COURSE PACK

FOR

INTRODUCTION TO LINUX OPERATING SYSTEM

Course Code	**:**	**307**
Course	**:**	**BCA**
Semester	**:**	**III**
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Institute of Management & Research, New Delhi
An iso 90001:2015 certified institute
"A+" grade accreditation by NAAC

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Course code:307

1. **Course Title: Introduction to Linux operating system**

2. **Course Overview:**

Linux is one of popular version of UNIX operating System. It is open source as its source code is freely available. It is free to use. Linux was designed considering UNIX compatibility. Its functionality list is quite similar to that of UNIX. The defining component of Linux is the Linux kernel, an operating system kernel first released on October 5, 1991 by Linus Torvalds.

Linux was originally developed as a free operating system for personal computers based on the Intel x86 architecture, but has since been ported to more computer hardware platforms than any other operating system. Because of the dominance of Android on smartphones, Linux has the largest installed base of all general-purpose operating systems. Linux, in its original form, is also the leading operating system on servers and other big iron systems such as mainframe computers and virtually all fastest supercomputers

The course will address the basics of the Linux operating system, the need for its study, the features of the Linux O.S. The following questions will be answered during the course:

a) Why do we need to study java?
b) How Linux is different from other operating systems?
c) What are the commands in Linux?
d) What is shell programming?
e) What are the concepts of user management in Linux?
f) How to control the system running Ubuntu operating system?

This course will equip the students with an understanding of the fundamental principles of the operating system. **The students are expected to review the course readings and the indicated portion of the prescribed text for class discussions prior to attending each session.**

1. Learning Outcome:

After undergoing this course, the student will be able to:

CO1: Understand the Linux O.S, its features, flavors, booting and exploring Ubuntu.
CO2: Securing, personalizing and changing the configurations in Ubuntu.
CO3: Understand the file system, file related commands and shell programming.
CO4: Understand processes, vieditor, regular expressions and GIMP.

2. List of Topic/ Module:

Topic/ Module	Contents/Concepts
Module I: Introduction to Linux Operating System	
	Flavours of Linux O.S
	Benefits of Linux
	Realities of running Linux
	Booting process
	Exploring the desktop
	Virtual desktops
	Commands to view the hardware
	Getting online using different networks
	Configuring emails and instant messages
	Configuring Bluetooth, printer and sound cards and transferring photos
Module II: Personalizing Ubuntu	
	Securing computer using Ubuntu
	Personalizing Ubuntu
	Windows security vs Linux security
	Root and ordinary users
	Configuring input devices, mouse options, and keyboard setting
	Personalizing login details, creating a shortcut and Link
	Adding and removing menus, adding application menu to panel and setting power saving feature.
Module III: File system and Introduction to Bash Shell	
	Managing and understanding file system
	Drive references, file access and storage
	Nautilus, Menu bar, tool bar, location bar and zoom Controls

	View icons, launching files and running Programs

	Accessing removable storage devices and ejecting media from drives
	Bash shell and shell programming
	Commands related to files
	File permissions
	Mounting and mount command
Module IV: Miscellaneous commands, processes, vi editor and GIMP	
	Working with text files
	Miscellaneous commands
	Vi editor
	Processes
	Introduction to GIMP

3. Evaluation Criteria:

Internal Assessment (40)

Component	Description	Weightage
First Internal Examination	First internal question paper will be based on first 1st and 3rd unit of syllabus.	10 marks
Second Internal Examination	Second internal question paper will be based on last 2nd and 4th unit of syllabus.	10 marks
class test	Class test will be conducted based on the different aspects of LINUX	5 marks
Quiz 1	Will have multiple choice , true false and fill in the blanks type question based on LINUX	5 marks
Quiz 2	Will have multiple choice , true false and fill in the blanks type question based on LINUX	5 marks
Attendance	Above 75% - 10 marks Below 75% - 0 mark	10 marks

Note :
All three CES will be mandatory. If any student misses anyone CES in that case the weightage of each CES would be 3.33 marks and if a student attempts all three CES then his/her best two CES will be considered, in that case the weightage would be 5 marks each.

External Assessment (60)

Component	Description	Weightage
Viva voce	An oral examination	30 marks
Practical Exam	Practical test will be conducted based on the different aspects of Linux	30 marks

4. Recommended/ Reference Text Books and Resources:

Text Book	**1.** The Complete Reference: Using Linux; Jack Tackett Jr. and David Gunter Third edition
Course Reading	**1.** Linux/ Unix by Sumitabha Das
References	**1.** Introduction to Linux by Machtelt Garrels **2.** Linux from Scratch by Gerard Beekmans
Internet Resource:	**1.** www.tutorialspoint.com>linux **2.** http://www.ee.surrey.ac.uk/Teaching/Unix/

5. Session Plan:

Module I: Introduction to Linux Operating System

Session	Topics	Learning Outcomes
1	Introduction of Linux Flavours of Linux	LO1.To know the Linux O.S and its flavours.CO1
2	Benefits of Linux Realities of running Linux	LO1. Be able to understand the benefits and realities of running Linux. CO1
3	Booting Process of Linux Exploring the desktop and Virtual Desktop	LO1. Understand the booting process and able to explore the Ubuntu desktop. CO1
4	Getting online using different networks	LO1. Be able to connect to different types of network. CO1

5	Configuring emails, messaging Configuring Bluetooth, sound cards, printers and transferring photos	LO1. To understand how to configure various devices. CO1

Module II: Personalizing Ubuntu

6	Securing computer using Ubuntu	LO2. Know how to secure the computer using Ubuntu. CO2
7	Personalizing Ubuntu	LO2. Know how to change the desktop background, theme etc. CO2
8	Windows security vs Linux security Root and ordinary users	LO2. Understand the Linux security and root and other users.CO2
9	Configuring input devices, mouse options, and keyboard setting Personalizing login details, creating a shortcut and link	LO2. Know how to configure input devices and be able to personalize login details CO2
10	Adding and removing menus, adding application menu to panel and setting power saving feature	LO2. Be able to add and remove menus and can set power saving feature.CO2

Module III: File system and Introduction to Bash Shell

11	Managing and understanding file System	LO3. To understand the file system. CO3
12	Drive references, file access and storage	LO3. Understand he file access and storage. CO3
13	Nautilus, Menu bar, tool bar, location bar and zoom controls	LO3. Understand various bars in Ubuntu.CO3

14	View icons, launching files and running Programs	LO3. Know how to view icons and run programs.CO3
5	Introduction to Bash Shell	LO3. Know the Bash shell. CO3
16	Shell programming	LO3. Implement the shell programs.CO3
17	Commands related to Files	LO3. Know the file related commands. CO3
18	Modes in file	LO3.Understand the modes in file. CO3
19	File permissions	LO3. Understand the file permissions CO3
20	Mounting file system	LO3. Understands mounting CO3

Module IV: **Miscellaneous commands, processes, vi editor and GIMP**

21	mount command	LO4. Know the mount command in Linux. CO4
22	Miscellaneous Commands	LO4. Know the commands in Linux. CO4
23	Processes in Linux	LO4.Understand the processes in Linux.CO4
24	Kill command Zombie processes	LO4. Understand the zombie process and kill command. CO4
25	Introduction to vi Editor	LO4. Understand the vi editor.CO4
26	Using vi to edit to the File	LO4. Understand how to edit the file in vi editor.CO4
27	Regular expressions	LO4. Know the regular expressions. CO4
28	Piping Multimedia	LO4.Understand piping, multimedia.CO4
29	Introduction to GIMP	LO4.Know GIMP.CO4
30	Editing images	LO4.Able to edit images.CO4

9. Contact Details:

Name of the Instructor:	**Ms.Neha Sabharwal, Mr.Santanoo Pattnaik**
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Teaching Venue:	**Assigned classroom as per timetable**
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STUDY NOTES

