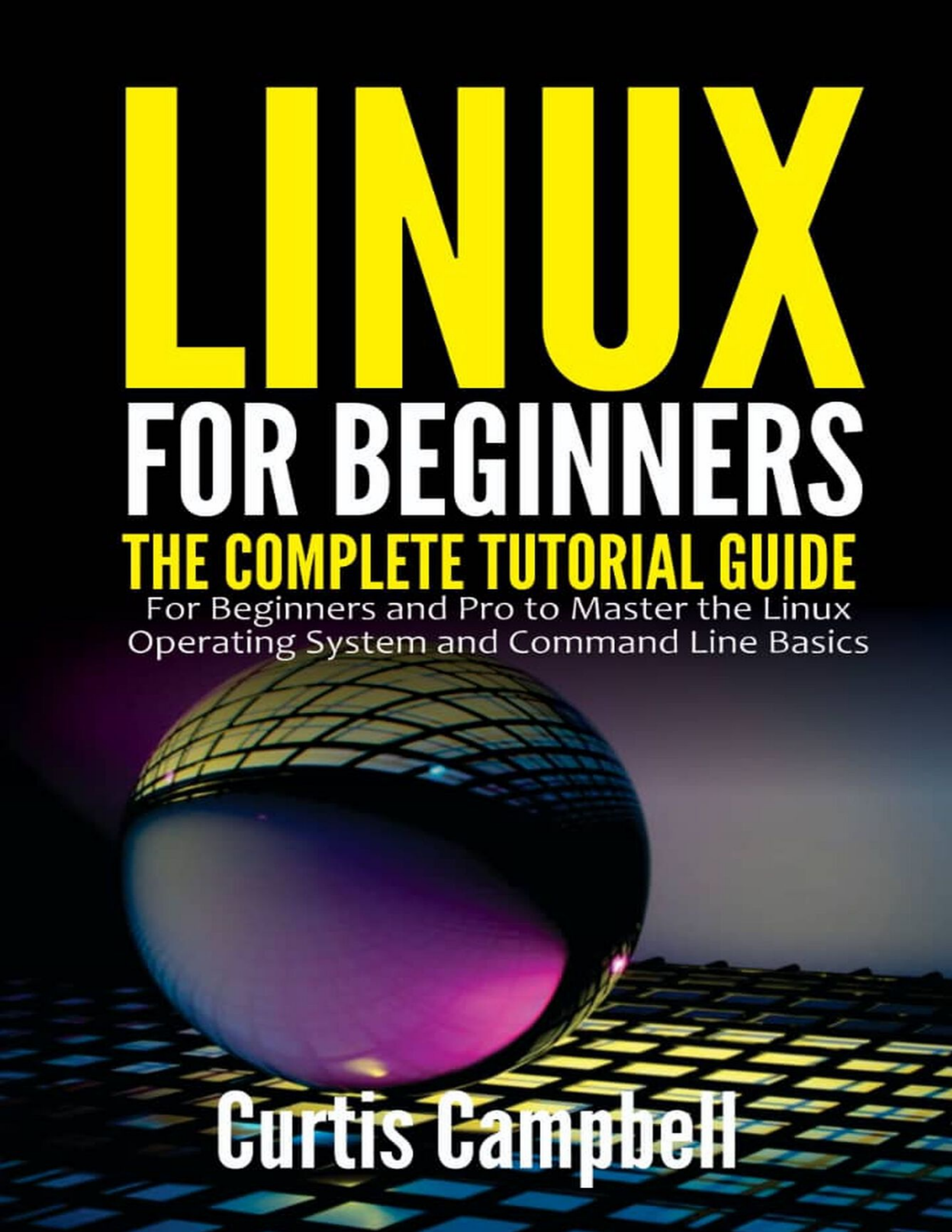
LINUX
FOR BEGINNERS
THE COMPLETE TUTORIAL GUIDE
For Beginners and Pro to Master the Linux Operating System and Command Line Basics



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Linux for Beginners

The Complete Tutorial Guide for Beginners and Pro to Master the Linux Operating System and Command Line Basics

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Campbell

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INTRODUCTION

Linux is an open-source and free Operating System that depends on the UNIX programming language. The beauty of the Linux system it is free and easy to use. Furthermore, in comparison with other Operating Systems, Linux has a very large user base.

The OS was built on the Intel x86 model and it allows users to customize it to any form, based on what they like. Additionally, the Linux-based system is capable of supporting multiple directories and libraries.

Before using the Linux Operating System, you need to have basic knowledge about reading, writing, and editing shell script. In recent times, the Linux OS was not known by an average PC user, but it has grown massively to be used in Android, smart watches, video games, washing machines, and so much more technologies.

For the records, Linux users have grown since March 14, 194, when its first version (Linux Kernel 1.0) was established. A large number of Linux distributions allow users to easily operate the Operating System without stress. While a few Linux distributions are sold to the public, others can be obtained for free.

As a newbie in the world of Linux, you are urged to continue reading to learn more about the OS and possibly integrate it into your PC.

CHAPTER ONE

Meaning of Linux

LINUX is a kernel or an operating system dispersed under an open-source permit. Its usefulness list is very similar to UNIX. The piece is a program at the core of the Linux operating system that deals with basic stuff, such as allowing hardware to speak with programming.

Linux is upheld on pretty much every significant computer platform including X86, ARM, and SPARC, making it quite possibly the most broadly upheld Operating Systems. Although it started out as a PC operating system, but it has broadened its horizon to include supercomputers, data centers, servers, and so much more devices.

In fact, Linux is operated in integrated devices like security controls, routers, game consoles, smartwatches, digital cameras, Androids, TV and so much more. Additionally, Linux has the largest user base when any operating

system is brought to the table due to the addition of Android.

Linux also has its distribution, and it is usually called a set of Linux packages. Furthermore, Linux distribution is also seen as an operating system that includes a range of algorithms focused on the Linux kernel, which also includes the Linux supporting software and modules.

Users can derive or obtain a Linux-based Operating System by simply installing one of the Linux distributions, which can be gotten on several devices like computers, and embedded systems.

How is Linux working OS utilized?

Each model of the Linux operating system oversees hardware assets, dispatches and handles applications, and gives some type of UI. The massive advancement local area and wide scope of conveyances imply that a Linux version is accessible for practically any assignment, and it has entered numerous spaces of computing.

For instance, Linux has arisen as a famous OS for web workers like Apache, just as for network activities, logical processing undertakings that require high figure groups, running data sets, and running cell phones with OS versions like Android.

What is an Operating system?

The Operating System on your PC is in control of the computer’s software and hardware. Various computer apps are majorly run at the same time, and they require access to your PC’s CPU, memory, and storage. Usually, this operation is controlled and run by the Operating System to make sure that all the software gets the resources it needs.

System development and Computer software gain majorly from an Operating System and without having an Operating System, each app will have to add its user interface and the extensive code needed to control the PC’s low-level functions like network connectivity, disc storage, and others.

Due to the numerous available hardware resources, it is likely to increase any app size and make software development meaningless. A lot of fundamental and important tasks, like presenting text on a major output screen, and

sending data packets may be passed on to system software.

Going further, system software permits applications to interact with the devices at all times without the applications being aware of important information as concern the hardware. The Operating System can work on nearly any range of apps if they gain access to similar resources and services in a similar way. As a result, this reduces the programming and time required to form and debug a program while ensuring that users can manage, watch, and control system hardware across an instinctive interface.

If you want to optimize Operating System services to an exact hardware area, the Operating System will have to utilize a large database of computer drivers. Although any software may likely make an introduction call to the storage media, the Operating System will get the call and call on the close driver to change the call into commands needed by the hardware resources on a particular computer system. Currently, the Operating System works as a robust interface for locating, configuring and controlling several hardware, including memory management, processors, and processing modules.

Definition of UNIX

UNIX is a multitasking, multiuser, time-sharing, and portable OS initially created in 1969 by a gathering of people at AT&T. UNIX was first customized in low-level computing idea yet was reinvented in C in 1973.

UNIX has been ported to more machine families than some other OS. Accordingly, it has come to be related to the idea of open systems. Unix Operating Systems are broadly utilized in PCs, workers, and cell phones. The UNIX climate was additionally a fundamental component in the advancement of networking and the internet.

UNIX was created based on the way of thinking that the system power comes from the connections among programs, instead of on the actual projects. UNIX programs are composed to do a particular thing great, and projects are composed with the goal that they cooperate. AS a result, UNIX engineers uphold effortlessness, movability, and clearness in the plan.

Difference between Linux and UNIX

While both UNIX and Linux are important for use, there are still some

notable differences between the two.

UNIX is a multi-user OS and you must pay before using it. In fact, it is not also open source. It was created in 1969 by the Ken Thompson group at AT&T Bell Labs. Furthermore, UNIX can be used on workstations, servers, and so much more.

On the other hand, unlike UNIX, Linux is an open-source multi-user and multi-tasking OS. It was first created by Linus Torvalds in 1991. According to numerous users, Linux Operating System is mostly operated in smartphones, mainframes, desktops, and so much more devices.

Here are the major differences between Linux and UNIX:

- In terms of development: While UNIX is not open-source and was created by AT&T Bell Labs, Linux, on the other hand, is open-source and was created by the Linux community.

- In terms of supported file systems: UNIX is supported by gpfs, ufs, zfs, fs, xfs, and hfs. Meanwhile, Linux is supported by NTFS, Ext2, FAT32, Ext3, FAT, Ext4, Btrfs, Jfs, Xfs, and ReiserFS.

- Cost: While UNIX is known as a licensed Operating System, Linus is free to use.

- Usage: UNIX is majorly utilized on PCs, servers, and workstations while Linux is majorly utilized in servers, mainframes, desktop, and smartphones.

- Target processor: CUnix supports Itanium and PA-RISC while Linux supports Intel’s x86 hardware processors.

- Default Shell: For UNIX, it is Bourne Shell, while for Linux, it is Bash ***(NB: In this instance, Bash also means Bourne Again Shell)***.

CHAPTER TWO

Benefits of Linux

Linux is an OS similar to Mac OS and Window that also has several distributions and variations due to its modular design. The Operating System can schedule apps, manage basic devices, and control file system services.

As a matter of fact, Linux has several benefits as compared with other operating systems, and no wonder why it is mostly utilized in nearly all fields in the current world, including supercomputers, home appliances, smartphones, cars, and others.

1. Open Source

One of the essential advantages of Linux is that it is an Open Source Operating System. For instance, its source code is easily available for everyone. Anyone fit for coding can contribute, change, overhaul and circle the code to anyone and under any circumstance.

2. Security

Linux is more secure interestingly unlike other OS like Windows. Furthermore, Linux isn't absolutely secure as there are some and it is less vulnerable than others. Each program in Linux whether an application needs authorization from the administrator ***(NB: The authorization usually comes in form of a password)***.

3. Reestablish older computer systems

Linux assists you to use your old Computer Systems as a firewall, switch, file

server, and others. There are various distributions open to using depending on your system abilities. ***(NB: For instance, low-end systems usually use Puppy Linux)***.

4. Customization

This is one characteristic that offers a massive benefit over other OS. In Linux, you are free to customize any feature, include and remove any feature depending on your needs as long as it is an open source OS.

Asides from this, several beautiful icon themes and wallpaper can be added to provide a stunning design to your system.

5. Software Updates

You will experience a great number of software updated when using Linux. The software updates are very fast than other updates in some OS. Finally, updates carried out in Linux can be easily achieved without encountering any critical issue.

6. Several Distributions

There are numerous distributions made available and they can also be referred to as Linux distros. It gives several options to users. Users can pick any bistros depending on their preferences. A few bistros of Linux are Ubuntu, Debian, Linus Mint, Fedora, Arch Linux, and so much more.

