

	Experiment No : 1	Date : 2nd Feb 2025
Title	Linux Operating System and Installation of Linux	
Aim	To Study Linux Operating system and Installation of Linux	
Hardware Requirement	Personal Computer	
Software Requirement	Linux Operating System(Ubuntu) Ver 20.04	
Theory	<p>What is an Operating System? A program that acts as an intermediary between a user of a computer and the computer hardware.</p> <ul style="list-style-type: none"> ➤ Operating system goals: ➤ Execute user programs and make solving user problems easier. ➤ Make the computer system convenient to use. ➤ Use the computer hardware in an efficient manner. <p>Computer System Structure</p> <ul style="list-style-type: none"> ➤ Computer system can be divided into four components: <ul style="list-style-type: none"> • Hardware – provides basic computing resources <ul style="list-style-type: none"> o CPU, memory, I/O devices ➤ Operating system <ul style="list-style-type: none"> • Controls and coordinates use of hardware among various applications and users ➤ Application programs – define the ways in which the system resources are used to solve the computing problems of the users <ul style="list-style-type: none"> • Word processors, compilers, web browsers, database systems, video games ➤ Users <ul style="list-style-type: none"> • People, machines, other computers 	

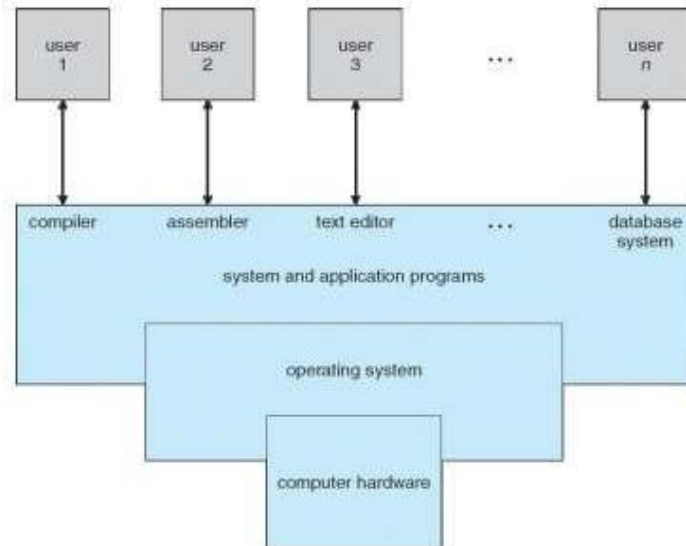


Fig.Component of Operating System

What Operating Systems Do?

- Depends on the point of view
- Users want convenience, ease of use
 - Don't care about resource utilization
- Users of dedicated systems such as workstations have dedicated resources but frequently use shared resources from servers
- Handheld computers are resource poor, optimized for usability and battery life
- Some computers have little or no user interface, such as embedded computers in devices and automobiles

Operating System Definition

- OS is a resource allocator
 - Manages all resources
 - Decides between conflicting requests for efficient and fair resource use
- OS is a control program
 - Controls execution of programs to prevent errors and improper use of the computer

Function of Operation

- Memory Management
- Processor Management
- Device Management

- File Management
- Network Management
- Security
- Control over system performance
- Job accounting
- Error detecting aids
- Coordination between other software and users










Linux

- Just like Windows, iOS, and Mac OS, Linux is an operating system. In fact, one of the most popular platforms on the planet, Android, is powered by the Linux operating system.
- An operating system is software that manages all of the hardware resources associated with your desktop or laptop