UNIT 1

- **Introduction to Linux Operating system**
- **various flavors of Linux O.S.**
- **The benefits of Linux, The realities of Running Linux,**
- **Learning to use Linux, BootingAny one flavor of Linux like ubuntu, red hat etc,**
- **Working with virtual desktops,**
- **Getting online Using an Ethernet Card ,Joining wireless network ,**
- **Configuring Email and instant messaging, Adding a Printer , Configuring a local printer, Configuring a network printer, Setting up digital imaging devices, Transferring photos from digital camera, Configuring scanner, Configuring Bluetooth, Configuring sound cards**

Introduction to Linux Operating system

Various flavors of Linux O.S., The benefits of Linux, The realities of Running Linux, Learning to use Linux, Booting Any one flavor of Linux like ubuntu, red hat etc, Starting up ,Logging in, Exploring the desktop ,Working with virtual desktops, Getting Everything up and running ,Viewing your hardware , Getting online Using an Ethernet Card ,Joining wireless network ,Configuring Email and instant messaging, Adding a Printer , Configuring a local printer, Configuring a network printer, Setting up digital imaging devices, Transferring photos from digital camera, Configuring scanner, Configuring Bluetooth, Configuring sound cards

Introduction to Linux operating system

Just like Windows XP, Windows 7, Windows 8, and Mac OS X, Linux is an operating system. An operating system is software that manages all of the hardware resources associated with your desktop or laptop. To put it simply – the operating system manages the communication between your software and your hardware. Without the operating system (often referred to as the "OS"), the software wouldn't function. Linux is a Unix-like computer operating system (OS) assembled under the model of free and open-source software development and distribution. The defining component of Linux is the Linux kernel, an operating system kernel first released on October 5, 1991 by Linus Torvalds.

Features of Linux

- **Portable** – Portability means softwares can works on different types of hardwares in same way.Linux kernel and application programs supports their installation on any kind of hardware platform.
- **Open Source** – Linux source code is freely available and it is community based development project. Multiple teams works in collaboration to enhance the capability of Linux operating system and it is continuously evolving.
- **Multi-User** – Linux is a multiuser system means multiple users can access system resources like memory/ ram/ application programs at same time.
- **Multiprogramming** – Linux is a multiprogramming system in which several programs are run at the same time on a uniprocessor. Since there is only one processor, there can be no true simultaneous execution of different programs. Instead, the operating system executes part of one program, then part of another, and so on. To the user it appears that all programs are executing at the same time.
- **Hierarchical File System** – Linux provides a standard file structure in which system files/ user files are arranged.
- **Shell** – Linux provides a special interpreter program which can be used to execute commands of the operating system. It can be used to do various types of operations, call application programs etc.
- **Security** – Linux provides user security using authentication features like password protection/ controlled access to specific files/ encryption of data.
- **Live CD/USB:** Almost all Linux distributions have Live CD/USB feature by which user can run/try the OS even without installing it on the system.
- **Graphical user interface (X Window System):** People think that Linux is a command line OS, somewhere its true also but not necessarily, Linux have packages which can be installed to make the whole OS graphics based as Windows.
- **Support's** most national **or customized keyboards:** Linux is used worldwide and hence available in multiple languages, and supports most of their custom national keyboards.
- **Application Support:** Linux has its own software repository from where users can download and install thousands of applications just by issuing a command in Linux Terminal or Shell. Linux can also run Windows applications if needed.

Various flavors of Linux- Some of them are:

1. Arch Linux is a Linux distribution for computers based on IA-32 and x86-64 architectures. It is composed predominantly of free and open-source software, and supports community involvement.The design approach of the development team follows the KISS principle("keep it simple, stupid") as the general guideline, and focuses on elegance, code correctness, minimalism and simplicity, and expects the user to be willing to make some effort to understand the system's operation.

2. CentOS (abbreviated from **Community Enterprise Operating System** and pronounced is a Linux distribution that attempts to provide a free, enterprise-class, community-supported computing platform which aims to be functionally compatible with its upstream source, Red Hat Enterprise Linux (RHEL). In January 2014, CentOS announced the official joining with Red Hat while staying independent from RHEL ,under a new CentOS governing board.

3. Debian is a Unix-like computer operating system that is composed entirely of free software, most of which is under the GNU General Public License, and packaged by a group of individuals called the Debian Project. Three main branches are offered: *Stable*, *Testing*, and *Unstable*.

4. Fedora (formerly **Fedora Core**) is an operating system based on the Linux kernel, developed by the community-supported Fedora Project and sponsored by Red Hat. Fedora contains software distributed under a free and open-source license and aims to be on the leading edge of such technologies.

5. Gentoo Linux is a computer operating system based on the Linux kernel and built using the Portage package management system. It is distributed as free and open-source software. Unlike a binary software distribution, the source code is compiled locally according to the user's preferences and is often optimized for the specific type of computer. Precompiled binaries are available for some larger packages or those with no available source code.

6. Linux Mint is a community-driven Linux distribution based on Debian and Ubuntu that strives to be a "modern, elegant and comfortable operating system which is both powerful and easy to use. Linux Mint provides full out-of-the-box multimedia support by including some proprietary software and comes bundled with a variety of free and open- source applications. Its motto is "from freedom came elegance."

7. Ubuntu is a Debian-based Linux operating system and distribution for personal computers,smartphones and network servers. It uses Unity as its default user interface. It is based on free software and named after the Southern African philosophy of *ubuntu* (literally, 'human-ness'), which Canonical Ltd suggests can be loosely translated as "humanity to others" or "I am what I am because of who we all are".Development of Ubuntu is led by UK-based Canonical Ltda company owned by South African entrepreneur Mark Shuttleworth. Canonical generates revenue through the sale of technical support and other services related to Ubuntu. The Ubuntu project is publicly committed to the principles of open-source software development; people are encouraged to use free software, study how it works, improve upon it, and distribute it.

8. OpenSUSEformerly SUSE Linux and SuSE Linux Professional, is a Linux-based project and distribution sponsored by SUSE Linux GmbH and other companies. It is widely used throughout the world. The focus of its development is creating usable open-source tools for software developers and system administrators, while providing a user-friendly desktop, and

featureRealities of running Linux

- **Advantages of Linux**

1. **FREEDOM**- Most Linux distros are free. Users do not need to pay for a copy, but this is only one aspect of freedom enjoyed by Linux users! In addition, Linux distros can be freely downloaded and legally installed on as many computers as you want and freely (and legally) given to other people. Because most distros are open source, you have access to the source code and can customize Linux to be whatever you want it to be; you can even create your own distro if you like.

2. **LINUX IS VERY STABLE-**Linux systems rarely crash, and when they do, the whole system normally does not go down. The "blue screen of death" familiar to Windows users is not a worry for Linux users.

3. **LINUX IS LESS VULNERABLE TO COMPUTER MALWARE**- Because most computer malware are designed to attack Windows (often throughActive X which is not typically found in Linux) the odds are considerably less for Linux to be infected with a virus than Windows. One nice security feature In Linux is that files must be made to be executable by someone with administrator privileges, which requires a password. So even if a Linux virus is loaded on a Linux computer, it will not be able to run without the user who has administrator privileges intentionally making it executable.

4. **LINUX TYPICALLY DOES NOT SLOW DOWN OVER TIME-** UnlikeWindows, Linux does not easily become bogged down with spyware, viruses, Trojans, etc., which can greatly reduce a computer's performance. Also, because Linux does not have a registry like Windows, it is not plagued with registry errors which can slow down a computer over time.

5. **LINUX CAN BREATHE NEW LIFE INTO OLD COMPUTERS**- If you have an older computer (especially Pentium III or later) laying around, you can install Linux and in essence have a new computer. In many cases Linux will run faster and you can do all of the basics such as browse the Internet, email, play games, and create and edit documents, spreadsheets, and PowerPoint presentations. It should also be mentioned that Linux runs great on newer computers as well.

6. **WITH LINUX, YOU HAVE SO MANY CHOICES IN A WIDE VARIETY OF DISTROS-** Linux comes in all sizes and flavors, which offers a wide variety from which to choose the distro which will best suit your needs. Another advantage of this variety is the innovation that is taking place in the Linux world because it is open source.

7. **A SUPERIOR METHOD OF UPDATING SOFTWARE-** With Linux distros such as Ubuntu, OpenSUSE, PCLinuxOS, Fedora and many others, the majority of any software needed can be downloaded, installed, and updated from a central package management system provided by the distro. The result is a very smooth and seamless software updating process for Linux users.