As a newbie, you can utilize Linux Mint or Ubuntu. Meanwhile, if you have some years of experience as a programmer, you can utilize Fedora or Debian.

7. No payment to be made

Linux is free to use on the internet ***(NB: You only need to download and begin using it)***. With Linux, you are not mandated to purchase the license because a great deal of the software has GNU General Public License.

In fact, the free-to-use advantage was regarded as one of the major benefits of Linux over Windows and other OS. In the case of Windows and other OS,

you will have to spend a huge amount of money to obtain the license.

8. Immense Community Support

Scenes and mediums by happy users are created on the internet to assist and deal with the issue in which other users are encountering. There is a huge load of committed programmers who are willing to assist you when you have any issues.

9. Privacy

Linux makes sure the privacy of user's information because it won't request or collect personal information from the user when it's software or distribution is in use.

10. Stability

Linux provides enough stability, and there is no need for it to reboot after a short time. Going further, the Linux system hardly ever freezes or becomes slow. Unlike in Windows, where you need to reboot your system once you install or delete an app, the Linux system does not have this issue.

Developers of Linux have also made it clear that the system can work without any interference.

11. Performance

Linux gives a high and stable performance on several workstations and networks. Also, it permits a high number of users to work at the same time and it handles them professionally

12. Network Support

Linux provides support for network functionality as made available by programmers over the web. Additionally, Linux assists users to set up server and client systems on computer systems without any hassle and it is usually done quickly.

13. Flexibility

Linus gives a large range of flexibility, allowing you to install only needed parts. For now, you do not have to install a full suite. Linux developers will also advise you to store Linux files below several partitions ***(NB: This should be done in case one of the Linux files gets corrupts, allowing you not to encounter any loss at all and retrieve your document easily)***.

As a Linux user, what you only have to fix is the exact partition and not the full file which you must carry out when using other operating systems like Windows.

14. Compatibility

Linux performs all available file formats, and it also permits a huge number of file formats.

15. Fast and easy installation

Linux developers sought to make Linux easy to install from the internet and they also achieved it. To install Linux from the internet, you do not need to table down anything because it is capable of running on any hardware, including your outdated systems.

16. Adequate use of Hard Disk

Linux carries out every operation efficiently, including when the hard disk is nearly occupied. As a result, it raises the performance of the Linux ***(NB: This makes Linux offer high performance to its users as well)***.

17. Multitasking

As we have mentioned earlier, Linux is a multitasking OS because it can carry out several operations at the same time without any reduction in speed like downloading a huge file ***(NB: This is a very important benefit because***

other low-end systems and PCs might not be able to multitask effectively, and even if they do, the download speed will be drastically reduced).

18. Run several desktops

Linux gives several desktop environments to simplify its use. At the time you are installing Linux, you can select any desktop environment depending on your needs like GNOME and KDE ***(NB: While KDE means K Desktop Environment, GNOME means GNU Network Object Model Environment)***.

19. Run various work regions

Linux gives distinctive work region conditions to simplify it to use. While presenting Linux, you can pick any work territory environment according to your longings like KDE (K Desktop Environment) or GNOME (GNU Network Object Model Environment).

How to Choose Linux Distribution

Choosing or selecting a Linux distribution can be one of the most challenging

tasks for a Linux user. Numerous amazing choices have their own special durable suites.

In addition, there are regular updates, general community information, and news that make the process of choosing a Linux distribution even more challenging. Meanwhile, to make the process a bit easier to choose a Linux distribution, some questions will assist you in your decision ***(NB: While asking yourself some questions, you should also remember that you should try as much as possible not to make the wrong choices because they can ruin you and your hope to creating a magnificent design)***.

Here are some of the questions that will enable you to choose a Linux distribution easily:

1. **Server vs. Desktop**

This is a very fundamental question you should ask yourself when choosing a Linux distribution. You need to know if you want to run the distribution on a server or desktop. The requirements for both distributions are not the same. For instance, server distributions require to be strong and stable, while it is perhaps much better to have an updated software when you choose the route or desktop distribution.

More so, if you choose to run a server, you need a long release cycle, support, reliability, and a compatible version of the software you need. On the other hand, when it comes to desktops, you don’t have to get a long release cycle. You simply have to get a new version of your applications. You can also get a rolling release that will permanently keep you on the bleeding edge. Although stability is important, it is not a crucial requirement.

Instead, you will have to get a graphical desktop environment and a distribution that offers something that will attract your eyes.

2. **Desktop: Beginner vs. Advanced**

Perhaps, if you will be running Linux on your desktop, you need to also inquire from yourself if you want a beginner or an advanced Linux type. There are several Linux distributions such as Ubuntu, but ensure your choice is user-friendly.

On the other hand, there are also Linux distributions such as Arch and Gentoo Linux that allow you to do anything you want with your system such as breaking it differently and explicitly. Furthermore, the distributions allow you to have control over your system and you can form amazing custom-tailored outcomes ***(NB: The disadvantage with it is that you may likely not get what you expect, and it takes a huge amount of time to maintain)***.

Ensure you do not allow the Beginner Linux distribution to deceive you. Here are some of the differences between a Beginner and an Advanced Linux distribution:

Beginner: SolusOS, OpenSUSE, Linux Mint, Ubuntu, Fedora, and ElementaryOS

Advanced: Slackware, Debian, Gentoo, Arch Linux, and OpenSUSE Tumbleweed

After deciding if you will get a beginner or advanced Linux distribution, some crucial factors differentiate them from each other.

3. Software Repositories

A software repository is another factor you need to consider when choosing a Linux distribution. In this case, you should be bothered about how much and the kind of software seen in the repositories. In a case whereby a distribution is without an application you require, it may be a worry for you. For instance, Fedora and Ubuntu have high software repositories and large third-party support. If you want to use your desktop for everyday operation and multimedia, you should consider getting Ubuntu.

A few Linux distributions such as Debian do not ship alongside non-free software and places it in a different repository and this is something you need to take into consideration.

4. Hardware Resources

The main reason Linux has continued to sell is that it can cut down and utilize little resources that are made available. In fact, Linux can also utilize outdated computers and make them functional once more with little resource-intensive systems.

There are several amazing distributions that seek to be as light as possible, including Linux.

5. Desktop Environments

Since your eyes will mostly be focused on your desktop environment consistently, it means you need to choose a Linux distribution that is actually worth it. Also, you need to choose a Linux distribution with a comfortable and good desktop environment that will not give you any issue while using it.

Perhaps, if you have not utilized Linux in the past, you should get a Linux distribution with an attractive desktop environment such as GNOME. Also, other desktop options can be found in the same Linux distribution. For example, Ubuntu has something referred to as flavors that also have different desktop environments.

Meanwhile, other advanced Linux distributions such as Gentoo and Arch Linux do not have a default desktop environment and they do not ship alongside a desktop environment. Instead, you are expected to install and set it up by yourself. From a positive angle, you are free to select from any desktop environment as you wish.

To emphasize desktop environments, they are important because they dictate with tools that are present when you install them.

6. Update Cycles

It would not be a welcome development if you have a desktop computer that is unwilling to update to new applications with amazing features due to one reason or the other. This is the reason you need to search for how frequently your choice of Linux distribution releases a new version and the software it is allowed to update in its repositories.

This point is the tricky and confusing aspect because there is no straightforward and particular Linux distribution you can choose that can update software for you. On the other hand, running or using the latest and new software always can lead to things breaking. For example, Linux distributions such as Arch Linux is known to always lead to breaking when its software is updated.

Other Linux distributions such as Gentoo, OpenSUSE Tumbleweed, and SolusOS do not have a particular version ***(NB: Distributions without updated software will always update once their respective software is being released)***. It also means that you will never find a hard obstruction to obtaining new software.

A few distributions that stay in the center ground between old and bleeding edge are Linux Mint, Debian, ElementaryOS, Ubuntu, SolusOS, and OpenSUSE.

7. Community

It is important not to forget a distribution community. In this instance, the community includes people you will ask for solutions from when something does not go as planned. ***(NB: Don't be deceived into believing that everything will go smoothly because you will surely experience one issue or the other as you journey along)***.

For reference purposes, the Ubuntu community is large and it is saddled with the responsibility of helping Linux beginners. Ubuntu community cannot be compared with the Arch Linux community because the latter expects that you to have achieved some level of professional skills.

The Linux community will also be called when it is time to pack software away from the default distribution repositories. Once more, Ubuntu's large number of community members is a huge asset and whenever a person certifies or supports Linux, they will package the software for Ubuntu. More communities are identified for packing new software and Arch Linux's AUR repository is packed with software in which the community arranges and maintains for Arch Linux users.

8. Severs: Flexibility vs. Enterprise

Whenever you are choosing a Linux distribution for your servers, the worry is totally different when choosing with a desktop. In this instance, you will have to get a system that will never disappoint you. In case the system disappoints you, you will have to find a way to fix it immediately.

Running an ultra-long term support distribution may seem like a fantastic idea until the internet app you created will fail to run because the entire

software in the repositories is old. The only solution is to make everything balance. By making everything balance, we mean a web server should have some form of flexibility. Also, web technologies are growing by the day and you wouldn't want to see yourself custom assembling everything to get your web application working once again.

However, it may not be the worst situation if your email server is old but does not change. This is because email servers are infamously hard to configure, and it is always better if they remain safe, secure, and stable.

Additionally, database servers can also be on the center ground, and it is usually based on what type of thing the database will serve. Also, the database for a web app may require a couple of new features to make the software keep on communicating daily. However, if you are using an internal DB for records, you may have to get something very simple and stable.

Linux distributions made for the enterprise usually have unbearable long support for windows that do not change. Meanwhile, distributions that serve different purposes usually move faster and permit for a little flexibility in your software option.

Here are some recommendations when choosing servers:

Flexible: Debian, Gentoo, and Ubuntu

Enterprise: Debian, Slackware, RHEL, and CentOS

Ubuntu and Linux Mint

This type of Linux distribution is perfect for beginner and advanced users. It is presently the most used Linux distribution worldwide. The Ubuntu and Linux mint is built on a Debian core, and it has added a constant release cycle.

One beautiful thing about using the Ubuntu and Linux Mint is easy to use and it is backed up financially. Additionally, it is a free distro, hence, copyrighted materials like DVD playing software are not represented with Ubuntu, meaning you are mandated to download and install it differently.

Lastly, Linux Mint is dependent on Ubuntu, and it is specially made for

novice users and it also offers a KDE and GNOME version.

SuSE Linux

As you have with Ubuntu and Linux Mint, the SuSE Linux is also suitable for beginners and advanced users. Formally, it was a free German Linux distribution, which, after some period, was bought by Novell, and who further went ahead to sell it to VMWare. SuSE Linux is an amazing all-rounder Linux which is prepared for the Enterprise.

Red Hat/CentOS/Fedora

The Red Hat/CentOS/Fedora was formally a common Linux installer, but it has slowly faded away in terms of popularity. The good thing about this Linux installer is that it is easy to use, although it has a little frustrating twist, it is still a software package that is guilty of dependency issues, added with the YUM system.

The software is not a free Enterprise version, and it has full phone-based support supported by tough experiments. On the other hand, CentOS is regarded as the free version which is gotten from RHEL but it cannot be compared to the former.

Lastly, Fedora is regarded as the bleeding-edge fork of Red Hat which includes all its recent whistles and bells and it is capable of suffering from low stability than the other enterprise list.

Debian

Perfect for intermediate and advanced users. It is well built for Linux distribution and it also includes a joint effort with an apt-get system to correct the issue of the RPM software packaging in SuSe, Mandriva, and Redhat.