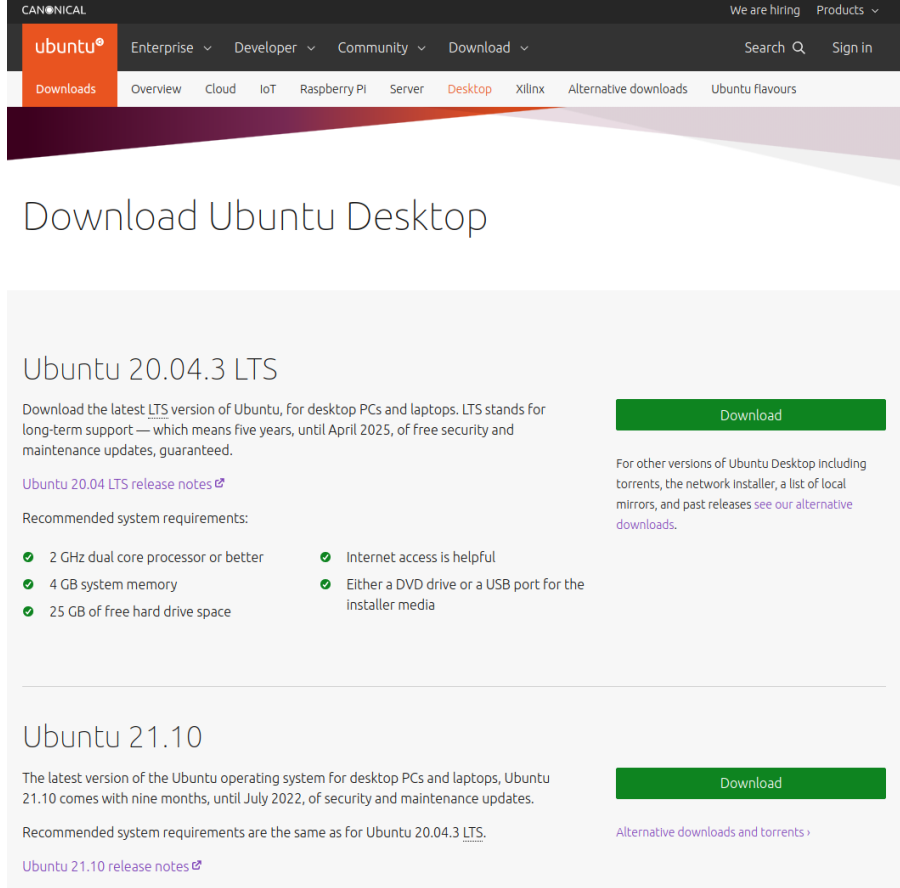
Linux vs Windows

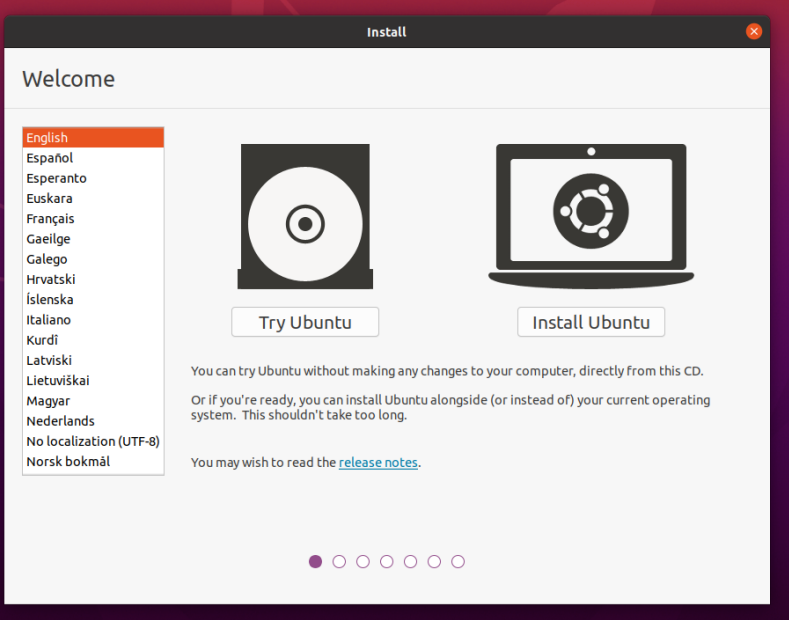
Sr. No.	Key	Linux	Windows
1	Open Source	Linux is Open Source and is free to use.	Windows is not open source and is not free to use.
2	Case sensitivity	Linux file system is case sensitive.	Windows file system is case insensitive.
3	kernel type	Linux uses monolithic kernel.	Windows uses micro kernel.
4	Efficiency	Linux is more efficient in operations as compared to Windows.	Windows is less efficient in operations.
5	Path Separator	Linux uses forward slash as path separator between directories.	Windows uses backward slash as a path separator.
6	Security	Linux is highly secure as compared to Windows.	Windows provides less security as compared to Linux.
7	Cost Incurred	Linux is free to use for everyone.	Windows do not come free for any user.