- **Disadvantages of Linux**

1. **MANY WINDOWS PROGRAMS WILL NOT RUN IN LINUX -**iTunes, Microsoft Office, Internet Explorer and many other Windows programs will not run natively in Linux.

2. **THERE IS A SMALLER SELECTION OF PERIPHERAL HARDWARE DRIVERS FOR LINUX-**there is a smaller selection of peripheral hardware drivers (for printers, scanners, and other devices) in Linux as compared to Windows, though many new Linux hardware drivers are constantly being added.

3. **THERE IS A LEARNING CURVE FOR PEOPLE WHO ARE NEW TO LINUX-**despite this, most Linux distros, especially the major ones, are very intuitive and user-friendly. Also, the desktop environments in Linux are in many ways similar to Windows in their appearance.

- **Customizing your desktop**

One of the advantages to a windowed environment through Unity is the ability to change the look and feel of your desktop.

Appearance - You can change the background, fonts, and window theme to further modify the look and feel of your desktop. To begin, open Appearance by eitherright-clicking on your background or selecting **change desktop background** or selecting **Session Indicator ‣System Settings ‣Appearance**.

If you want to select wallpaper from your Picture folder, click the drop-down menu above thumbnails and select the **Pictures** Folder. You'll see all the pictures in your *Pictures* folder as thumbnails, where you can select them as your wallpaper. To add wallpaper that is in another folder, just click the **plus icon** below the thumbnails and then in pop-up window, select the path to our custom folder and choose the picture inside of it.

Changing Ubuntu theme

Ubuntu also has an option to change the Desktop theme, which in one click will change the entire way your computer looks. To do that, click on the drop-down menu below the Wallpaper thumbnails, and choose between **Ambiance**, **Radiance**, or **High Contrast**. Ambiance is a light

theme that looks a bit more Mac-like, while Radiance is the darker brown theme used in Ubuntu by default.

Launcher Icon Size

You can also change the size of the **Unity Launcher icons** in the left-side toolbar. Simply click on the little slider below the theme options and drag it to the left to reduce icon size, or drag it to the right to increase the size.

Changing Behavior settings

The second tab under **Appearance** settings is **Behavior**, where we can change some basic settings for the **Unity launcher** and **top menu bar** behavior. You can auto-hide the Unity launcher, enable the workspaces and *Show Desktop* icon

Auto-hide the Launcher

You can hide your Unity Launcher. All we have to do is to click the On/Off button at top right corner inside Behavior tab, and Unity Launcher will be **hidden** right away. Then, you can bring back the Unity Launcher by moving your desktop to the **Reveal location** of your choice: the left side of the screen, or just the top left corner.

Getting online

Three connections:

A **wired connection** is when your computer connects to the Internet using an Ethernet cable. This is usually connected to a wall socket or networking device like switch or a router.
A **wireless connection** is when your computer connects to the Internet using a wireless radio network usually known as Wi-Fi.
A **dialup connection** is when your computer uses a *modem* to connect to the Internet through a telephone line.

In order to connect to the Internet using Ubuntu, you need to use the Network Manager utility. Network Manager allows you to turn network connections on or off, manage wired and wireless networks, and make other network connections, such as dial up, mobile broadband etc. You can access Network Manager by using its icon found the top panel. This icon may look different depending on your current connection state. Clicking this icon will reveal a list of available network connections. The current connection (if any) will have the word "disconnect" underneath it. You can click on "disconnect" to manually disconnect from that network. Select "Enable Networking" to enable networking again.

Establishing a wired connection

If you have an *Ethernet* cable running from a wall socket or networking device, such as a switch or router, then you will want to setup a wired connection in Ubuntu. In order to connect to the Internet with a wired connection, you need to know whether your network supports DHCP *(Dynamic Host ConfigurationProtocol)*. DHCP is a way for your computer to automatically be configured to access your network and/or Internet connection. DHCP is usually automatically configured on your router.

Automatic connections with DHCP

If your network supports DHCP then you may already be set up for online access. To check this, click on the Network Manager icon. There should be a "Wired Network" heading in the menu. If "Wired connection 1" appears directly underneath, then your machine is currently connected and probably setup for DHCP

Manual configuration with static address

To manually configure a wired connection, click on the Network Manager icon and select **Edit Connections**. Make sure you are looking at the "Wired" tab inside the "Network Connections" window. The list may already have an entry, such as "Wired connection 1" or a similar name. If a connection is listed, select it and click the **Edit** button. If no connection is listed, click the **Add** button.

If you are adding a connection, you need to provide a name for the connection. This will distinguish the connection being added from any other connections added in future. In the "Connection Name" field, choose a name such as "Wired Home."

To setup the connection:

1. Make sure that the **Connect automatically** option is selected under the connection name.
2. Switch to the **IPV4 Settings** tab.
3. Change the **Method** to "Manual."
4. Click on the **Add** button next to the empty list of addresses.
5. Enter your IP address in the field below the **Address** header.
6. Click to the right of the IP address, directly below the **Netmask** header and enter your network mask. If you are unsure, "255.255.255.0" is the most common.
7. Click on the right of the network mask directly below the **Gateway** header and enter the address of your gateway.
8. In the **DNS Servers** field below, enter the address of your DNS server(s).
9. Click **Save** to save your changes.

Wireless

If your computer is equipped with a wireless (Wi-Fi) card and you have a wireless network nearby, you should be able to set up a wireless connection in Ubuntu.

Connecting to a wireless network for the first time - If your computer has a wireless network card, you can connect to a wireless network. Most laptops and netbooks have a built-in wireless networking card. Ubuntu is usually able to detect any wireless network in range of your computer.

To see a list of wireless networks, click on the Network Manager icon. Under the "Wireless Networks" heading you should see a list of available wireless networks.

Scanning text and images

Scanning a document or an image is very simple in Ubuntu. Scanning is handled by the application Simple Scan. Most of the time, Ubuntu will simply detect your scanner and you should just be able to use it. To scan a document, follow these steps:

1. Place what you want to scan on the scanner.
2. Click to open the Dash and enter **scan**.
3. Click on Simple Scan.
4. Click to choose between **Text** or**Photo** from **Document ‣Scan ‣Text**.
5. Click **Scan**.
6. Click the **Paper Icon** to add another page.
7. Click **Save** to save.

Adding a local printer

If you have a printer that is connected to your computer with a USB cable then this is termed a *local printer*. You can add a printer by clicking on the **Add Printer** button. In the left hand pane of the "New Printer" window any printers that you can install will be listed. Select the printer that you would like to install and click **Forward**. You can now specify the printer name, description and location. Each of these should remind you of that particular printer so that you can choose the right one to use when printing. Finally, click **Apply**.

Adding a network printer

Make sure that your printer is connected to your network either with anethernet cable or via wireless and is turned on. You can add a printer by clicking **Add Printer**. The "New Printer" window will open. Click the "+"sign next to *Network Printer*. If your printer is found automatically it will appear under *NetworkPrinter*. Click the printer name and then click **Forward**. In the text fields you can now specify the printer name, description and location. Each of these should remind you of that particular printer so that you can choose the right one to use when printing. Finally click **Apply**. You can also add your network printer by entering the IP address of the printer. Select "Find Network Printer," enter the IP address of the printer in the box that reads **Host:** and press the **Find** button. Ubuntu will find the printer and add it. Most printers are detected by Ubuntu automatically. If Ubuntu cannot detect the printer automatically, it will ask you to enter the make and model number of the printer.

Workspaces

Workspaces are also known as virtual desktops. □ese separate views of your desktop allow you to group applications together, and by doing so, help to reduce clusttr and improve desktop navigation. For example, in one workspace, you can open all of your media applications; your office suite in another, and your web browser open in a third workspace. Ubuntu has four workspaces by default.

Reading and composing email

Introduction to Thunderbird

Thunderbird is an email client developed by Mozilla and is easy to setup and use. It is free, fast, and comes packed full of useful features. Even if you are new to Ubuntu and Thunderbird, you will be up and running in no time, checking your email and staying in touch with friends and family.