Popular known for having an edge over other Linux distributions, it is regarded as the solid distribution for modern users because it is easy to distribute like Linux Mint and Ubuntu.

Slackware and Arch Linux

It is good for advanced and server users. Slackware was identified as the first and original Linux distribution. It is also focused on geeks who prefer to change their settings. A drawback regarding Slackware is that it is difficult to install and use. In fact, Slackware uses .tar.gz packages and not the common .deb or .rpm systems.

If you are an advanced user but you do not like to use the Slackware distribution, you may opt instead for Arch because it offers nearly the same level of customization as you have with Slackware.

CHAPTER THREE

Basic Linux Commands

Check below for a list of the basic Linux commands:

1. **Pwd:** After launching the terminal, you will be taken to the home directory of your user. To be sure of the exact directory you are in, you can simply utilize the **"pwd"** command.

2. **Ls:** Utilize the **"is"** command to be sure what files are present in the directory (NB: You can view the entire hidden files by utilizing the command identified as "is-a".

3. **Cd:** Utilize the **"cd"** command to open a directory. For instance, if you are present in the home folder, and you will move over to the downloads folder before entering "cd downloads". ***(NB: Be sure to know that this command is case sensitive, and you need to enter in the name of the folder the way it is)***.

4. **Rmdir and mkdir:** Utilize the mkdir command whenever you have to create a folder or a directory. For instance, if you need to create a directory referred to as **"DIY",** you should enter **"mkdir DIY".**

5. **Rm:** Utilize the rm command to delete both directories and files. You can also specify what you will like to delete by simply entering **"rm-r"** to delete only the directory.

6. **Touch:** This particular command is majorly used to make a file. Additionally, the touch command can be just about anything, inkling an empty zip or empty txt file.

7. **Man and –help:** To get more information as regards a particular

command and how to utilize it effectively, simply use the man command. The man command will display the manual pages of the command.

8. **Cp:** Utilize the cp command to copy files by going through the command line. It requires two arguments; which are simply the location of the file to copy and where it is meant to be copied to.

9. **Mv:** Utilize the mv command to move or change the location of files through the command line ***(NB: This command also serves people that want to rename a file)***.

10. **Locate:** Use locate command to find a fine in a Linux system, and it serves the same purpose as search command in Windows. You can easily call on this command when you are not particularly sure where you stored a file or the exact name of a particular file.

CHAPTER THREE

Installing Linux

What type of PC is needed?

The type of PC needed for installing Linux will depend based on what operation you want to carry out with your Linux. In most cases, the system requirements usually range from an outdated Intel 386 to a modern PC.

Users can run Linux on a bit strange hardware like ARM-based machines, Macintosh, and so much more.

So, to determine the type of PC you need to install Linux, we will have to discuss the type of CPU, RAM, hardware, Video card and so much more that are required.

CPU

Linux was initially made available on the Intel 386 around the early ’90s, but it is not a perfect representation or meaning that the Linux will perform better on a PC other than a Macintosh PC. In the modern world, Linux desktop is common on AMD, Intel, and PPC processors, hence, a majority of the used software is made on the platforms.

If you own a different platform like Atari, Amiga, ARM-based processor, and Sparc, Linux will be surely different because most software titles may not be present for a particular platform.

RAM

RAM or Memory is another crucial requirement when planning to install a Linux distribution. Without a doubt, a majority of the used Linux distributions at this time need at least 1GB to use.

Meanwhile, if you are planning to utilize Linux for non-graphical reasons, like firewall, or web page hosting, you are free to run a basic installation of

Linux. A few of the basic Linux installations will usually run on 8MB. On the other hand, if you want to have a mainstay about using Linux and you want the best performance, then you should consider using a higher RAM.

The point is that the higher RAM you use, the better for your PC and Linux because it will run without any issues. But if you decide to only the Linux at home, you must get a minimum of 1GB RAM because that is the least storage capacity that can withstand any operation.

With more tough and challenging operations and functions such as editing artwork, audio, editing movies and so much more, you need to get at least 2GB RAM and even more. Additionally, server users who will like to hold or host several websites must get at least 4GB or 8GB RAM, but small server users will not mind using only about 1GB of RAM.

Video Card

The required video card or graphics adaptor needed for Linux is just a bog-standard one. Also, it is preferable to get an SVGA adaptor in your computer system that has sufficient RAM to support resolutions of a minimum of 1024 x 768.

Furthermore, Graphics Accelerator cards of numerous kinds are supported by modern distribution and present for even quicker graphics. More so, if you need a good graphics performance in Linux, the NVidia range is a good choice, this is because they are supported under Linux.

In addition, ATI cards are also a common option, but their driver support for Linux does not seem to be an excellent option as compared with NVidia. As a potential user, if you are confused about the kind of card you need, it is best to simply visit your device manager in Mac OS or Windows. Also, integrated graphics chipsets like Cirrus Logic and intel I Series are not bad either.

How to Install a Linux Distribution

Now, we have arrived at installing Linux. Before we get started, Linux is an operating system that permits users with an understanding of programming to change and form their operating system depending on their needs.

There are tons of Linux distributions including Debian and Ubuntu, however,

all Linux distributions run over a Linux server.

Steps to take to install Linux with USB Stick or CD-ROM

First of all, download .iso or go ahead to download ISO files on a PC over the internet and keep it on the USB stick or CD-ROM after you have made it bootable with UNetBootin and Pen Drive Linux.

Once you have achieved the above steps, you can now proceed to install Linux properly by following the steps below:

1. **Boot into the USB Stick**

At the initial stage, you will have to reboot your PC after joining a pen drive or CD-ROM into the PC. Then hit Enter when it has booted before selecting the pen drive or CD-ROM option to begin the additional booting process. You can attempt a manual booting process by pressing F12 to begin ***(NB: Holding F12 will permit you to choose from several boot options prior to starting your computer system)***.

The entire options, notwithstanding if it is either CD-ROM or USB will provide you with a list which you are expected to choose one ***(NB: After this, you will find a new screen whenever your computer boots, and it is known as "GNU GRUB". It is a boot loader that takes control of all installation processes on Linux. Be aware that the screen will be displayed if there are numerous operating systems)***.

Here is what you have to do when booting into the USB stick:

- Proceed to set the keyboard layout
- At this point, your computer system will ask you the type of applications you would prefer to install to begin using Linux ***(NB: In most cases, the two options which will be made available for you to choose from including Minimal and Normal installation)***

2. **Derive Selection**

Here, you need to choose the drive for installation of the operating system to complete. You can choose the option which reads “Erase Disk and install Ubuntu”, especially if you will like to replace the former operating system. But if not, simply choose the option which reads **“Something else”** and select **Install Now**.

3. **Begin the Installation process**

Now is the time to start the installation process. At this point, a little panel will request verification or confirmation to start the installation process. Choose Continue if you do not want to alter or modify any information made available. Also, choose your location on the map and proceed to install Linux.

The next step requires you to input your login details before Linux can be installed.

4. **Conclude the Installation**

Once the installation process is complete, you will find a prompt asking you to restart or better still, reboot your computer system. Furthermore, you can also choose to download drivers depending on your needs by opening the System Settings menu.

Simply adhere to the steps below to complete the installation process:

1. Choose Additional Drivers and from the available list, also choose the graphics driver ***(NB: Note that several important drivers can be accessed in the list, and a common example is Wi-Fi drivers)***.

There are numerous other options to follow if you choose to install Linux.

Installing Linux using Virtual Box VMWARE

Requirements to install Linux using Virtual Box VMWARE:

- Stable and fast internet connection
- Minimum of 12GB free space
- Minimum of 4GB RAM

Here are the steps to take to install Linux through this means:

1. First of all, download the Virtual Box from the original **Oracle Virtual Box site**.
2. Proceed to install Linux using Virtual Box: Once you have downloaded the Virtual Box, you are now free to install Linux. Simply utilize the .iso file you downloaded from the web and begin the Virtual Box. ***(NB: At this stage, we have to assign or give RAM to Virtual Operating System. Also, the least RAM should be 2GB)***.
3. Go on to select an option below the one which reads **"Create a virtual disk".**
4. Select the kind of storage you will like on your hard disk before proceeding to select the disk with the least size of 12GB.
5. Select the option which reads Create option and proceed to select the **START button** to commence the **Virtual Box** and browse through while navigating to the location of the .iso file.
6. At this point, Linux Operating System will begin, so choose to **Install.**
7. Choose the drive for completing the Operating System installation. Choose **"Erase Disk and install Ubuntu"** if you no longer need the former Operating System. However, if you still need the previous Operating System, simply click **"Something else: and select Install Now**.
8. Choose **Continue and select a valid username and password.**
9. Wait for a while, probably around 15 minutes for the Linux installation to come to an end.
10. After the installation process is completed, it is always best that you restart or reboot your system ***(NB: If you encounter any issue while waiting for the installation process***

to complete, you are expected to close and reopen the Virtual Box for the installation process to commence once more).

CHAPTER FOUR

How to copy an ISO file to CD or DVD

Copying an ISO image to a CD is not similar to dragging and dropping the file from the download section and copying it once more to an empty USB stick or DVD ***(NB: Hence, you will have to burn the disk image on the media before doing any other thing)***.

There are a plethora of methods to place an ISO image on a USB stick, and it is a very easy step to take. Windows users can easily achieve this feat by operating a free tool identified as Rufus.

Check below for the steps needed to copy an ISO file to CD or DVD:

1. Select your USB stick ***(NB: This option can be found from the drop-down menu referred to as "Device")***.
2. Look towards the right side of your screen and you will find a CD icon alongside a small box below it. Ensure you select it a wait for a dialog box to be displayed. Once it has successfully been displayed, take the time to find the ISO file you earlier downloaded and launch it.
3. Select Start.
4. The next screen will prompt you to verify if it is Ok to download the SYSLINUX software. You are expected to select the Yes option.
5. After completing the above step, you will find a dialogue box concerning an ISO Hybrid image. Choose OK.
6. Also, verify that you clicked your USB stick. ***(NB: Be sure you did not select another one and be sure to know that any data you stored on your USB will be removed)***.
7. Once all is done, proceed to restart your PC.

About Sort Command

The sort command assists you in either order or sort lines in text files. Users can sort the information in a text file and show the output on the screen ***(NB: Otherwise, users can also redirect the output to a file)***.

Depending on your needs or requirement, the sort command gives you numerous command-line options for sorting information in a text file.

Here is an example of a Sort Command Syntax:

```
$ sort [-options]
```

For instance, check out the below test file:

```
$ cat test
zzz
sss
qqq
aaa
BBB
ddd
AAA
```

Also, the below contains the outcome of the result when sort command is carried out on the file without performing any other option ***(NB: What it does is to simply sort lines in test file and shows the sorted result)***.

```
$ sort test
aaa
AAA
BBB
ddd
qqq
sss
zzz
```

CHAPTER FIVE

How to sort files

Here is how to sort files:

1. **Carry out Numeric Sort with –n option**

If you decide to sort on the numeric value, you can utilize the **–n or –numeric sort option.**

Simply make or form the below test file for the below instance:

```
$ cat test

22 zzz

33 sss

11 qqq

77 aaa

55 BBB
```

The below sort command sort lines in test files on numeric value in the initial word of line and shows sorted result.

```
$ sort -n test
11 qqq
22 zzz
33 sss
55 BBB
77 aaa
```

2. Sort Human Readable Numbers with –h option

If you choose to sort on human-readable numbers like 1G, you should ensure you utilize the h or –human numeric sort option.