	8	Efficiency	In the case of operations, Linux is way more efficient than Windows.	For operations, Windows are comparatively way less efficient than Linux.	
	9	Uses in Hacking	People generally use Linux for the systems that are hacking-based.	Windows is not a very efficient OS for hacking purposes as compared to Linux	

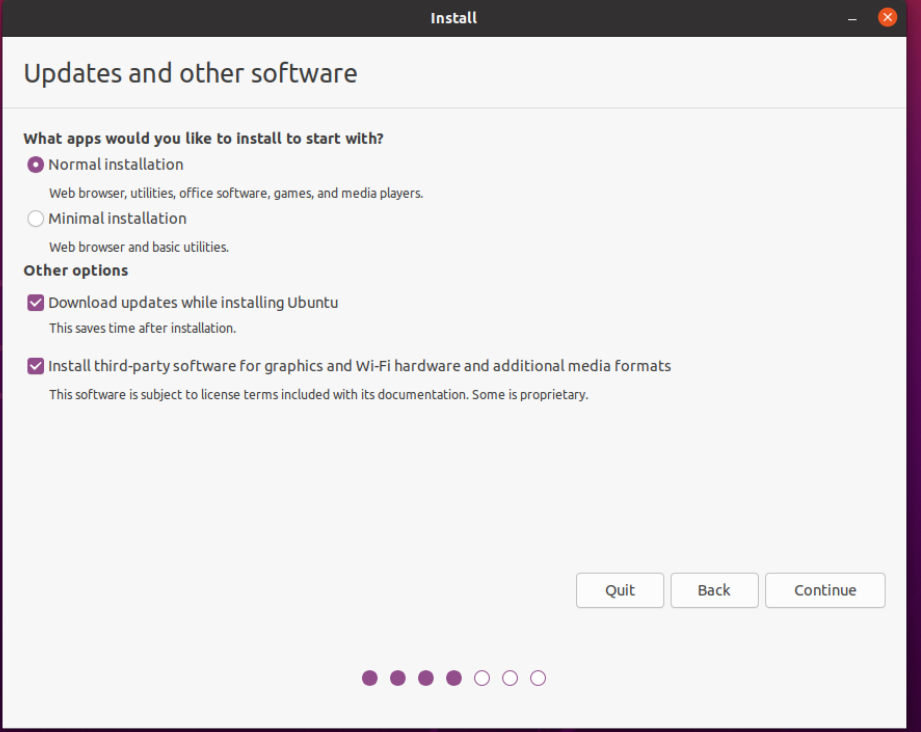
	Installation													
	Different ways to Install Linux 1.Bootable USB Drive a.Universal USB Installer b.Ubuntu ISO file (www.ubuntu.com/ download) 2.Live CD a.Ubuntu ISO file (www.ubuntu.com/ download) b.Write ISO file on CD 3.Virtual Box a. Virtual Box Software b. Source of ISO File(www.ubuntu.com/ download) 4.Remote Installation(LAN/Website) a. LAN – ISO File(www.ubuntu.com/ download)													