Setting up Thunderbird

In the top right corner of the Ubuntu desktop you will see an envelope icon in the notification area. This is the *messaging menu*. From here, you can launch Thunderbird by clicking **set up mail**. Alternatively, you can click the Ubuntu button in the top left corner of the screen at the top of the Launcher to bring up the Dash and type **thunderbird** into the search box. Once Thunderbird opens, you will be greeted by a pop-up box prompting you to setup your email account.

Checking and reading messages

Thunderbird will automatically check your email account for new messages every ten minutes, but if you need to manually check for new messages at any time, left-click the **get mail button** in the top left corner of the workspace. Thunderbird will then check your email account for new messages and download them. As they are downloaded, you will see the new email appear in the message window on the right side of the workspace. When you click on one of your emails, it will appear in the window below your email list. If you want to view your email in a full window, double left-click your chosen email, and Thunderbird will display the email in a full window in its own tab. At the top of the open email, you will see information about the email and the five quick action buttons, **reply**, **forward**, **archive**, **junk** and **delete.**

Using instant messaging

Instant messaging allows you to communicate with people in real time online. Ubuntu includes the Empathy application that lets you use instant messaging features to keep in touch with your contacts. To start Empathy, open the **Messaging Menu** (the envelope icon on the menu bar), then select **Chat**. Empathy lets you connect too many instant messaging networks. You can connect to: Google Accounts, Windows Live, Salut, Yahoo!

Running Empathy for the first time

When you open Empathy for the first time, at this time, Empathy does not know about any of your instant messaging accounts. You can add accounts to be used with empathy by clicking the **Account** Settingsbutton, or you can use the menu bar to navigate to **Empathy ‣Accounts**. Click **Add account…** on the left hand side of the window if it is not already selected. At the top of the window, where it says *Show accounts thatintegrate with:* select *Empathy* from the drop-down menu. Now click on the name of the chat service with which you have an account, we have selected a Google account. You must now enter your login credentials and authorize Empathy to access your account. After adding your accounts, you can now use Empathy to chat with all of your friends, right from your Ubuntu desktop.

Desktop Sharing

Desktop sharing is a very nice feature available with Ubuntu. It can be used for a lot of purposes, like troubleshooting, online meetings, or just showing off your cool desktop to your friend. It is very easy to get remote desktop sharing working between two Ubuntu machines.

To share your screen, you will first have to set up Desktop Sharing. Open the Desktop Sharing application from the Launcher. Next, select **Allowother users to view your desktop**; you may want to deselect **Allow otherusers to control your desktop**. After you have Desktop Sharing

configured, open Empathy. To begin sharng your desktop, right-click on the contact you wish to share with, and select **Share my desktop**.

Bluetooth

Bluetooth is a wireless technology that is widely used by different types of devices to connect to each other. It is common to see a mouse or a keyboard that supports Bluetooth. You can also find GPS devices, mobile phones, headsets, music players and many other devices that can connect to your desktops or laptop and let you transfer data, listen to music, or play games as an example.

If your computer has Bluetooth support then you should see a Bluetooth icon in the top panel, usually near the volume icon. Click on the Bluetooth icon to open a popup menu with several choices, such as an option to **Turnoff Bluetooth**. The Bluetooth preferences can also be accessed from **System Settings ‣Bluetooth**. If you want to connect a new device—for example, to have a mobile phone send pictures or videos to your computer—select **Setup newdevice.** Ubuntu will open a window for new device setup. When you click **Forward**, Ubuntu will show you how many Bluetooth devices are present near your computer. The list of available devices might take a minute or so to appear on the screen as your system scans for these devices. Each device will be displayed as soon as it is found by Ubuntu. Once a device you'd like to connect with appears in the list, click on it. Then, choose a PIN number by selecting **PIN options**. Once the device has been paired, Ubuntu will open the "Setup completed" window. In Ubuntu, your computer is hidden by default for security reasons. This means that your Ubuntu system can search other Bluetooth devices, but others cannot find your Ubuntu system when they perform a search on their own computer. If you would like to let another device find your computer, you will have to explicitly allow your computer to be found. To allow your computer to be found, select "Make computer discoverable" in Bluetooth preferences. You can also click on the Bluetooth icon and select **Visible** to make your computer discoverable.

UNIT –II

- **Securing computer using Ubuntu/Red Hat and personalizing Ubuntu/Red Hat, Windows security vs. Linux Security**
- **Changing the wallpaper, Configuring input devices**
- **Changing keyboard settings and shortcuts**

Securing computer using Ubuntu

Security should always be considered when installing, deploying, and using any type of computer system. Although a fresh installation of Ubuntu is relatively safe for immediate use on the Internet, it is important to have a balanced understanding of your system's security posture based on how it will be used after deployment.

- System security starts with good system administration. This includes checking the ownership and permissions of all vital files and directories, monitoring use of privileged accounts, etc.
- When making a service accessible to the network, make sure to give it ``least privilege,'' meaning that you don't permit it to do things that aren't required for it to work as designed. For example, you should make programs setuid to root or some other privileged account only when they really need this. Also, if you want to use a service for only a very limited application, don't hesitate to configure it as restrictively as your special application allows.
- Another important point is to avoid ``dangerous'' software. Of course, any software you use can be dangerous, because software may have bugs that clever people might exploit to gain access to your system. Things like these happen, and there's no complete protection against this. This problem affects free software and commercial products alike. However, programs that require special privilege are inherently more dangerous than others, because any loophole can have drastic consequences. If you install asetuid program for network purposes be doubly careful that you don't miss anything from the documentation, so that you don't create a security breach by accident.
- Another source of concern should be programs that enable login or command execution with limited authentication. The rlogin,rsh and rexec commands are all very useful, but offer very limited authentication of the calling party.

Changing Keyboard Layout in Ubuntu

Steps to change:

1. **Click the Settings button in the upper-right corner of the screen.** This will open the power and settings menu.
2. **Select "System Settings".**
3. **Click "Text Entry".** It may also be labeled "Language & Text" or "Keyboard Layout"
4. **Click the "+" button beneath the list of installed keyboard layouts.**
5. **Choose the layout that you want to add to Ubuntu.**

6. Click .Add to add it to your list of layouts.

7. Note the keyboard shortcuts. The "Switch to next source" and "Switch to previous source" shortcuts allow you to quickly cycle through your enabled layouts. You can select each one and set a new shortcut if you'd like.

8. Change your layout. After enabling the keyboard shortcuts, click the Language button in the Ubuntu menu bar and select the layout you want from the list.

9. Click the Language button and select "Show Layout Chart". This will show you which keys on your keyboard are assigned to which characters.

UNIT III

- **Nautilus**
- **File System**
- **File related commands**
- **Shell**
- **Mounting**

Nautilus file manager
Just as Windows has Windows Explorer to browse files and folders, Ubuntu uses the Nautilus file manager by default.

The Nautilus file manager window
When you select the **Home Folder** shortcut in the Launcher, click on a folder in the Dash, or double-click on a folder on the desktop, the Nautilus file manager window opens. The default window contains the following features:

menu bar- The menu bar is located at the top of the screen, the so called global menu. These menus allow you to modify the layout of the browser,navigate, bookmark commonly used folders and files, and view hidden file and folders.

titlebar-The titlebar shows the name of the currently selected folder. It also contains the **Close**, **Minimize**, and **Maximize** buttons.

toolbar-The toolbar contains tools for navigation. On the right is the search icon (which looks like a magnifying glass); clicking on this icon opens a field so you can search for a file or folder by name.

left pane -The left pane of the file browser has shortcuts to commonly used folders.

central pane -The largest pane shows the files and folders in the directory that you are currently browsing.

Navigating Nautilus
To navigate between folders, use the bookmarks in the left pane of the Nautilus file manager. You can also retrace your steps by clicking on the name of a folder in the path bar. Double- clicking on a visible folder will cause you to navigate to it.

Opening files
To open a file, you can either double-click on its icon or right-click the iconor select one of the **Open With** options.

Creating new folders
To create a new folder from within Nautilus, click **File ‣Create New Folder**.