You can form the below test file for the below instance:

```
$ cat test
2K
2G
1K
6T
1T
1G
2M
```

The available or below sort command will sort human-readable numbers like 1K which equals 1 Thousand in the test file and shows the sorted result.

```
$ sort -h test
1K
2K
2M
1G
2G
1T
6T
```

3. You can Sort Months of any Year with –M option

If you decide to sort in the order of months in a year, you can utilize the –M or –month sort option.

Simply form the below test file for this instance:

```
$ cat test
sept
aug
jan
oct
apr
feb
mar11
```

The below sort command will sort lines in the test file based on the months

(NB: Be aware that lines in the file should have a minimum of 3 character names of the month name at the beginning of the line. This means if we provide ja meaning January, it means sort command will not look at it only based on month name).

4. View if the content is previously sorted with the –c option

If you want to view or verify if data in a text file is already sorted or not, you should ensure you utilize the –c or –check = diagnose the first option.

Form or make the below test file for this instance:

```
$ cat test
2
5
1
6
```

The below sort command will view if text file data is already sorted or yet to be sorted. In case the data is not already sorted, it will display the first occurrence with line numbers and values that are not arranged.

```
$ sort -c test
sort: test:3: disorder: 1
```

5. Reverse the result and view for distinctiveness with –r and –u options

If you need to get sorted results in reverse mode, it is advisable to utilize –r or –reverse options. On the other hand, if the file has multiple lines, to achieve

special lines in the sorted output, simply utilize the –u option.

Form the below test file for the instance we are presenting to you:

```
$ cat test
5
2
2
1
4
4
```

The below sort command sorts lines in a test file in reverse mode and show the sorted result:

```
$ sort -r test
5
4
4
2
2
1
```

Also, the below sort command sorts lines in test file in reverse order and deletes multiple lines from the sorted result:

```
$ sort -r -u test
5
4
2
1
```

6. **Carefully sort the content, modify delimiter, and write the result to a file with –k, -t, and –o options**

If you will like to sort the word position or column in lines of text file, you should use the –k option. Meanwhile, if each word in every line is made different by delimiter asides from space, you can easily specify delimiter with –t option.

Furthermore, you can get sorted results in any given output file with the –o option and not showing output on standard output.

Form the below test file for this instance:

```
$ cat test
aa aa zz
aa aa ff
aa aa tt
aa aa kk
```

The below sort command sorts lines in the test file on the third word of every line and shows the sorted output:

```
$ sort -k3 test
aa aa ff
aa aa kk
aa aa tt
aa aa zz
```

```
$ cat test
aa|5a|zz
aa|2a|ff
aa|1a|tt
aa|3a|kk
```

In this case, multiple options are utilized at the same time. In the case of the text file, words in each line are parted away by delimiter I.

Open and Edit Files

Linux file system permits you to run several operations on file such as edit, create, multiple Linux editors such as nano, Gvim, Vim, Emacs, Gedit, and others.

Editing files in Linux

Check below for the steps to edit files on a Linux server over several text editors:

1. **Edit files with VI editor**

This is the most used text editor in Linux. The VI editor has several models such as normal mode, line mode, insert mode, command mode, and others. Each of these modes permits you to operate its unique operations.

Furthermore, the VI editor is also regarded as the most used text editor in Linux because of its modality. A majority of the tools contain a single mode, hence, they collect input and carry out the commanded operation, but VI has numerous modes.

Once the VI editor begins, it will launch with normal mode, which is known as the command mode. Notwithstanding what is being entered in this mode, it is always seen as a command and not input.

In some instances, it looks to be like a usual editor, but when it is being used frequently, it will seem like the best editing tool.

Prior to editing files, you should know how to change a mode in the VI editor. Thankfully, here are some of the ways to change a mode in VI editor:

- Hit I key for insert mode.
- Hit ESC for normal mode.
- Hit :w test.txt to save the file as test.txt
- Hit :wq! To save the new file and close the editor
- Hit :q! to close from the editor and not save the file

If you decide to edit a file, you should ensure you create a file by utilizing the cat command: `cat > Demo.txt`

All the commands listed above let you enter the content of the file, enter the content of the file on the terminal, and hit CTRL + D to save the file.

2. Edit files using a nano text editor

Unlike VI editor which is a very popular editor in Linux, Nano is pretty much straightforward. Going further, it is a built-in editor for Linux distributions and you do not really need to know so much about nano editor before utilizing it.

As regards nano, no primary command is utilized to operate or run on the file ***(NB: This simply means the entire basic operations are shown on the lower part of the editor)***. It is possible to start each of them with the CTRL key, for instance, to save the file, simply hit CTRL + O, to close it from the editor, simply hit CTRL + X.

To edit a file using the nano editor, launch the file from the directory where it was kept by adhering to the below command:

```
nano Demo.txt
```

The overhead command will launch the Demo.txt file with a nano editor. Meanwhile, if you choose to edit the file, simply move the cursor and enter your preferred text, and hit CTRL + O to save the file.

3. Edit file with Emacs editor

Going further, the Emacs editor also permits you to edit files. Furthermore, it has numerous built-in features like a web browser, terminal, calendar, and others. Emacs editor works just like a normal text editor and you can edit files and save them by navigation bar.

Although it does not come as a built-in editor in Linux, but it can be installed using the terminal. If you decide to install Emacs editor, launch the terminal by pressing **CTRL + ALT + T** and run the following command:

```
sudo apt-get install emacs
```

The top command will ask you to input your admin password, so you are expected to enter the password and hit ENTER.

CHAPTER SIX

How to Create a Collection of Files

Creating a file and a collection of files is a very essential knowledge that every Linux user is expected to know. Users can create a new file either from the desktop file manager or from the command line.

Before creating a new file, you will have to write permissions on the parent directory ***(NB: If you fail to do this, you will get a permission denied error)***. Also, if you decide to show the contents of a directory, simply utilize the ls command.

How to Create a File Using the Touch Command

The touch command permits users to update the timestamps on former files and directories and create empty and new files. The touch command is also the simplest and knowledgeable way to create empty and new files.

If you choose to create a new file, you are expected to execute the touch command, afterwards, go through the name of the file you will like to create:

```
$ touch file1.txt
```

In a case whereby the file file1.txt does not come up, then it will be created ***(NB: But if it formally existed, only the timestamps will be changed)***. To create several files at the same time, simply specify the name of the files but ensure you space them like the below example:

```
$ touch file1.txt file2.txt file3.txt
```

How to Create A File Using The Redirection Operator

Redirection lets you capture the result from a command and deliver it as input to another file or command. You have two methods to redirect output to a file

Additionally, the > operator has to overwrite a former file, while the >>

operator will attach or add the result to the file.

Creating an empty zero long file needs you to specify the name of the file you will like to create after the redirection operator:

```
$ > file1.txt
```

The above command will be the straightforward command to create a new file in Linux ***(NB: Whenever you choose to create a file with a redirection, be cautious enough not to overwrite an essential or crucial existing file)***.

How to Create a File Using the Cat Command

The cat command is basically utilized to read and concatenate files, but it is also utilized for creating new files. If you decide to create a new file, simply run the cat command and then the redirection operator > and the file name you want to create.

Then Hit Enter, followed by the text and after that, hit the CTRL + D to save the files:

```
$ cat > file1.txt
```

How to Create a File Using the Echo Command

The job of the echo command is to print the strings that are given as arguments to the standard output, which can also be sent back to a file. To create or form a new file, simply run the echo command after the text you will like to print and utilize the redirection operator > to write or enter the output to the file you will like to create:

```
$ echo "Some line" > file1.txt
```

If you decide to create an empty file, utilize the below command:

```
$ echo > file1.txt
```

How to Create a File Using Heredoc

Heredoc also referred to as “Here document” is a kind of redirection that permits you to pass several lines of input to a command. This particular

method of creating files is majorly utilized anytime you decide to create a file that has several lines of text from a shell script.

For instance, to create a new file file1.txt, you need to use the below code:

```
$ cat << EOF > file1.txt
 Some line
 Some other line
 EOF
```

The main part of the Here Document usually includes special characters, commands, and variables.

How to Create a Large File

In some instances, you may decide to create a large data file. This is usually essential anytime you decide to test the write speed of your driver or the download speed of your connection.

Creating a large file with the dd command

The dd command is majorly utilized to change and copy files.

To create a file with the name 1G.test alongside a size of 1GB, you need to run the following command:

```
$ dd if=/dev/zero of=1G.test bs=1 count=0 seek=1G
```

How to use the fallocate command

The fallocate command is a command-line utility designed to give real disk space for files. Check below for the command that is named 1G.test alongside a size of 1GB:

```
$ fallocate -l 1G 1G.test
```

How to Compress Files to Save Space

There are a plethora of tools to compress files to save space on Linux, however, they do not act similarly or produce the same compression level.

Check below for the list of tools you can utilize to compress files to save files;

1. **Tar**

The tar command is not precisely a compression command. It is majorly utilized to get some files in intone file for easy conveyance to another system. Tar also gives compression feature which is exceptionally a good choice.

After compression is included in a tar command alongside the z option, it utilizes a gzip to complete the compressing process. Tar can also be used to compress one file as a group, although it does not present a benefit over utilizing gzip.

In order to use tar for this operation, simply specify the file like you would have done as a group of files using the tar **"cfz newtarfile filename"** command. If you like, users can utilize the tar.gz extension which is likely to make the file character seeable, but a majority of Linux users will most likely see tgz to mean the same thing ***(NB: Users will have both the compressed and first file whenever the compression is done)***.

To retrieve several files and compress the result in a single command, simply utilize the same basic syntax, but ensure you specify the files to be added as a group and not the single file.

2. **Zip**

The zip command forms a compressed file and does not touch the original file. Also, the syntax is easy but need to remember that your first file should be the final argument on the command line.

3. **Gzip**

The gzip command is very easy to utilize. You simply have to enter gzip after the name of the file you will like to compress. In contrast with the other commands, gzip will encrypt the files in their right location ***(NB: This means the original file will be replaced by the encrypted file)***.

Here is an example:

```
$ gzip bigfile
$ ls -l bigfile*
-rw-rw-r-- 1 shs shs  21606751 Apr 15 17:57 bigfile.gz
```

4. Bzip2

In similarity with gzip command, bzip2 will compress or reduce the file you have selected, and not the original file.

Here is an example:

```
$ bzip bigfile
$ ls -l bigfile*
-rw-rw-r-- 1 shs shs  18115234 Apr 15 17:57 bigfile.bz2
```

5. XZ

This is a new compression tool and you only need to give the file name to the command. Once more, the original file will be compressed in the right location. Check below for an example:

```
$ xz bigfile
$ ls -l bigfile*
-rw-rw-r-- 1 shs shs 13427236 Apr 15 17:30 bigfile.xz
```

Coming to large files, you will see that xz will require more time to run than other compression commands, but the compression outcome is brilliant.

CHAPTER SEVEN

Alternatives to Microsoft Office

Microsoft Office is long-existing productivity software. Perhaps, if you are in search of another option because of performance, price, or you do not like any of the Microsoft products, you should not worry because there are tons of available options.

Here are some of the alternatives to Microsoft Office:

1. **Google Workspace**

The leading Microsoft Office option for businesses is Google Workspace which was previously known as G Suite. The joint effort of Google Docs, Google Sheets, Google Forms, Gmail, and so much more to deliver quality to users.

One amazing thing about Google Workspace is that it works amazingly well on Linux, Max, Windows, and other PCs that run on the latest web browser. Users can easily combine their effort and share any content without having to

download it. Asides from that particular feature, users can also add features that can't be found by using plugin integrations.

Meanwhile, the leading drawback to using Google Workspace is offline usage. Although Google presents offline versions thanks to plugins on the Google Chrome browser, they cannot be relied upon. Business users using Google Workspace are mandated to pay the $6 for every month while non-business users can carry out different functions while using a free Google account.

