from a CD or DVD

Sometimes it may be necessary to start your system from the install media to repair disks or recover damaged files. Both Red Hat and Oracle Enterprise Linux install

media include a rescue mode that allows you to start from the install disk and get into a limited shell where you can scan for problems and manipulate your system disk.

When it is necessary to start the system in rescue mode, start up with the install disk in the optical drive that was used to perform the install. When the main screen appears, press the F5 key to enter rescue mode.

You are brought to the screen where you must type `linux rescue` to enter rescue mode. You are then prompted for some information about what will be needed for resources and then are presented with the rescue mode shell.

From here, scan for disk errors or manipulate the files on the system. When this is done, eject the install disk, type `exit` and the system will reboot.

Startup and Shutdown Scripts

When Linux enters a given runlevel, the `init` process executes the scripts found in `/etc/rc#.d`. Scripts within this directory starting with a `K` are kill scripts and are run first. They stop processes that should not be running at the given runlevel. Scripts starting with `S` are start scripts and start processes that should be running at the given runlevel.

These scripts are automatically passed an argument of `stop` in the case of `K` scripts, or `start` in the case of `S` scripts. Because of this, it is typical for a start and kill script for a given process to actually be the same script linked to `S` or `K`. The script uses the argument to determine what action to take.


The `S` and `K` scripts in the `rc#.d` directories should always be symbolic links pointing at the original script in the `/etc/init.d` directory. This allows one copy to be maintained but referenced at different runlevels. These scripts can be manipulated by manually creating and removing symbolic links but the `chkconfig` command offers a more streamlined method to maintain them.

Outcome:

To learn the Start-up and shutdown scripts on Linux.

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 7	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: Process management commands and their execution.

Apparatus Required:

Hardware Requirements – Intel core II CPU

Software Requirements – Red-hat Linux

Procedure:

Command : ps

Usage: This command commonly used to list down all the process which are currently running in a machine.

Syntax : (Display Process info) ps [option]

Option: -u option to displays the process that belongs to a specific username

-e - to display all the processes.

-f - to display full format listing.

-l - List all the keyword options

Example: \$ ps -e f

Output:

```
root 26551 5 0 Feb10 ? 00:03:41 [pdflush]
```

```
root 26570 5 0 Feb10 ? 00:00:20 [pdflush]
```

```
root 30344 3382 0 Feb21 ? 00:00:11 sshd: root@pts/14
```

The above example shows the options of ps command to get all the processes.

Command :nohup

Usage : The nohup utility which allows to run command./process or shell script that can continue running in the background after you log out from a shell.

Syntax :nohup command-name &

Where,

- Command-name: is name of shell script or command name. You can pass argument to command or a shell script.
- & :nohup does not automatically put the command it runs in the background; you must do that explicitly, by ending the command line with an & symbol.

Example:

1) Login to remote server

```
$ ssh user@remote.server.com
```

2) Execute script called pullftp.sh

```
# nohup pullftp.sh &
```

3) Type exit or press CTRL + D exit from remote server.

```
# exit
```

Command : kill

Usage: Kill command is use to send signal to a process or to kill a process. Typically

use kill -SIGNAL PID, where you know the PID of the process. There are other ways to effectively kill a process —

- killing a process by name,

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- killing a process by specifying part of the name,
- killing a process by pointing out the process with cursor etc.,

Syntax : kill [options] [pids|commands]

Options : -a -> all process matching with PIDs between 2 and 35767

- p -> list only the PID

PID - > PID identification number

Example: \$kill pid

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Command : nice

Usage : To run a program with modified scheduling priority. Kernel decides how much processor time is required for a process based on the nice value.

Possible nice value range is: -20 to 20

Syntax: nice [OPTION] [COMMAND [ARG]...]

Option: -n, --adjustment=ADJUST

Increment priority by ADJUST first

--Help - display this help and exit

--Version - output version information and exit

Result: Thus the above process management Commands have been executed and


checked the output successfully.

Output:

To learn the Process management commands and their execution.

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 8	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: Firewall Configuration in Windows.

- 1) From the Windows XP SP2 desktop, click Start, and then click Control Panel.
- 2) In Control Panel, click Security Center.
- 3) In Windows Security Center, under Manage security settings for, click Windows Firewall.
- 4) In the Windows Firewall dialog box, select the Don't allow exceptions check box.
- 5) Click OK.

Configuring Windows Firewall Exceptions

By default, Windows Firewall displays a notification dialog box, whenever it blocks a program.