Hidden Files and Folders
If you wish to hide certain folders or files, place a dot (.) in front of the name (*e.g.*, ".Filename").

➢ File system

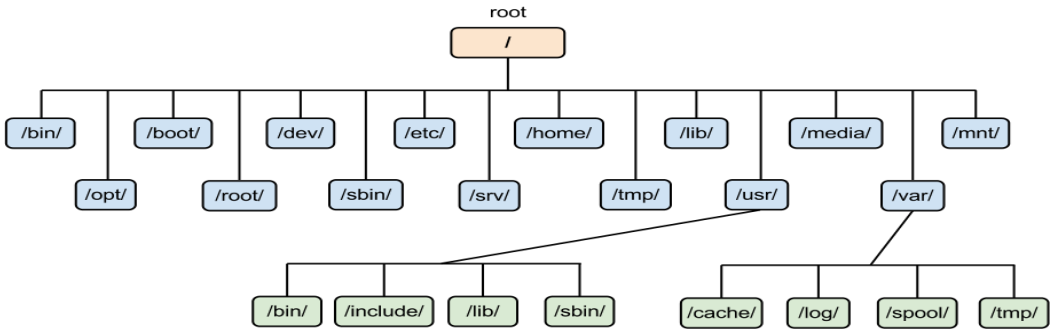
What is a File?

File are collection of data items stored on disk. Or, it's device which can store the information, data, music (mp3 files), picture, movie, sound, book etc. In fact whatever you store in computer it must be inform of file. Files are always associated with devices like hard disk, floppy disk etc. File is the last object in your file system tree.

What is a directory?

Directory is group of files. Directory is divided into two types:

- Root directory – Strictly speaking, there is only one root directory in your system, which is denoted by / (forward slash). It is root of your entire file system and cannot be renamed or deleted.
- Sub directory – Directory under root (/) directory is subdirectory which can be created, renamed by the user.



File related commands

Some of them are :

ls command- is most widely used command and it displays the contents of directory

options-

-l – long list(displays lots of information)

-t – lists by modification date

-s – lists by size

-h – lists file sizes in human readable format

-r – reverse the order

-a – lists all hidden files

-F- lists files of directory

cd command – it sets the current working directory of a process.

cd.. – moves one level hierarchy down from the current directory

cd../../ - moves two level in hierarchy down from the current directory

cd. – moves to your previous directory

mkdir command- It is used to create a new directory.

Options

-m – set file mode

-v – print a message for each created directory

More command – it will display a page at a time and then wait for input which is spacebar.

wc command–counts the characters,words or lines in the file depending upon the options.

Options –

-l - print total no.of lines in afile

-w – print total no.of words in a file

-c - print total no.of characters in a file

-L – print the length of the longest line

- **Bash Shell**

Bourne again shell (Bash) is a free Unix shell that can be used in place of the Bourne shell. Bash is basically a command processor that typically runs in a text window, allowing the user to type commands that cause actions. It can read commands from a file, called a script. It supports the following:

- File name wildcarding

- Piping
- Hear documents
- Command execution
- Variables and control structures for condition testing and iteration

Variables in Shell

To process our data/information, data must be kept in computers RAM memory. RAM memory is divided into small locations, and each location had unique number called memory location/address, which is used to hold our data. Programmer can give a unique name to this memory location/address called memory variable or variable (Its a named storage location that may take different values, but only one at a time).

In Linux (Shell), there are two types of variable:
(1) **System variables** - Created and maintained by Linux itself. This type of variable defined in CAPITAL LETTERS.
(2) **User defined variables (UDV)** - Created and maintained by user. This type of variable defined in lower letters.

System Variable	Meaning
BASH=/bin/bash	Our shell name
BASH_VERSION=1.14.7(1)	Our shell version name
COLUMNS=80	No. of columns for our screen
HOME=/home/vivek	Our home directory
LINES=25	No. of columns for our screen
LOGNAME=students	students Our logging name
OSTYPE=Linux	Our Os type
PATH=/usr/bin:/sbin:/bin:/usr/sbin	Our path settings
PS1=[\u@\h \W]\$	Our prompt settings
PWD=/home/students/Common	Our current working directory
SHELL=/bin/bash	Our shell name
USERNAME=vivek	User name who is currently login to this PC

How to write shell script
Following steps are required to write shell script:
(1) Use any editor like vi or mcedit to write shell script.
(2) After writing shell script set execute permission for your script as follows
syntax:
chmod permission your-script-name
Examples:
$ chmod +x your-script-name
$ chmod 755 your-script-name

This will set read write execute(7) permission for owner, for group and other permission is read and execute only(5).
(3) Execute your script as
syntax:
bash your-script-name
sh your-script-name
./your-script-name
Examples:
$ bash bar
$ sh bar
$ ./bar

Mounting - Mounting a filesystem simply means making the particular filesystem accessible at a certain point in the Linux directory tree. When mounting a filesystem it does not matter if the filesystem is a hard disk partition, CD-ROM, floppy, or USB storage device. You simply need to know the device name associated with the particular storage device and a directory you would like to mount it to. Having the ability to mount a new storage device at any point in the directory is very advantageous.

In order to determine what filesystems are currently being used type the command:

$ mount

When you type this at a command prompt, this command will display all the mounted devices, the filesystem type it is mounted as, and the mount point. The mount point being local directory that is assigned to a filesystem during the process of mounting

How to mount filesystems - Before you can mount a filesystem to a directory, you must be logged in as root (some filesystems can be mountable by a standard user) and the directory you want to mount the filesystem to must first exist. Also in some situations, you must be logged in as the root user in order to make the particular mount directory. If the directory exists, and any user can mount that particular device, then it is not necessary to be logged in as root. When mounting a particular filesystem or device you need to know the special device file associated with it. A device file is a special file in Unix/Linux operating systems that are used to allow programs and the user to communicate directly with the various partitions and devices on your computer. These device files are found in the /dev folder.

UNIT IV

- **File command**
- **Linux processes**
- **GIMP**

cat command – displays the contents of a file on screen.

Options

-E – display $ at end of each line

-n – number all output line

head command- it by default display the first 10 lines of a file.

tail command – it by default displays the last 10 lines of a file.

vi editor

One edits a file in vi by issuing the command: vi file-to-edit.txt

The vi editor has three modes, command mode, insert mode and command line mode.

1. **Command mode:** letters or sequence of letters interactively command vi. Commands are case sensitive. The ESC key can end a command.
2. **Insert mode:** Text is inserted. The ESC key ends insert mode and returns you to command mode. One can enter insert mode with the "i" (insert), "a" (insert after), "A" (insert at end of line), "o" (open new line after current line) or "O" (Open line above current line) commands.
3. **Command line mode:** One enters this mode by typing ":" which puts the command line entry at the foot of the screen.

Terminate session:

- Use command: ZZ
  Save changes to current file and quit.
- Use command line: ":wq"
  Save (write) changes to current file and quit.
- Use command line: ":w"
  Save (write) changes to current file without quitting.
- Use command line: ":w!"
  Save (write) changes to current file overriding the file permissions if the user has the

privileges to change the file permissions. For example this will save a file with read only privileges if the user is the owner or has the ability to modify the privileges to allow a

write. This will not permanently modify the file privileges. Note that there is no space between the two characters. A space will infer that the output is streamed to a Unix command following the "!".

- Use command line: ":w *filename*"
  Save (write) changes to a new file of name "*filename*" without quitting.
- Use command line: ":q!"
  Ignore changes and quit. No changes from last write will be saved.
- Use command line: ":qa"
  Quit all files opened.

grep command - The grep command is used to search text or searches the given file for lines containing a match to the given strings or words. By default, grep displays the matching lines. Use grep to search for lines of text that match one or many regular expressions, and outputs only the matching lines. grep is considered as one of the most useful commands on Linux and Unix- like operating systems.

Option –

-b - precede each line with its block no.

-c - print the count of matched lines

-i – ignores uppercase and lowercase distinctions.

I- lists file names but not matched lines

-h – display the matched lines but do not display the filenames

-n – print line number with output lines.