2. Apache Open Office

If you are worried about the cost of Microsoft Office, then you should look into using Apache Open Office. The features from Open Office come from unpaid workers who are interested in developing the program for a wide community to use it.

3. WPS Office

WPS Office is software that allows Android, Windows, iOS, and Linux users can use. Although it is free, but in order to remove the adverts, you will have to pay $30 annually. WPS Office emanates from Kingsoft ***(NB: Kingsoft is a Chinese developer committed to delivering quality)***.

Apps under WPS Office may include WPS Presentation, WPS Writers, and WPS Spreadsheet. This suite has a customizable interface, which means you can choose the menu style you prefer. Additionally, it further supports tabbed document editing, similar to what you have with a web browser.

Finally, WPS Office has an integrated cloud with 1GB storage and it is also lightweight and quick to use.

4. Dropbox

Dropbox is particularly known for file sharing and it also presents a competitive app majorly concentrated on word processing. In addition, Dropbox Paper is closely and firmly integrated into Dropbox ***(NB: Because of this, it is relatively easy to share files)***.

Furthermore, Dropbox Paper permits several simultaneous coworkers and lets

you export files in the common pdf and docs file formats. With Dropbox, you will have a simple user interface and you can easily get a free Dropbox account ***(NB: For users who wants to open a free Dropbox account, they must have at least 2 GB of storage while intending business users should ensure they have a larger space and cash because they will be paying $19.99 every month)***.

5. **FreeOffice**

The FreeOffice is another alternative to Microsoft Office, and it looks so much like it. From the name, it is easy to depict that this suite option is free to use. Excitingly, it works on Linux, Mac, and Windows PCs and it is developed by SoftMaker.

Popular applications made available in FreeOffice include Presentations, PlanMaker, and TextMaker. FreeOffice also allows users to select the modern ribbon view or the classic Windows-style menu.

Alternatives to Internet Explorer

Browsers are integral parts of any Linux, Windows, and Mac PCs because it allows users to check what is ongoing on the internet at any time they want. By default, Internet Explorer is the installed browser on Linux, but we have compiled other web browsers you can install and begin using today.

They include:

1. **Brave Browser**

This browser was formed to block every other thing asides from website trackers and user-allowed advertisements. Brave Browser is packed with numerous benefits including maximum security, now web trackers, Chromium extension support, speed, and bug tracking.

Although it is a fantastic browser to use its only downside is that the opt-in micro payment system that supports or permits content creators has an uncertain way to send your payments to a likely receiver.

2. Google Chrome

Without a doubt, Google Chrome is the most used internet browser around the world. Although the first version of Google Chrome was slow, bad, and un-inspiring, over the years, its developers have sought to raise the bars, and this includes making the browser top-notch at all fronts.

One good thing about Google Chrome is that it includes a large list of important built-in features simple to use and it has a fast speed. The drawback to using Google Chrome on your Linux PC is that the browser includes a proprietary code and it uses heavy memory.

3. Mozilla Firefox

Mozilla Firefox is the web browser that initiated open-source web browsing. Unlike other low-class web browsers, Firefox is committed to providing adequate security to web browsers, and it also includes several extensions which users can explore any day and any time they want.

Asides from the above benefits, Firefox also has an equal user experience across several systems. As you have with Google Chrome, Firefox's disadvantage is that it uses heavy memory and it has an HTML5 compatibility problem.

4. Konqueror

This web browser is not a common one but it delivers exciting features which include web browsing to users and intending users. The web browser is managed and controlled by the international KDE free software community and Linux users can easily get hold of it.

The advantages of using Konqueror are that:

- It is fast and reliable
- It is pre-installed on several Linux PCs
- It has customizable URL shortcuts
- It has a pop-up blocker and ad-blocker
- It serves as a file manager and other functions

Meanwhile, the downside of using Konqueror includes:

- It majorly runs on Linux ***(NB: Although this is a major disadvantage for other PC systems like Windows and Mac, but it is an exciting advantage for Linux users because have a browser they can differentiate from other PC systems)***.
- It won't function effectively if you fail to install the numerous KDE libraries.

5. **Lynx**

Lynx is a special browser and it is all based on text. More so, it is an ancient web browser that is still in full use by users. The advantages of Lynx are numerous and they are outlined below:

- It is a small web browser
- Since it is lightweight, it does not require too much space
- It is perfect for safe browsing and testing as well
- It is relatively safe and secure for use
- It also supports Windows and DOS use

Its downsides include:

- It only performs text functions and nothing else.

Alternatives to Photoshop

As we all know, Photoshop is a very common photo editing software, which also serves different and multiple functions for users worldwide. However, if you are not convinced about the features offered by Photoshop or if you decide to have a glance at other photo editing options, then you can try your luck with the amazing alternatives listed below:

1. **Pixlr**

This Photoshop alternative is an online free and closed source image editing software that provides users with the choice of creating exciting and manipulative photos while using several editing tools and numerous free effects. Although Linux users won't be able to access this photo editing software through an application, it is still available to be used via browsers for free.

2. **Photopea**

Photopea is another free improved photo editor for creating and customizing raster graphics online. This photo editor runs in a browser and it also efficient locally ***(NB: This simply means you are free to use the photo editor when you are offline)***.

Furthermore, this photo editing software is made to look like Photoshop because its numerous features still include working with masks, layers, filters, key binding, vectors, smart objects and so much more. Also, Photopea supports users that work with well-known graphics formats like the sketch, XCF, XD, RAW, and PSD.

In Photopea, there are usually adverts that are displayed but if you are not bothered about the displayed ads, then it may be the right option for you to use.

3. **GIMP**

GIMP, an acronym for GNU Image Manipulation Program is an open-source image editing program and a free one that was formed with highly refined tools for photography, illustrations, and graphic designs. In fact, GIMP nearly offers similar Photoshop features including filters, color correction, layers, magic wand, artboards, and so much more.

Users can customize GIMP to set up their likely key bindings and also apply a skin to allow GIMP similar to Photoshop and also copy its keyboard shortcuts. Lastly, it is important to know that GIMP can be found in the official package repository of your Linux distribution.

4. Krita

This is a cross-platform, open-source, and free painting app to offer cheap art tools to allow everyone to create professional and beautiful digital paintings.

If you are a lover of creating illustrations, comics, and concept art, then Krita is your number one stop and it also offers interesting features including brushes, pen tool, layer masks, color palette, HDR support, brushes, artboards, undo and redo, and so much more.

5. Darktable

Darktabe is a cross-platform, open-source, and free image editing app designed by photographers for the same photographers to use as well. The image editing app allows users to work on digital files including RAW and negatives images.

Like you have with other photo editing software, Darktable also offers mindblowing features like custom filters and so much more. The excellent thing about Darktable I that it can perform different functions including supporting numerous image formats, zero-latency, manage colors, GPU accelerated image processing, and so much more.

The image editing app can be found in the official package repository of your Linux distribution.

CHAPTER EIGHT

Alternatives to Adobe Acrobat Reader

Since before time, books have been the mainstay of many countries worldwide and they will continue to reign in several countries of the world for many years to come. Meanwhile, with the advent of technology, physical books have been transformed into what we call eBooks ***(NB: eBooks is a form of a book that can be viewed and read online on smartphones, PCs, and tablets)***.

Because of this, developers sought to create applications or platforms in which users can view and read these ebooks without having to go through too much stress. One of the proven ways this can be done is by downloading Adobe Acrobat Reader.

However, in recent times, there has been the development of alternatives to Adobe Acrobat Reader which individuals including Linux users can download and begin reading.

The below list takes a look at the alternatives presented to represent Adobe Acrobat Reader:

1. **Foxit Reader**

This reader app is a top-notch freemium PDF reader that has numerous users due to its amazing features and performances. Foxit Reader also has a free and paid version, which challenges the effort made by the developers of Adobe Acrobat Reader.

One amazing feature offered by Foxit Reader is that it can annotate PDF documents, which permits for more understanding of reading text and assists you in summarizing texts. With Foxit Reader, users can rotate their screens, check out several background themes, and perform a whole lot more functions.

Additionally, Foxit Reader offers a navigation panel that includes multiple sections of your PDF like comments, bookmarks, and so much more.

2. Evince

This is another important PDF reader in which Linux users can use and enjoy. It is also an open-source and free document reader designed by FOSS and it can be accessed not just by Linux users but also by Windows and Mac users.

It is interesting to discover that Evince is the default document viewer for GNOME-based desktop environments ***(NB: Although the list is endless, but the noticeable ones include Debian, Ubuntu, and Fedora)***. A remarkable and striking feature about Evince is that it can show 2 pages at the same time and it also supports displaying files in slide shows and on the entire screens.

Furthermore, Evince also lets users switch the page view either to the left or right-hand side. In this document reader, you will find an integrated search system that highpoints a particular side and shows the page number where you highlighted and you can add notes.

3. Okular

This is a cross-platform and lightweight document reader designed by workers in KDE. It does not only support reading through PDF but also additional file-formats including XPS, Epubs, ODF, and others. It is user-friendly and easy to use as everything including the features is well arranged for users.

Users can easily alter or modify the layout and remove or add a few elements. The leading benefit of using Okular is that it offers numerous tools that have special functions. For instance, you can utilize the text selection tool to copy a few texts and apply other functions to them. This document reader includes an annotation tool that includes highlighting, drawing polygons, adding notes, and others.

4. Master PDF

As the name implies, Master PDF is a PDF reader that offers users numerous exciting benefits, including being able to create, edit, join files, add comments, offer signatures, and also encrypt PDF files. Additionally, Master PDF includes several annotation tools whereby users can explore it to

highlight text, add shapes, add notes, and more into their PDF files.

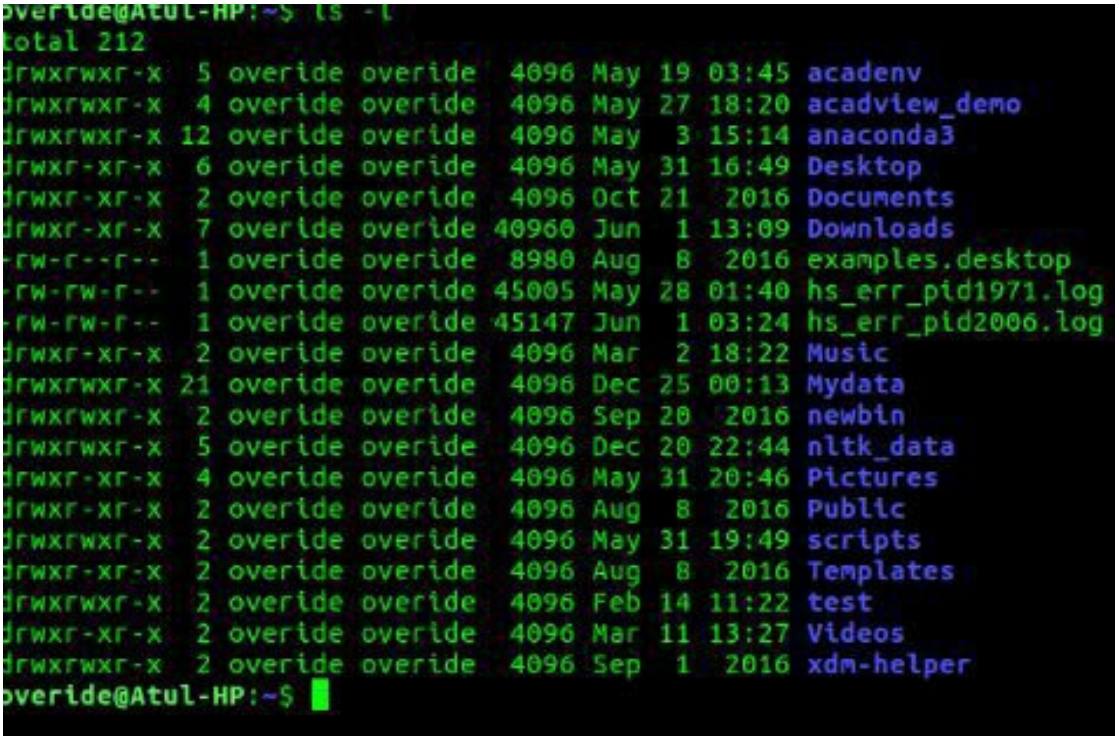
Excitingly, Master PDF includes an editing window where users can edit their annotations. As a matter of fact, the edits are different and they may include modifying colors, adding statuses or types.