- 1) In Security Center, under Manage security settings for, click Windows Firewall.
- 2) On the Exceptions tab, either clear or select Display a notification when Windows Firewall blocks a program.
- 3) Click OK.

To configure Windows Firewall Program Exceptions

- 1) In the Windows Firewall dialog box, click the Exceptions tab.
- 2) Under Programs and Services, select the check box for the program or service that you want to allow, and then click OK.
- 3) If the program or service that you want to allow is not listed, click Add Program.
- 4) From the list, scroll to the program that you want to add, select it, and then click OK.
- 5) Click Change scope.
- 6) Specify the set of computers for which this program is unblocked, and then click OK.
- 7) Click OK.
- 8) If the program that you want to allow is not listed in the Add a Program dialog box, click Add Program and then click Browse.


- 9) Browse to the program that you want to add, select it and then click Open.
- 10) Click OK. The program will now appear in the Add a Program dialog box, under Programs.
- 11) Click OK.

Outcome:

To understand the implementation of Firewall Configuration in Windows.

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 9	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: Firewall Configuration in Linux.

In Linux Iptables is a straightforward firewall that provides protection from simple attacks common to dedicated servers. Iptables provides IPv4 packet filtering and NAT, which facilitates traffic filtering and blocking.

Iptables comes pre-installed on nearly every Linux distribution. We can use the following command to update or retrieve the package:

```
sudo apt-get install iptables
```

Decide Which Firewall Ports to Block

The first step in firewall installation is deciding which ports to leave open on your dedicated server. This will vary based on what you are using the dedicated host for. For example, if you are running a web server, you would likely want the following ports open:

Web: 80 and 443

SSH: Typically run on port 22

Email: 110 (POP3), 143 (IMAP), 993 (IMAP SSL), 995 (POP3 SSL).

Flush the Default Firewall Rules

In order to ensure we are starting with a fresh set of rules, run this command to flush the rules from the firewall:

```
iptables -F
```

Block Common Server Attack Routes

We'll run some standard commands here to block common attacks

Block syn-flood packets:

```
iptables -A INPUT -p tcp ! --syn -m state --state NEW -j DROP
```

Block XMAS Packets:

```
iptables -A INPUT -p tcp --tcp-flags ALL ALL -j DROP
```

Block null packets:

```
iptables -A INPUT -p tcp --tcp-flags ALL NONE -j DROP
```

Open Required Ports

Now that common attack routes are covered, we can open up the ports we need. Here are some examples for you to work off of:

Allow SSH access:

```
iptables -A INPUT -p tcp -m tcp --dport 22 -j ACCEPT
```

Open up LOCALHOST access:

```
iptables -A INPUT -i lo -j ACCEPT
```

Allow web traffic:

```
iptables -A INPUT -p tcp -m tcp --dport 80 -j ACCEPT
```

```
iptables -A INPUT -p tcp -m tcp --dport 443 -j ACCEPT
```

Allow SMTP traffic:

```
iptables -A INPUT -p tcp -m tcp --dport 25 -j ACCEPT
```

```
iptables -A INPUT -p tcp -m tcp --dport 465 -j ACCEPT
```

Test Firewall Configuration

Run the following command to save the configuration and restart your firewall:

```
iptables -L -n
```

```
iptables-save | sudo tee /etc/sysconfig/iptables
```


```
service iptables restart
```

Outcome:

To understand the implementation of Firewall Configuration in Linux.

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LAB MANUAL

	Course Name: System Administration Lab	Experiment No. 10	
	Course Code : PCS-557 Faculty : Mr. Dhajvir Singh Rai	Branch: CSE	Semester: VI

Objective: Study of Important LINUX Services.

1. Common Linux Services and How to Control Them

Starting and Stopping Services at Boot Time

Some common web related services running on a Linux server are, but not limited to, include: httpd (Apache), mysqld (MySQL), vsftpd (Very Secure FTP), named (BIND), iptables (packet filtering ruleset), sshd (Secure Shell), network (network related services) and various others. Usually these services are started at boot time. To check what services are installed on the server, you can use the chkconfig tool. For example:

```
[root@server ~]# chkconfig --list
sshd 0:off 1:off 2:on 3:on 4:on 5:on 6:off
webmin 0:off 1:off 2:off 3:on 4:off 5:off 6:off
network 0:off 1:off 2:on 3:on 4:on 5:on 6:off
named 0:off 1:off 2:on 3:on 4:on 5:on 6:off
vsftpd 0:off 1:off 2:on 3:on 4:on 5:on 6:off
iptables 0:off 1:off 2:on 3:on 4:on 5:on 6:off
mysqld 0:off 1:off 2:off 3:off 4:off 5:off 6:off
httpd 0:off 1:off 2:on 3:on 4:on 5:on 6:off
[root@server ~]#
```