-w – match the whole word

- v – select non matching lines

Processes in Linux

Processes carry out tasks within the operating system. A program is a set of machine code instructions and data stored in an executable image on disk and is, as such, a passive entity; a process can be thought of as a computer program in action.Linux processes have the following states: [1]

Running

The process is either running (it is the current process in the system) or it is ready to run (it is waiting to be assigned to one of the system's CPUs).

Waiting

The process is waiting for an event or for a resource. Linux differentiates between two types of waiting process; *interruptible* and *uninterruptible*. Interruptible waiting processes can be interrupted by signals whereas uninterruptible waiting processes are waiting directly on hardware conditions and cannot be interrupted under any circumstances.

Stopped

The process has been stopped, usually by receiving a signal. A process that is being debugged can be in a stopped state.

Zombie

This is a halted process which, for some reason, still has a task_struct data structure in the task vector. It is what it sounds like, a dead process.

zombie process or **defunct process** is a process that has completed execution (via the exit system call) but still has an entry in the process table: it is a process in the "Terminated state". This occurs for child processes, where the entry is still needed to allow the parent process to read its child'sexit status: once the exit status is read via the wait system call, the zombie's entry is removed from the process table and it is said to be "reaped". A child process always first becomes a zombie before being removed from the resource table.

kill command

The *kill* command is used on Linux and other Unix-like operating systems to terminate *processes* without having to log out or *reboot* (i.e., restart) the computer. Thus, it is particularly important to the stability of such systems.

A process, also referred to as a *task*, is an *executing* (i.e., running) instance of a program. Each process is automatically assigned a unique *process identification number* (PID) when it is created for use by the system to reference the process.

The syntax for kill is

kill [signal or option] PID(s)

The only *argument* (i.e., input) that is required is a PID, and as many PIDs as desired can be used in a single command. Typically no signal or option is used.

Thus, if it is desired to terminate a process with a PID of 485, the following will usually be sufficient:

kill 485

The kill command has a misleading name because it does not actually *kill* processes. Rather, it sends signals to them. Each process is supplied with a set of standard *signal handlers* by the operating system in order to deal with incoming signals. When no signal is explicitly included in the command, *signal 15*, named SIGTERM, is sent by default. If this fails, the stronger *signal 9*, called SIGKILL, should be used. For example, the following command would nearly guarantee that process 485 would be killed:

kill -9 485

The only situation in which signal 9 will fail is if the process is in the midst of making a *system call*, which is a request to the *kernel* (i.e., the core of the operating system) for some action such as process creation. In this situation, the process will die once it has returned from the system call.

Introduction to GIMP

GIMP stands for **GNU Image Manipulation Program** is a free and open-source raster graphics editor used for image retouching and editing, free-form drawing, resizing, cropping, photo-montages, converting between different image formats, and more specialized tasks. GIMP is a cross-platform image editor available for GNU/Linux, OS X, Windows and more operating systems. It is free software, you can change its source code and distribute your changes. Whether you are a graphic designer, photographer, illustrator, or scientist, GIMP provides you with sophisticated tools to get your job done. GIMP is an advanced picture editor. You can use it to edit, enhance, and retouch photos and scans, create drawings, and make your own images. It has a large collection of professional-level editing tools and filters, similar to the ones you might find in Photoshop. Numerous fine-control settings and features like layers, paths, masks, and scripting give you total control over your images. Many image file formats are supported, including JPEG, Photoshop (.psd), and Paint Shop Pro (.psp) files. It can also be used to scan and print photos.

Edit photos using GIMP

Step 1: Open up Your project

When you have GIMP installed, open it up and click File>Open and then go to where you have your pictures and click it then click Open.

Step 2: crop your image

If you don't want your image cropped then skip this step.

Click on the "Toolbox - Tool Options" window and click the Rectangle Select, Then Select the

part of your photo you want cropped, then click on Image>Crop to Selection and it will remove the part that is not selected.

Step 3: Change the Brightness

When you take your photos, sometimes it is too dark, this is where the Brightness-Contrast comes in.

Click on Colors>Brightness-Contrast. The brightness slider makes it Brighter/Darker and the Contrast slider makes the colors show more if you move it towards the direction of the brightness slider.

Step 4: Export your files

When you are done editing your image, click on File>Export and then click on the file you edited, then click Export,
NOTE: You don't save your file because if you do it will say that you can only use "save" for saving it in a GIMP File Format.

Step 5: Compare the difference

In the last step compare the original photo with the edited photo.

PRACTICE QUESTIONS

- Write the Linux command to display calendar with various options.
- Write a Linux command to display date with various options.
- Write a Linux command to display the list of users who are currently using linux server.
- Write a Linux command to display your user name.
- Write Linux command to list all the directories and files on the server.
- Write the Linux command to create a file and display the content of a file.
- Write the Linux command to print the content on standard output device.
- Write the Linux command to show the current working directory.
- Write the Linux command to create a directory, change a directory and delete a directory.
- Write the linux Command to copy a file to some other location.
- Write the linux command to move a file to some different location.
- Write the linux command to compare the contents of two files.
- Write and briefly explain atleast4 Linuxflavours other than discussed in class.
- Explain realities of Linux.
- how to configure Bluetooth. Write the steps.
- Explain the realities of running Linux.
- How to get online using Ethernet card. Write steps.
- Explain the booting process of any one flavor of Linux.
- Difference between windows security and Linux security.
- Explain the file system concept in Linux.
- Write any five file related commands in Linux with their options. Give example for each command.
- Explain Bash Shell. Write one shell program.
- Explain file permissions in Linux.
- Explain mounting using the mount command.
- Write any five miscellaneous commands in Linux with their options. Give example for each command.
- Define Zombie process. How to kill processes?
- what are regular expressions? Explain them.
- Define piping. Give an example.
- Explain GIMP.

QUESTION PAPERS

BharatiVidyapeeth Deemed University, Institute of Management And Research (BVIMR), New Delhi 1st Internal Examination (August,2016)

INTERNAL QUESTION PAPER

Course – BCA | Semester – V
Subject – Introduction to Linux operating system | Course Code – 506
Max. Marks: 40 | Max. Time: 2 Hours

Instruction: 1. Read all the questions carefully

Q. 1 Attempt any five questions. Answer in 50 words. [5 x 2]

a) How to create a new file in Linux? Give an example.
b) Define Shell script? What is the purpose of Shell scripts?
c) How to configure Bluetooth in Ubuntu? Write the steps.
d) How to rename and copy the files in Linux?
e) How to change the directory in Linux?
f) How to find a file in Linux?
g) How to create and remove directory in Linux OS? Give example.
h) What is Nautilus?

Q. 2 Attempt any two questions. Answer in 200 words [2 x 5]

a) Explain various flavors of Linux operating system.
b) Explain the Booting process of Ubuntu.
c) Explain the ls command with options.

Attempt any two questions. Answer in 200 words [2 x 5]

a) How will you connect to the internet in Ubuntu using wired, wireless and dial-up connection? Write the steps.
b) Explain the steps involved in writing and executing the shell script. Write any one shell script.
c) How to view the hardware in Linux? Explain.

Attempt any one. Answer in 600 words. [10 x 1]

a) With the help of a diagram explain the file System of Linux operating system. How the mounting and unmounting of file system is done in Linux operating system?
b) Explain commands for file management operations in Linux with options. What are the various file permissions? Explain the numeric as well as the symbolic representation for the file permissions.

Bharati Vidyapeeth Deemed University,
Institute of Management and Research (BVIMR), New Delhi
Departmental Exam
DEPARTMENTAL QUESTION PAPER

Course - BCA | Semester - V

Subject - Introduction to Linux operating system | Course Code - 506

Max. Marks: 100 | Max. Time: 3 Hours

Section – I

Attempt any four questions from section – I **(15 marks each)**

Q1.Explain the booting process of Linux in detail. What is run level? List various run levels. Explain them.

Q2. Explain various distributions / flavours of Linux operating system in detail.

Define process in Linux. What are the different types of processes? How to avoid zombie process. Explain.

Q3. How Linux stores and organizes files? Explain in detail with help of a diagram.