5. MuPDF

This is an open-source and free PDF reader which is popular for its lightweight and fast response. The notable difference between MuPDF and other document readers is the command line tools, which permit users to create PDFs from text files, change the direction of the pages, and also change the height and width of the screen.

All the listed document readers are alternatives to Adobe readers, and users can explore and take advantage of them for their Linux systems and other PCs depending on what they deem fit.

What is Shell Scripting?



Shell Scripting is an open-source computer program made to be operated by the Linux and Unix shell. Also, it is a program to write a series of commands

for the shell to carry out.

Shell Scripting is able to join long and continuous sequences of commands into one and easy script that can be kept and carried out anytime and it also reduces the programming capabilities.

Before we proceed, a shell is a Unix word that means an interface between a user and an OS service. It gives users an interface and allows human-readable commands into the system and carried out these commands which can be run without manual control and provides the program's output in a shell script.

An OS consists of several parts, however, the two major parts are usually Shell and Kernel.

Types/Kinds of Shell

The two major types of shell in Linux include:

1. **C Shell:** The noticeable factor in this shell is% and its other categories include

    - Tops C shell also referred to as tcsh
    - C shell also referred to as csh

2. **Bourne Shell:** The noticeable factor in this shell is S and its sub categories include:

    - Bourne Again Shell also referred to as bash
    - Korn Shell also referred to as sh
    - POSIX shell also referred to as sh

How to Write a Shell Script

Shell Scripts are penned down with text editors. While using your Linux system, proceed to launch a text editor program, also launch a new file and start entering a shell script or shell program, and go on to permit the shell to carry out your shell script and input your script at the position from where the shell can locate it.

Here are the steps to take in creating or making a Shell Script:

1. Make a file with a vi editor ***(NB: A file can also be crated with an optional or alternative editor)***. Proceed to give the script file a name using extension .sh.
2. Begin the script with #! /bin/sh.
3. Write or pen down a few codes.
4. Ensure you save the script file using filename.sh.
5. To execute the script, enter bash filename.sh.

For basic information, # is an operator also known as shebang which guides the script to the interpreter location ***(NB: This simply means if you utilize # /bin/sh, the script will be sent to the bourne-shell)***.

The below is a little script:

```
#!/bin/sh
ls
```

Check below for the steps to create Shell Script Programs in Unix or Linux:

Add shell commands

Commenting is very vital in any program you want to run. When it comes to Shell programming, the syntax to include or add a comment is made available below:

```
#comment
```

Shell Variables

Variables keep data in numbers and characters format. In the same vein, Shell variables are utilized to keep data ***(NB: One thing about Shell variables is that they can only be utilized by the shell)***.

For instance, the below creates a shell variable and print it:

```
variable ="Hello"
echo $variable
```

The following is a little script that can be utilized as a variable:

```
#!/bin/sh
echo "what is your name?"
read name
echo "How do you do, $name?"
read remark
echo "I am $remark too!"
```

CHAPTER NINE

Why you should use Linux

There are a plethora of reasons why you should use Linux over other software platforms including Mac and Windows. In the olden days, Linux was majorly utilized for servers and it was not known to work for desktops. However, its ease of use and interface has developed over the past years, hence, it has grown to be used by thousands of people worldwide.

The reasons why people should use Linux are outlined below:

1. **Security levels are high**

By installing Linux on your PC, you are sure to avoid any malware and virus. In fact, the security level is so high that it cannot even be compared to other systems like Windows.

The major reason for a high level of security is because it is open-source software and the source code is always available to be seen. Because of this, a large number of developers around the world have seen the code and its mistakes have been spotted and corrected.

2. **Runs on multiple hardware**

Everyone should use Linux because it runs on any hardware. Furthermore, Linux ensures they explore the system's resources and its installation can be modified for users and any particular hardware requirements.

As we all know, the installation process is easy and it permits users to select the modules they prefer to install ***(NB: As a result, it lets users install Linux on old hardware)***.

Linux runs on multiple hardware, from watches to a supercomputer and you can revive your slow Windows PC by simply installing the Linux system.

3. **Free to use**

Another reason why Linux should be used by everyone is that it is free to use and users need not purchase anything before using it. Notwithstanding its free usage, users can still access the entire basic software and as well as numerous educational software.

4. **Open Source**

This is, unarguably, the most essential part of Linux because its source code can be accessed in the Free and Open Source Software category. What's more, the developer community profits from the open-source because users and members are free to view and change the source code, which cannot be done with proprietary software.

The open-source feature will also help more countries develop their own Linux.

5. **Easy to use**

Linux is an ideal OS that offers a user-friendly and graphical user interface. With Linux, you can access all the functions present in Windows.

Also, the Graphical User Interface has been improved because you can carry out more commands, even without having any idea of anything.

6. **Customization**

Users have remarkable flexibility in modifying the system depending on their requirements. There are several options for desktop icons, panels, and wallpapers. Also, there are several desktop environments to select from including KDE, GNOME, and so much more.

7. **Stability**

The Linux system has high stability and it is not likely to crash easily. Also, the Linux Operating System runs very quickly as it was when it is initially installed. Unlike what you have in Windows, you don't have to reboot a Linux server after every patch or update. Because of this, Linux has a very high number of servers running on the web.

How to Partition disk

Making and erasing partitions in Linux is standard practice since storage devices, (for example, hard drives and USB drives) should be organized here and there before they can be utilized. Much of the time, large storage devices are separated into different parts referred to as partitions. Partitioning additionally permits you to separate your hard drive into detached segments, where each segment carries on as its own hard drive. Also, partitioning is majorly helpful if you run a different OS.

There are bunches of powerful and exciting tools for making, eliminating, and in any case, controlling disk partitions in Linux and they include:

- **GPT design:** The parted order can make a Globally Unique Identifiers Partition Table GPT), while fdisk and cfdisk are restricted to DOS partition tables.
- **Large disks:** A DOS parcel table can design up to 2TB of disk space, albeit up to 16TB is conceivable at times. Be that as it may, a GPT partition table can deliver up to 8ZiB of space.
- **More partitions:** Using essential and expanded parts, DOS segment tables permit just 16 partitions. With GPT, you get up to 128 partitions and can decide to have others as well.
- **Dependability:** Only one duplicate of the partition table is put away in a DOS partition. GPT keeps two duplicates of the partition table ***(NB: This is always toward the start and the finish of the disk)***. The GPT likewise utilizes a CRC checksum to check the partition table uprightness, which isn't finished with DOS partition.

With the present bigger disks and the requirement for greater adaptability in working with them, utilizing parted to work with disk partitions is the right choice to go with. More often than not, disk partition tables are made as a component of the working OS installation procedure. Direct utilization of the parted command is most helpful while adding a storage device to a current Operating System.

The accompanying list clarifies the way toward partitioning a storage device with the parted command:

1. **List the partitions:** Utilize partee - l to distinguish the storage device you need to parcel. Commonly, the main hard disk (/dev/sda or/dev/vda) will include the Operating System, so search for another disk to track down the one you need (examples include, /dev/sdb).

```
$ sudo parted -l
[sudo] password for daniel:
Model: ATA RevuAhn_850X1TU5 (scsi)
Disk /dev/vdc: 512GB
Sector size (logical/physical): 512B/512B
Partition Table: msdos
Disk Flags:

Number  Start   End    Size   Type     File system  Flags
 1      1049kB  525MB  524MB  primary  ext4         boot
 2      525MB   512GB  512GB  primary               lvm
```

2. **Launch the storage device:** Utilize parted start working with the chosen storage device. For this instance, the gadget is the third disk on a virtual framework (/dev/vdc). It is essential to be specific on the device you need to utilize. If you only enter parted with the device name, it will arbitrarily choose a storage device to change.

```
$ sudo parted /dev/vdc
GNU Parted 3.2
Using /dev/vdc
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted)
```

3. **Set the partition table:** Set the partition table sort to GPT, at

that point, type “Yes” to acknowledge it.

```
(parted) mklabel gpt
Warning: the existing disk label on /dev/vdc will be destroyed
and all data on this disk will be lost. Do you want to continue?
Yes/No? Yes
```

The mklabel and mktable commands are utilized for a similar reason ***(NB: Which is creating a partition table on a storage device)***. Also, the allowed partition tables are aix, amiga, bsd, dvh, gpt, macintosh, ms-dos, pc98, sun, and circle. Recall mklabel will not create a partition, instead, it will create a partition table.

4. **Check the partition table once more:** Reveal the data regarding the storage device.

```
(parted) print
Model: Virtio Block Device (virtblk)
Disk /dev/vdc: 1396MB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:
Number Start End Size File system Name Flags
```

5. **Get assistance:** To discover how to make another partition, type: (parted) help mkpart.

6. **Make a partition:** To make another partition, you are expected to enter the following.

```
(parted) mkpart primary 0 1396MB

Warning: The resulting partition is not properly aligned for best perform
Ignore/Cancel? I

(parted) print
Model: Virtio Block Device (virtblk)
Disk /dev/vdc: 1396MB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:
Number Start   End     Size    File system Name Flags
1      17.4kB  1396MB  1396MB  primary
```

Filesystem type (fstype) won't make an ext4 filesystem on/dev/vdc1. A DOS partition table's partition types are extended, primary, and logical. More so, in a GPT partition table, the partition type is utilized as the partition name. Giving a partition name below GPT is an absolute necessity; in the above model, the primary is regarded as the name and not the partition type.

7. **Save and close:** Changes are consequently saved when you close the partition. To close, simply enter the following.

```
(parted) quit
Information: You may need to update /etc/fstab.
$
```

Features of Ubuntu 20.04 LTS

Owning to the release of the Ubuntu 20.04 LS, there are new features that come with it. The Ubuntu 20.04 codenamed Focal Fossa has numerous features which are made available below:

1. **Added default theme variants**

In the former version, the default theme brought about a dark version. Meanwhile, the new Ubuntu 20.04 adds to the 3 variants of the default Yaru theme: including Standard, Dark, and Light.

This new option is included in the Settings app and you are not mandated to install GNOME tweaks before switching between the default themes.

2. **Visual and performance developments**

With the new release of Ubuntu 20.04, you are sure to expect an improvement in performance and visual level. This simply means that the display will be much clearer and the performance will be top-notch as compared with the previous versions.

3. **Deactivate all desktop notifications with the "Do Not Disturb" option**

If you are bothered by the numerous desktop notifications, the best thing you can do is to disable all desktop notifications with the "Do Not Disturb" option.

4. **Fractional scaling**

The new release of Ubuntu 20.04 introduces fractional scaling. If you have been seeing that icons that are usually at 100% looked little and the ones at 200% looked big, this is the time when you can utilize fractional scaling to the core.