You can also specify one service with chkconfig. For example, if you want to see if mysqld is running, you can use this command:

```
[root@server ~]# chkconfig --list mysqld
mysqld 0:off 1:off 2:off 3:off 4:off 5:off 6:off
[root@server ~]#
```

When specifying a service, `chkconfig` will only return the settings for the specific service. `Chkconfig` reports the service name and the status of the service at each run level. In the example above, `mysqld` is set to not start at boot for any run level. This means that you will need to manually start the service. To control the start (or not starting) at boot is also done with `chkconfig`. For example, you would like the `mysqld` service to start when the system is booted in to run level 3:

```
[root@server ~]# chkconfig --level 3 mysqld on
[root@server ~]# chkconfig --list mysqld
mysqld 0:off 1:off 2:off 3:on 4:off 5:off 6:off
[root@server ~]#
```

`Mysqld` will now start if the system is booted in run level 3.

If you would like to stop the service from starting in run level 3:

```
[root@server ~]# chkconfig --level 3 mysqld off
[root@server ~]# chkconfig --list mysqld
mysqld 0:off 1:off 2:off 3:off 4:off 5:off 6:off
[root@server ~]#
```

If you would like to simply ensure a service starts at the necessary run level, you can run the following command:

```
[root@server ~]# chkconfigmysqld on
[root@server ~]# chkconfig --list mysqld
mysqld 0:off 1:off 2:on 3:on 4:on 5:on 6:off
```

Alternatively, you can run this command to ensure the service does not start at any run level:

```
[root@server ~]# chkconfigmysqld off
[root@server ~]# chkconfig --list mysqld
mysqld 0:off 1:off 2:off 3:off 4:off 5:off 6:off
[root@server ~]#
```

You can use the `chkconfig` command to stop or start a service when booting into specific run levels. Use:


```
[root@server ~]# chkconfig --list
```

To see which services are available to the `chkconfig` command.

Using the Service Command to Start and Stop Services

You can easily stop, start and restart services with a simple command line tool. The service command can be used with any of the services listed with `chkconfig --list`. You must be logged in as root to use the service command. For example, `mysqld` is not set to start at boot but you wish to start it now. You can use the service command:

```
[root@server ~]# servicemysqld start
Starting MySQL: [ OK ]
[root@server ~]#
```

The service command can also be used to stop services. For example, you want to stop the `mysqld` service. Use the following command:

```
[root@server ~]# servicemysqld stop
Stopping MySQL: [ OK ]
[root@server ~]#
```

If you want to check to see if a service is running (or not running), you can also use the service command. For example:

```
[root@server ~]# servicemysqld status
mysqld is stopped
[root@server ~]#
```

2. Important Linux Daemons and Startup Services

These are programs or processes which are run at boot time. Some remain in memory to execute various tasks when required (daemons). Most are started and stopped with scripts in the `/etc/rc.d/init.d` directory. The exact contents of this directory will depend on which packages from a particular distribution are installed. For example, installing the Apache package will cause an `httpd` script to be placed in `/etc/rc.d/init.d`.

- `amd` - runs the automount daemon for remote filesystem mounting such as `nfs`
- `anacron` - checks delayed ``cron'` tasks (see below) at boot time and executes them. Useful if you have cron jobs scheduled but don't run your machine all the time.
- `apmd` - Advanced Power Management BIOS daemon. For use on machines, especially laptops, that support `apm`. Monitors battery status and can shut down the system if power is too low.
- `arpwatch` - keeps watch for ethernet IP address pairings that are resolved using the

ARP protocol.

- atd - runs jobs queued by `at`
- autofs - control the operation of automount daemons, used to mount and unmount devices on demand
- bootparamd - allows computers to boot from a Linux machine using the BOOTP network protocol. A server process that provides information to diskless clients necessary for booting
- crond - automatic task scheduler. Manages the execution of tasks that are executed at regular but infrequent intervals, such as rotating log files, cleaning up /tmp directories, etc.
- cups - daemon for print services under the Common Unix Printer System, a replacement for lpd
- dhcpd - implements the Dynamic Host Configuration Protocol (DHCP) and the Internet Bootstrap Protocol (BOOTP). Used to lease out IP addresses to remote machines.
- drakfont - font server in Mandrake
- fetchmail - daemon to fetch mail at regular intervals from mail servers
- ftpd - ftp server daemon.

Outcome:

To understand the important services provided by LINUX .