Q4. Explain various features of Linux. Explain the difference between windows security and Linux security

Q5. Explain regular expressions used in Linux with examples. What do these regular expressions match?

i) ls -l | grep 'x [0-5] y' ii) ls -l | grep 'p.q'

Section II

Attempt any two questions from section – II **(20 marks each)**

Q1. Explain commands for file management operations in Linux with options. What are the various file permissions? Explain the numeric representation for the file permissions.

(a) Explain GIMP in detail.
(b) Name the three modes of vi editor. How you can switch from one mode to another?

Q2. Explain all the commands used in vi editor.

Q. 3 (a) Define shell. Why we use shell scripting? Write the steps involved in writing and executing the shell scripts. Write a shell script that will add two numbers.

(b) Explain the login and shutdown process in Linux.

BharatiVidyapeeth Deemed University,
Institute of Management and Research (BVIMR), New Delhi

INTERNAL QUESTION PAPER

Course - BCA Semester - V

Subject - Introduction to Linux operating system Course Code - 506

Max. Marks: 40 Max. Time: 2 Hours

Q. 1 Attempt any five questions. Answer in 50 words [5 x 2]

a) How to change the login picture in Ubuntu?

b) Write a command to search for the file 'abc' in the current directory?

c) What are pipes? Explain the use of pipes in Linux. Give one example.

d) What is the impact on Linux system if it has a lot of zombie processes running?

e) What does grep **"^*"** look for? Is the \ really necessary?

f) What do these regular expressions match? i) **a.b** ii) **a.*b**

g) What happens when you use **head** with multiple filenames?

h) Write a command that will:

i) Check whether the files are already sorted. ii) Display the last 5 lines of a file.

Q. 2 Attempt any two question. Answer in 200 words [2 x 5]

a) Explain the various phases in the creation of process.

b) Define codec. Why do we need codecs? How to install codecs? Write the steps.

c) Write short note on GIMP.

Q3. Attempt any two questions. Answer in 200 words [2 x 5]

a) How to change the keyboard settings in Ubuntu? Write the steps.

b) Define zombie process. How to avoid zombie process? Explain.

c) Explain grep command with options.

Q4. Attempt any one. Answer in 600 words [10 x 1]

a) What is a process? Explain the ps command with options. How to kill the processes in Linux? Explain in detail.

b) Explain vi editor in detail.

Solution of the above paper

Q. 1 Attempt any five questions. Answer in 50 words [5 x 2]

a) How to change the login picture in Ubuntu?

Ans We can change the login background using Nautilus:

1. open Nautilus (in root mode)
2. go to /usr/share/backgrounds.
3. cut/move/delete "warty-final-ubuntu.png"
4. then choose the picture you want (.png format)
5. rename it to "warty-final-ubuntu.png"
6. then move it back to /usr/share/backgrounds.

b) Write a command to search for the file 'abc' in the current directory?

Ans find . -type f -name "abc*"

c) What are pipes? Explain the use of pipes in Linux. Give one example.

Ans A pipe is a form of redirection that is used in Linux and other Unix-like operating systems to send the output of one program to another program for further processing.

The general syntax for pipes is:

command_1 | command_2 [| command_3 . . .]

examplels | wc -l

d) What is the impact on Linux system if it has a lot of zombie processes running?

Ans Zombies are basically the leftover bits of dead processes that haven't been cleaned up properly. If there are lot of zombie process then there is no space to store the PID of normal processes.

e) What does grep "^*" look for? Is the \ really necessary?

Ans grep searches for an asterisk at the beginning of the line. The * is not preceded by a character, so the \ isn't required.

f) What do these regular expressions match? i) a.bii) a.*b

i) This indicates that any single character can be substituted between a and b.

ii) .* indicates any number of characters, so this will return any number of characters between a nad b.

g) What happens when you use head with multiple filenames?

The head command reads the first few lines of any text given to it as an input and writes them to standard output (which, by default, is the display screen).

head's basic syntax is:

head [options] [file(s)]

If more than one input file is provided, head will return the first ten lines from each file, precede each set of lines by the name of the file and separate each set of lines by one vertical space.

h) Write a command that will: i) check whether the files are already sorted.

ii) Display the last 5 lines of a file.

Ans h) i) sort -c file name

This option is used to check if the file given is already sorted or not & checks if a file is already sorted pass the -c option to sort.

ii) tail -5 filename

Ans 2 a) A new process is created because an existing process makes an exact copy of itself. This child process has the same environment as its parent, only the process ID number is different. This procedure is called forking.

Fork-and-exec mechanism

b) "a codec is a device or computer program capable of encoding and/or decoding a digital data stream or signal."

In general, codecs are utilized by multimedia applications to encode or decode audio or video streams. In order to play encoded streams, users must ensure an appropriate codec is installed.

Watching DVDs requireUbuntutoinstallacoder-decoder(alsoknown asa“codec”),apieceofsoftware allowing your computer to understand the contents of theDVD and display the video.

Toinstallthecodecs,opentheUbuntuSofwareCentereitherthroughthe DashortheLauncher. Whenthe“Ubuntu SofwareCenter”windowopens, usethesearchboxinthetoprightandsearchforthefollowing: ‣ ubuntu-restricted-extras ‣ libdvdread□ ‣

libdvdnav□ Double-clickeachitemaboveandthenclicktheInstallbutt on. □is mayopenan“Authenticate”window. If so,enter your password,then click Authenticate to start the installation process.

c) GIMP (GNU Image Manipulation Program) is a freely available open source application for creating and manipulating graphic images that runs on Linux, other Unix-based operating systems, and also on Windows and Mac OS X. GIMP is distributed under licensing terms defined by the GNU project. You are likely to find GIMP as one of the optional applications that come in any large Linux package such as those distributed by Debian and Red Hat. You can also download it directly. GIMP offers photo retouching, image composition, and image authoring and is favorably compared by users to Adobe's Photoshop and Illustrator applications. GIMP was created by Peter Mattis and Spencer Kimball.

Tools used to perform image editing can be accessed via the toolbox, through menus and dialogue windows. They include filters and brushes, as well as transformation, selection, layer and masking tools.

Color There are several ways of selecting colors, including palettes, color choosers and using an eyedropper tool to select a colour on the canvas.

Selections and paths GIMP selection tools include a rectangular and circular selection tool, free select tool, and fuzzy select tool (also known as magic wand).

Image editing There are many tools that can be used for editing images in GIMP. The more common tools include a paint brush, pencil, airbrush, eraser and ink tools used to create new or blended pixels.

GIMP also provides "smart" tools that use a more complex algorithm to do things that otherwise would be time consuming or impossible. These include:

Clone tool, which copies pixels using a brush

Healing brush, which copies pixels from an area and corrects tone and color

Perspective clone tool, which works like the clone tool but corrects for distance changes

Blur and sharpen tool blurs and sharpens using a brushThe Smudge tool can be used to subtly smear a selection where it stands.

Dodge and burn tool is a brush that makes target pixels lighter (dodges) or darker (burns)

Ans 3 a) To change the keyboard layouts select System Settings
Then select Region & Language on the left of the items list to open the panel.
Click the + button in the Input Sources section, select the language which is associated with the layout
Then select a layout and press Add.When you add a new input source, it becomes available to use and it's shown in the list below Input Sources.

b) a zombie process or defunct process is a process that has completed execution (via the exit system call) but still has an entry in the process table: it is a process in the "Terminated state". This occurs for child processes, where the entry is still needed to allow the parent process to read its child's exit status: once the exit status is read via the wait system call, the zombie's entry is removed from the process table and it is said to be "reaped". A child process always first becomes a zombie before being removed from the resource table.
Zombie process can be avoided by following ways.

Make parent wait until the child finishes its execution using wait() or waitpid(). So that it can collect exit() status and removes its information from the process table.
The parent process can register a SIGCHLD handler with signal(). The child process will give a SIGCHLD signal after it exits, and parent can recover child in the handler.
If the parent doesn't care when the child exits, it can notice kernel by signal(SIGCHLD, SI_IGN). Then kernel will recover defunct child and parent process will not receive the SIGCHLD signal.
By forking twice.

c) The grep filter searches a file for a particular pattern of characters, and displays all lines that contain that pattern. The pattern that is searched in the file is referred to as the regular expression (grep stands for globally search for regular expression and print out).