If you activate the fractional scaling option, you can easily set the scaling option to 150, 125, 175, and 200 ***(NB: While using this option, always recall that it won't work for several monitor setups)***.

5. **Disable dock**

In this new release, you are now at liberty to disable the dock. Asides from disabling the dock, there is a new app, known as Extensions, which allows you to manage and gain control of extensions, and through this, you can easily disable or deactivate the dock feature.

6. Faster boot and install process

Because of the new compression algorithms, users can now install and boot their Ubuntu 20.04 by using lesser time.

7. No Python 2 and Amazon app

Unlike former releases that included an Amazon app by default, the new release failed to include Python 2 and an Amazon app. Individuals didn’t like the inclusion of the Amazon app in the former versions because what it does is to only open Amazon sites of your country (if at all you have one).

Other new features and releases include:

- WireGuard VPN uniquely backported
- No 32-bit systems
- Enhanced or developed ZFS support

CHAPTER TEN

Linux security Tips

Although it may be fun to use a Linux system for one particular operation or function or the other, but it is quite degrading when you begin to experience security issues on your Linux.

Here, we have compiled some security tips you can incorporate to keep your Linux system safe and secure.

1. Update the Operating System

After you have signed into your Linux system, refreshing and updating the Operating System ought to be the primary move you make. Simply launch a terminal and, contingent upon the kind of Linux you are running, run the following command:

For red hat based systems:

```
su -c 'yum update'
```

For Debian based systems:

```
sudo apt-get update && time sudo apt-get dist-upgrade
```

2. Activate the Firewall

On the off chance that you are running Ubuntu, the firewall is always deactivated. Because of this, it is always best that you utilize the graphical firewall interface “GUFW”, which is an acronym for “Graphical Uncomplicated Firewall.”

After installing GUFW, simply pass the following command:

```
sudo apt-get install gufw
```

Once GUFW is successfully installed, you can proceed to launch it by entering the below command:

```
gufw
```

Launch the GUFW and enable the firewall.

On Red Hat model 7, the firewall is always activated. On the off chance that you are running an older version, you should commence the firewall on an RH system by typing the below command:

```
systemctl enable firewalld
```

In order to configure the firewall and confirm blocks, you can launch the firewall by moving to System > Admin > Firewall from the type of panel at a shell prompt:

```
system-config-firewall
```

3. Install Antivirus Software

This particular option is important because every system is prone to malware and viruses. In order to keep away from any of them, you should endeavor to install valid anti-virus software such as AV software, ClamAV and so much more.

4. Third-Party Software

Third-party ought to be installed below the directory / opt. The third-party software reduces your attack surface by removing unnecessary programs that commence automatically.

The below command will list the entire running services. If you can spot the services you are not using, simply decide to uninstall the apps that related to that particular service:

```
‘netstat -npl’
```

The `‘top’` command helps see what processes are taking up a majority of the system resources, but you should install and use **“htop”** by entering the below command:

```
sudo apt-get install htop
```

The command identified as **“pstree”** is another amazing way of seeing processes, but it places them in a tree format.

5. **Deactivate SSH Root Login**

Deactivate SSH Root user access by launching the below file in your preferred text editor:

```
/etc/ssh/sshd_config
```

Look for the below line:

```
#PermitRootLogin no
```

Delete the pound sign from the start of the line: `#`

Then terminate the file and restart the SSH service by entering the below command:

```
/etc/init.d/sshd restart
```

6. Disable X Windows

If you are creating a Linux file server, there is no compelling reason to run X Window desktops such as KDE or Gnome. You can simply raise the security and performance of a server by deactivating X Windows.

The below command will deactivate X Windows by altering the run level command:

Launch the file:

```
/etc/inittab
```

Locate the line that reads:

```
id:5:initdefault:
```

Alter the line to:

```
id:3:initdefault:
```

7. Deactivate CTRL – ALT – DELETE

If you are creating a production server, you should deactivate the CTRL-ALT-DELETE option that begins the rebooting process.

While in your text editor, launch the below file:

```
/etc/inittab
```

Then find the line that reads:

```
ca::ctrlaltdel:/sbin/shutdown -t3 -r now
```

Furthermore, comment on the line by prefixing it using a pound sign at the beginning of the line: `#`

8. BIOS Security

Type in your BIOS configuration and deactivate booting from USB, CD/DVD, floppy, and external drives. Then activate the BIOS password and settle on a strong password you can always remember.

9. Audit your System

There are numerous free tools you can use to audit your system. The most recommended free too is Lynis, which is referred to as an open-source tool that carries out a local security assessment and audits local services in case of weaknesses. Lastly, the free tool is lightweight and straightforward to use.

Before using it, simply unzip it and run the below command:

```
./lynis audit system
```

Linux Network Administration

Linux system administration can be termed a task or job. It tends to be fun, baffling, intellectually testing, monotonous, and regularly an extraordinary wellspring of achievement. In other words, it’s a task like some others with great days and with terrible days.

For new Linux admins, many enter the work from their inclinations as home lovers or gamers. A Linux system administrator puts on numerous caps and

the smaller your surrounding is, the more caps you will wear.

Additionally, Linux administration encompasses new system builds, hardware maintenance, file restores, backups, filesystem housekeeping, automation, system security management, user maintenance. System admin also encompasses every component of software and hardware management for both virtual and physical

Strangely, you additionally need an expansive information base of virtualization, interoperability, network configuration, and Windows OS. A Linux system admin needs to have some specialized information on network security, firewalls, data sets, and all parts of a functioning network.

The explanation is that, while you're principally a Linux SA, you are likewise important for a bigger support team that regularly should cooperate to take care of complex issues. Security, in some structure or another, is frequently at the foundation of issues standing up to a help group. Users might not probably have appropriate access or a lot of access.

Finally, Linux system admins also have to be at the forefront of the best practices, maintain patches, apply hardware updates, learn new software, and read and adhere to security notifications.

How to know a file's type

The file command decides on the type of file. Once the file type is derived, it will send a message alongside the file type in a human readable format like ASCII. Filenames in UNIX work on their own and they are useful commands to know how to view or see a file.

Knowing a file's type

To know the file type of a file, you simply have to send the name of the file to the file command. Additionally, the file name together with the file type will be printed to standard output.

```
file file.txt
file.txt: ASCII text
```

To view or display the file type, simply send the –b option

```
file -b file.txt
ASCII text
```

The file command is helpful as filenames in UNIX and it does not relate to their respective type of file ***(NB: This means a file referred to as somefile.csv could mean a zip file)***.

Although the above could be confirmed by the file command as seen below:

```
file somefile.csv
somefile.csv: Zip archive data, at least v2.0 to extract
```

CHAPTER ELEVEN

How to know the file type of several files

The file command can further work on several files and will send the result as a different line to standard output for every file.

```
file unix-*.md
unix-cat.md:         ASCII text, with very long lines
unix-comm.md:        ASCII text, with very long lines
unix-cut.md:         UTF-8 Unicode text
unix-exit-status.md: ASCII text
unix-file.md:        ASCII text, with very long lines
```

How to view the mine file type

To see the mime file type and not the human-readable format, simply hit the **–i option**.

```
file -i file.txt
file.txt: text/plain; charset=us-ascii
```

How to delete, copy, move, and rename files

When operating your Linux system, there are situations when you will experience the need to copy, move, delete, and rename files. Meanwhile, there are three important functions every OS distribution must be able to use.

Luckily, Linux offers numerous commands to carry out different tasks by using the command line ***(NB: For your information, the command line is a very strong utility because it gives users the power to carry out more operations other than a graphical user interface can do)***.

Although these Linux commands are easy, it is important not to be misled because you can carry out powerful and much more difficult moves, copy, delete, rename commands with them.

How to use the Linux copy command to copy files
Linux offers users the cp command. The CP command allows you to quickly copy files and directories in a snap.

Additionally, the CP goes through the below basic syntax:

```
cp [OPTION] SOURCE DEST
```

The above Linux copy file command is simply copying the Source to Dest.

Linux Copy File and Directory Options

Additionally, the copy command in Linux provides for the addition of an option when carrying out the command. The Linux copy file command is easy and powerful.

Moving and Renaming Files in Linux
Linux provides users with an accessible utility for moving and renaming files referred to as the mv command. The command is further referred to as the Linux move command ***(NB: Asides from using the command to move a file, it is also capable of renaming a file)***.

For instance, take a look at the file below:

```
mv sample_data.txt data/
```

The top command will easily move sample_data.txt to the data directory. If the data directory is not there, the Linux system will form one and move the sample_daata.txt.

Furthermore, if the sample_data.txt is already present in the data, it will simply be overwritten.

Deleting files in Linux
Linux also provides users with rm for deleting files. You can check out the Linux delete file command syntax below:

```
rm sample_data.txt
```

In the above command, the sample_data.txt file is deleted by the Linux delete file command feature. Before we conclude this function, the Linux delete file command offers extra options including –f force, -r recursive, -I interactive, and –v verbose.

Users can also apply the commands and move them in more than a single file.

CHAPTER TWELVE

Environmental variables

When it comes to UNIX and Linux systems, environment variables are identified as a set of dynamic named values, which are kept within the system and are utilized by apps opened in subshells or shells ***(NB: In simple terms, an environment variable is known as a variable that includes a name alongside a linked or connected value)***.

What environment variables permit users to do is to customize or modify how the system and the performance of the applications on the system. For instance, the environment variable can keep or save data about the default browser, the keyboard layout settings, or the text editor.

Shell Variables and Environment Variables

Variables in Linux contain the below format:

```
KEY=value
KEY="Some other value"
KEY=value1:value2
```

Here are some notable things to know about the above format:

- You won't find any space in and around the equals = symbol;
- Whenever you give several values to the variable, you must separate them by color :
- The names of the variables are usually case-sensitive: This means that the beginning of the values should have an upper case.

So what are Environment variables: These types of variables are accessible

system-wide and are congenital by the entire spawned child shells and processes.

Shell variables on the other hand apply to the present shell instance. This means that each shell-like bash and zsh has its unique set of internal shell variables.

List of commands and set environment variables in Linux

- **Set:** This particular command either set or unset shell variables. When set is utilized without an argument, its result is that it will print a list of the entire variables and this includes shell functions, shell variables, and environment.
- **Env:** This command lets users run another program in a custom environment without changing the present one ***(NB: When this command is utilized without an argument, it will print a list of the present environment variables in use)***.
- **Unset:** This command terminates or deletes environment and shell variables.
- **Export:** In simple terms, the export command sets environment variables.
- **Printenv:** This command prints the entire or particular environment variables.

Common Environment Variables

The below list contains the widely known environment variables:

- **EDITOR:** This option represents the default file editor to be utilized. Furthermore, this is also the editor that will be utilized whenever you enter edit in your terminal.
- **USER:** This represents the current user that is signed up.
- **HOME:** This option represents the home directory of the present user.
- **MAIL:** This represents the location or the area where the present user’s mail is kept or can be accessed.
- **TERM:** This represents the present terminal emulation.
- **LANG:** This presents the present locales settings.

- **PATH:** This is a list of directories to be looked at when carrying out or performing given commands ***(NB: When a user runs a command, the system will look for the set of directories in the right order and utilize the first one that can be executed)***.
- **SHELL:** This is the path of the present user's shell, like zsh or bash.
- **LOGNAME:** As the name implies, it represents the user's name.

Files and Directory Permissions

Linux is basically a multi-user Operating System that permits several users to communicate and utilize similar Linux systems at the same time. In any organization that has a network of Linux servers, there are usually multiple important files and directories, and giving permissions like reading and writing to the entire users may be a massive security risk.

Therefore, the administrator or the root user must be saddled with the responsibility of altering the file permissions and permit only users or groups of users to change the files. Primarily, 3 categories of Linux users can access a file or directory and they include:

- The user who created the file
- Members of the group to which the file is located and more.

Whenever a user creates a file, the particular user is deemed as the rightful owner of the file and also a group with a similar name as the owner is given to the file. The rightful owner of the file can alter the default owner of the file by utilizing the chown command in Linux.

Check below for an example that uses the ls-l command to state the information that concerns a file:

```
$ ls -l ~/sample/file1.txt
```

In the above example, it is clear that there are a few parameters for every shown file using the ls command. The initial one is the file type and if you look closely at the example, you will find out that the – sign, which represents a regular file.

Additionally, the character d represents that it is simply a directory. Subsequently, you will find up to 9 characters that can assume different values including read, write, execute, no permission, and so much more. Going further, the 9 characters can be divided into 3 sets of characters each.

The first part of the 3 characters describes the file permissions for the file owner, while the other 3 parts are meant for the group member, and the final 3 parts are for the rest of the members.

The chmod command works in two ways, one of which is to change the permissions for the group members, owner, and the rest of the members.

1. **Symbolic method**

To fully comprehend the syntax for the symbolic method for describing the chmod command, it is important to first of all, know the who, which, and what ***(NB: This also means that the command needs to be specific to whom we are ascribing the permissions to)***.

While the character g means group, the character u means user, and the character a means all ***(NB: As a matter of fact, this particular list answers the who question)***. To remove the permissions, you need to utilize the – sign. In contrast, adding permissions requires you to utilize the + sign, and setting permissions, utilize the = sign.

Take a look at the following command:

```
$ sudo chmod u=rwx,og=x ~/sample/file1.txt
```

In the above example, the aim is to set the permissions while utilizing the equal (=) sign. ***(NB: Also take note that doing so will, first of all, remove all former permissions and give new permissions)***. In the same example, you will also have to assign the three permissions to the owner, and only carry out permission to other members and the group members.

Finally, another point to note is that the permissions are assigned in the right order and not in a bad manner.

2. Numeric Method

The other method is referred to as the numeric method. In this case, you need to describe the permissions as a three decimal number. Additionally, the conversion rules are simply symbols, meaning you are mandated to have a basic knowledge of binary numbers and how to convert them into decimal values.

Some of the rules include:

- **0: (000):** It means no permission is granted.
- **1: (001):** It means it has only the execute permission.
- **2: (010):** It means it has only the write permission.
- **3: (011):** It has the inclusion of the write and execute permissions.
- **4: (100):** It includes only read permission.
- **5: (101):** It assigns only read and execute permissions.
- **6: (110):** The read and write permissions are assigned.
- **7: (111):** Entire permissions.

From the above, the first character explains read permission, while the second character explains write and the final one explains execute.

File and Directory – Real Ownership

Users can change the ownership of the files and directories while utilizing the chmod command. View the syntax below if you choose to set the owner and the group for the file or directory:

```
$ sudo chown user:group <file>
```

From the above, it is clear that both the owner and the group members have already been changed.

CHAPTER THIRTEEN

Adding a User Group

A group in Linux refers to a unit whereby you can manage rights for numerous users at the same time. In addition, Linux groups permit users to manage several user permissions faster and easily.

Here are the recommended things to get before adding a User Group in Linux:

- Access to a terminal window
- A user account with root or sudo privileges
- A system that runs Linux

What does User Group in Linux mean?

In Linux, multiple users have different responsibilities which they are expected to carry out. A few users may need the ability to carry out applications, while other users may be limited and stopped from gaining access to some folders and files.

Linux group further allows you to create categories of users with pre-set permissions ***(NB: This means that rather than managing permissions for every user account, you can easily add a user to a group to give the right permissions)***.

Linux Groups is divided into Primary and Secondary Group.

Creating a user group in Linux can be completed by following the steps below:

1. First of all, you need to type the following:

```
sudo groupadd new_group
```

Then proceed to substitute new_group with the preferred name you need for your new group.

Adding User to Group

If you choose to add a former user to an old group, you should enter the following command:

```
sudo adduser user_name new_group
```

Furthermore, utilize the user add command to add a user:

```
sudo useradd –G new_group user_name
```

Alternatively, users can also utilize the usermod command to add a user to a group:

```
sudo usermod –a –G group_name user_name
```

The usermod command utilizes the –group and –append functions to attach the user to a specific group ***(NB: If you fail to use the –append command, the user will not be added to other groups)***.

Adding a User to Several Groups Simultaneously

Users are urged to utilize the usermod command to choose a particular group or groups to add. It can be done by entering the following command:

```
sudo usermod –a –G new_group,new_group2,new_group3 us
er_name
```

Adding a User and Add to Group

This particular function is important for creating a new user for a particular software app. Adding a user and add to a group can be accomplished by typing the following command:

```
sudo useradd –G new_group new_user
```

Subsequently, give a password to the new user by entering the following command:

```
sudo passwd new_user
```

CHAPTER FOURTEEN

How to Delete a Created Group

If you do not want a particular group to exist any longer, you can always choose to delete the group by using the following command:

```
sudo groupdel new_group
```

Listing Groups in Linux

By default, Linux has multiple different groups. A few of these groups including the sudo group are majorly used to grant permissions. Meanwhile, for other groups, they are hidden and utilized for system tasks.

To check the list of groups on your system, enter the command:

```
sudo nano /etc/groups
```

To show the groups that a user is among, enter the following group command:

```
groups
```

List of Well Known Groups in Linux

There are multiple popular group names present in Linux and they are outlined below:

- **Plugdev:** It permits users to access external storage devices.
- **Sudo:** A single member of the sudo group can utilize the sudo command to raise or increase their capabilities.
- **Adm:** This command permits users to watch their Linux system logs.
- **Wheel:** Although this command is old, but it still does the job of granting sudo kind of privileges.

- **Ipadmin:** It permits users to configure printers.
- **Cdrom:** It permits users to mount the optical drive.

System Shutdown, Restart, and Logout Commands

If your Linux system is experiencing one issue or the other or if you simply want your system to have a brief rest before using it again, you can take advantage of these options including shutting down, restarting and logging out.

To shut down your Linux system, you should enter the below command:

- `shutdown -h now`

The above command will instantly shut down and restart your system ***(NB: This particular command is mostly used in work)***.

- `shutdown -h +1`

Alternatively, the above command will shut down your Linux system after 1 minute.

- **Halt #**

The above command will instantly bring your Linux system to a stop, needing you to manually power off your system.

- **Poweroff #**

The listed command will instantly stop your Linux system and also turn off the system.

For Restart purposes, check out the following commands:

```
reboot #

shutdown -r now #

shutdown -r +1 #
```

While the first command will reboot your system, the second command will reboot your system immediately and the last command will shut down and reboot your Linux system after one minute.

For Logout purposes, check the below commands:

- **Ctrl +d #:** This command is mostly used in work.
- **Exit #:** This command is also used in work.

Archives and Compressed File Commands

While carrying out duties as a system admin, you might have downloaded a few archives that need the extraction to display the files. Also, you might be backing up a whole database that consists of long and small files that you want to add into one archive.

Compressing and archiving files are well-known functions in UNIX, and they are usually carried out by system admins regularly. Thankfully, Linux shows a set of different commands to compress, archive, extract, uncompress from an archive.

Archiving files on Linux using tar

Tar is a well-known command among other system administrators. It was first of all, used to write data to devices that failed to retrieve file systems. Meanwhile, in recent times, the tar command is utilized to archive files ***(NB: This simply means the act of arranging files together in one archive)***.

If you choose to archive files on Linux while utilizing tar, simply run “tar” alongside the **“cvf”** options.

```
$ tar -cvf archive.tar file1 file2 directory1 directory2

file1/
file2/
directory1/
directory2/
```

In this instance, there are three different options namely:

- **-v:** This means verbose. This command shows the files added to the archive when carrying out the function.
- **-c:** This means to create an archive: This command is used anytime you want to create a new archive designed from the files chosen.
- **-f:** This stands for file. This command is used to specify the filename of the archive you want to create.

The above options are very vital for archiving files on Linux. Additionally, when running the tar command alongside the "-f" flag, a new archive will be formed in your present working directory.

```
$ ls -l
total 20
-rw-rw-r-- 1 schkn schkn 10240 Nov  9 10:41 archive.tar
drwxrwxr-x 2 schkn schkn  4096 Nov  9 10:41 directory1
drwxrwxr-x 2 schkn schkn  4096 Nov  9 10:41 directory2
-rw-rw-r-- 1 schkn schkn     0 Nov  9 10:41 file1
-rw-rw-r-- 1 schkn schkn     0 Nov  9 10:41 file2
```

The above option simply describes that the size of the archive is larger than the sum of the files inside it. To compress files when archiving, you will have to provide more options to the tar command.

Extracting files using tar on Linux

After creating an archive file, you might have to extract the files situated in your archive. In order to extract files using the tar command simply attach the "-x" option and not the first "-c" option.

```
$ tar -xvf archive.tar

file1
file2
directory1/
directory2/
```

Be aware that extracting your files will not mean that the archive will be removed from your present working directory.

```
$ ls -l

total 28
-rw-rw-r-- 1 schkn schkn 10240 Nov  9 12:01 archive.tar
drwxrwxr-x 2 schkn schkn  4096 Nov  9 10:41 directory1
drwxrwxr-x 2 schkn schkn  4096 Nov  9 10:41 directory2
-rw-rw-r-- 1 schkn schkn     0 Nov  9 12:00 file1
-rw-rw-r-- 1 schkn schkn     0 Nov  9 10:41 file2
```

How to Compress Files Using gzip on Linux

Once your tar archive is complete, you will be prompted to compress it to reduce its size. The first point of call is to utilize the gzip utility.

The gzip utility is meant to be installed by default ***(NB: In case that is not already done, ensure you install it based on your distribution)***.

```
$ sudo apt-get install gzip

$ sudo yum install gzip
```

After installing gzip, simply run gzip and send the archive you created as an argument.

```
$ gzip archive.tar
```

Running the gzip command will form a tar.gz file in the present working directory. Very crucially, the first tar file will be upgraded to a tar/gz so you will not have the first archive.

```
$ ls -l
total 12
-rw-rw-r-- 1 schkn schkn  184 Nov  9 10:41 archive.tar.gz
drwxrwxr-x 2 schkn schkn 4096 Nov  9 10:41 directory1
drwxrwxr-x 2 schkn schkn 4096 Nov  9 10:41 directory2
-rw-rw-r-- 1 schkn schkn    0 Nov  9 10:41 file1
-rw-rw-r-- 1 schkn schkn    0 Nov  9 10:41 file2
```

From the above, the file size was reduced from 10 KB to 184 bytes, meaning the file size was reduced by 98% and thereabout.

CONCLUSION

While Linux has been in existence for a very long time, it has been overlooked by thousands of PC-based users for one reason or the other. Meanwhile, over the past years, Linux operating system has come under immense notice as it is currently competing with the likes of macOS and Windows.

Installing a Linux operating system or distribution is not a challenging task and it can be completed in a short period. The performances offered by Linux systems are excellent and you need not worry about experiencing a slow and frustrating line of operations.

Getting a Linux operating system is free and you do not have to break the bank to begin enjoying its features. Although attempting to install a Linux OS demands that you have one or two things in place like sufficient memory, CPU and so much more, its requirements are not so demanding as the one you will experience when installing either macOS or Windows on your PC.

Overall, we hope that this book has successfully answered all your questions and inquiries about what Linux and UNIX are all about. If you are still unsure about something regarding Linux, this guide is ever ready to refresh your memory and bring you into the limelight about Linux, its features, and other functions.