Syntax:
grep [options] pattern [files]
Options Description
-c : This prints only a count of the lines that match a pattern
-h : Display the matched lines, but do not display the filenames.
-i : Ignores, case for matching
-l : Displays list of a filenames only.
-n : Display the matched lines and their line numbers.
-v : This prints out all the lines that do not matches the pattern
-e exp : Specifies expression with this option. Can use multiple times.
-f file : Takes patterns from file, one per line.
-E : Treats pattern as an extended regular expression (ERE)
-w : Match whole word
-o : Print only the matched parts of a matching line,
with each such part on a separate output line.

Ans 4 a) A program/command when executed, a special instance is provided by the system to the process. This instance consists of all the services/resources that may be utilized by the process under execution.

Whenever a command is issued in unix/linux, it creates/starts a new process. For example, pwd when issued which is used to list the current directory location the user is in, a process starts. Through a 5 digit ID number unix/linux keeps account of the processes, this number is call process id or pid. Each process in the system has a unique pid.
Used up pid's can be used in again for a newer process since all the possible combinations are used.
At any point of time, no two processes with the same pid exist in the system because it is the pid that Unix uses to track each process.
Initializing a process

A process can be run in two ways:
Foreground Process : Every process when started runs in foreground by default, receives input from the keyboard and sends output to the screen.
When issuing pwd command

BackroundProcess : It runs in the background without keyboard input and waits till keyboard input is required. Thus, other processes can be done in parallel with the process running in background since they do not have to wait for the previous process to be completed.

Adding & along with the command starts it as a background process

ps (Process status) can be used to see/list all the running processes.

For a running program (named process) Pid of finds the process id's (pids)

Fields described by ps are described as:

UID: User ID that this process belongs to (the person running it)

PID: Process ID

PPID: Parent process ID (the ID of the process that started it)

C: CPU utilization of process

STIME: Process start time

TTY: Terminal type associated with the process

TIME: CPU time taken by the process

CMD: The command that started this process

There are other options which can be used along with pscommand :

-a: Shows information about all users

-x: Shows information about processes without terminals

-u: Shows additional information like -f option

-e: Displays extended information

Stopping a process

When running in foreground, hitting Ctrl + c (interrupt character) will exit the command. For processes running in background kill command can be used if it'spid is known.

$ ps –f

UID PID PPID C STIME TTY TIME CMD
52471 19 1 0 07:20 pts/1 00:00:00sh
52471 25 19 0 08:04 pts/1 00:00:00ps –f

$ kill 19
Terminated
If a process ignores a regular kill command, you can use kill -9 followed by the process ID .

$ kill -9 19
Terminated

b) There are many ways to edit files in Unix. Editing files using the screen-oriented text editor vi is one of the best ways. This editor enables you to edit lines in context with other lines in the file.

An improved version of the vi editor which is called the VIM has also been made available now. Here, VIM stands for ViIMproved.
vi is generally considered the de facto standard in Unix editors because −

It's usually available on all the flavors of Unix system.

Its implementations are very similar across the board.

It requires very few resources.

It is more user-friendly than other editors such as the ed or the ex.

You can use the vi editor to edit an existing file or to create a new file from scratch. You can also use this editor to just read a text file.

Starting the vi Editor

The following table lists out the basic commands to use the vi editor −

Sr.No. Command & Description

1

vi filename

Creates a new file if it already does not exist, otherwise opens an existing file.

2

vi -R filename

Opens an existing file in the read-only mode.

3

view filename

Opens an existing file in the read-only mode.

Following is an example to create a new file testfile if it already does not exist in the current working directory −

$vitestfile

The above command will generate the following output −

|

~

~

~

~

~
~
~
~
~
~
~
~
"testfile" [New File]

You will notice a tilde (~) on each line following the cursor. A tilde represents an unused line. If a line does not begin with a tilde and appears to be blank, there is a space, tab, newline, or some other non-viewable character present.

You now have one open file to start working on. Before proceeding further, let us understand a few important concepts.

Operation Modes

While working with the vi editor, we usually come across the following two modes −

Command mode − This mode enables you to perform administrative tasks such as saving the files, executing the commands, moving the cursor, cutting (yanking) and pasting the lines or words, as well as finding and replacing. In this mode, whatever you type is interpreted as a command.

Insert mode − This mode enables you to insert text into the file. Everything that's typed in this mode is interpreted as input and placed in the file.

vi always starts in the command mode. To enter text, you must be in the insert mode for which simply type i. To come out of the insert mode, press the Esc key, which will take you back to the command mode.

Hint − If you are not sure which mode you are in, press the Esc key twice; this will take you to the command mode. You open a file using the vi editor. Start by typing some characters and then come to the command mode to understand the difference.

Getting Out of vi

The command to quit out of vi is :q. Once in the command mode, type colon, and 'q', followed by return. If your file has been modified in any way, the editor will warn you of this, and not let you quit. To ignore this message, the command to quit out of vi without saving is :q!. This lets you exit vi without saving any of the changes.

The command to save the contents of the editor is :w. You can combine the above command with the quit command, or use :wq and return.

The easiest way to save your changes and exit vi is with the ZZ command. When you are in the command mode, type ZZ. The ZZ command works the same way as the :wq command.

If you want to specify/state any particular name for the file, you can do so by specifying it after the :w. For example, if you wanted to save the file you were working on as another filename called filename2, you would type :w filename2 and return.

Moving within a File

To move around within a file without affecting your text, you must be in the command mode (press Esc twice). The following table lists out a few commands you can use to move around one character at a time −

Sr.No. Command & Description

1. k

   Moves the cursor up one line

2. j

   Moves the cursor down one line

3. h

Moves the cursor to the left one character position

4. l

Moves the cursor to the right one character position

The following points need to be considered to move within a file −

vi is case-sensitive. You need to pay attention to capitalization when using the commands.

Most commands in vi can be prefaced by the number of times you want the action to occur. For example, 2j moves the cursor two lines down the cursor location.

There are many other ways to move within a file in vi. Remember that you must be in the command mode (press Esc twice). The following table lists out a few commands to move around the file −

Given below is the list of commands to move around the file.

Control Commands

The following commands can be used with the Control Key to performs functions as given in the table below −

Given below is the list of control commands.

Editing Files

To edit the file, you need to be in the insert mode. There are many ways to enter the insert mode from the command mode −

Sr.No. Command & Description

1. i

Inserts text before the current cursor location

2. I

Inserts text at the beginning of the current line

3. a

Inserts text after the current cursor location

4. A

Inserts text at the end of the current line

5. o

6. Creates a new line for text entry below the cursor location

7. O

Creates a new line for text entry above the

cursor location Deleting Characters

Here is a list of important commands, which can be used to delete characters and lines in an open file −

Sr.No. Command & Description

1. x

Deletes the character under the cursor location

2. X

Deletes the character before the cursor location

3. dw

Deletes from the current cursor location to the next word

4. d^

Deletes from the current cursor position to the beginning of the line

5. d$

Deletes from the current cursor position to the end of the line

6. D

Deletes from the cursor position to the end of the current line

7. dd

Deletes the line the cursor is on

As mentioned above, most commands in vi can be prefaced by the number of times you want the action to occur. For example, 2x deletes two characters under the cursor location and 2dd deletes two lines the cursor is on.

It is recommended that the commands are practiced before we

proceed further Change Commands

You also have the capability to change characters, words, or lines in vi without deleting them. Here are the relevant commands −

Sr.No. Command & Description

1. cc

Removes the contents of the line, leaving you in insert mode.

2. cw

Changes the word the cursor is on from the cursor to the lowercase w end of the word.

3. r

Replaces the character under the cursor. vi returns to the command mode after the replacement is entered.

4. R

Overwrites multiple characters beginning with the character currently under the cursor. You must use Esc to stop the overwriting.

5. s

Replaces the current character with the character you type. Afterward, you are left in the insert mode.

6. S

Deletes the line the cursor is on and replaces it with the new text. After the new text is entered, vi remains in the insert mode.

NOTES