	Distribution /Distro – based on Linux kernel a.RedHat b.Slackware c.Debian													
	Specific use of Distros													
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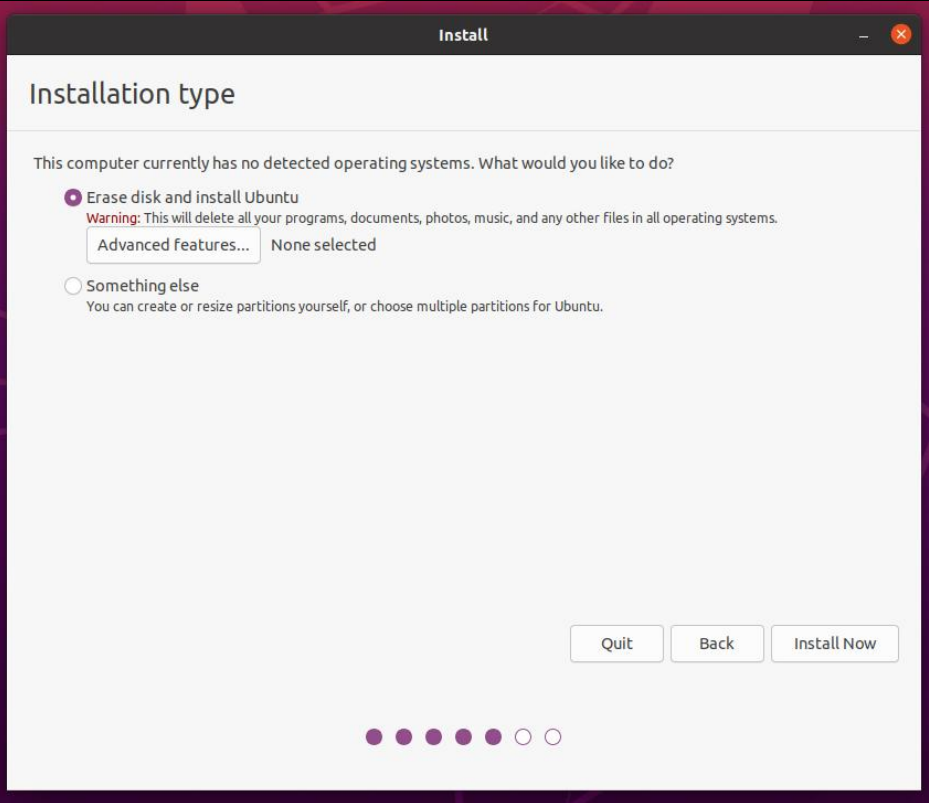
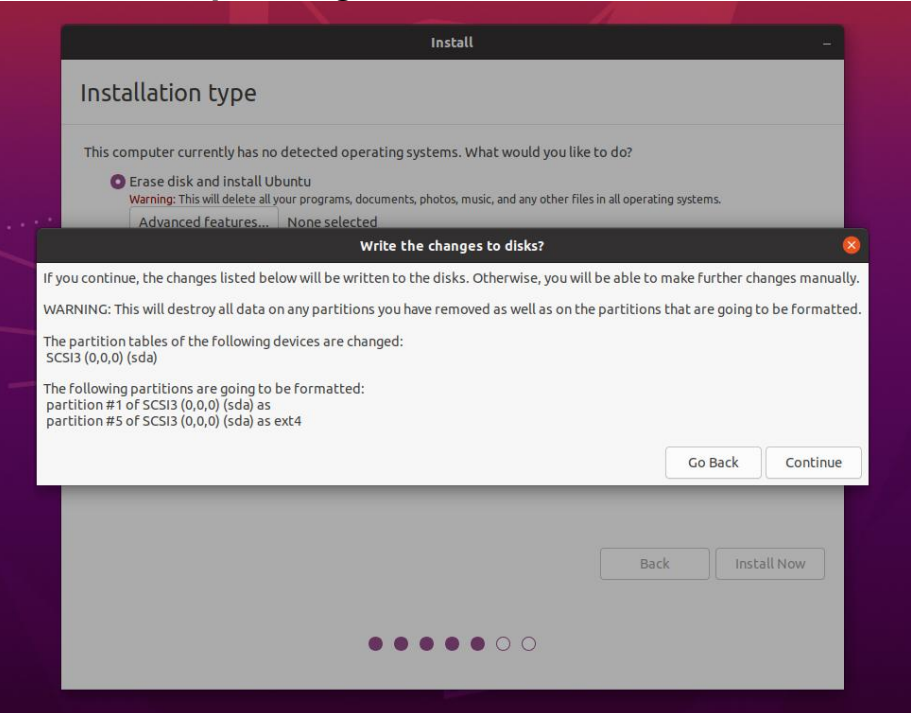
		Fedora	Another Linux kernel based Distro , Fedora is supported by the Fedora project, an endeavor by Red Hat. It is popular among desktop users . Its versions are known for their short life cycle.
		Gentoo	It is a source based Distribution which means that you need to configure the code on your system before you can install it. It is not for Linux beginners, but it is sure fun for Experienced Users .
		LinuxMint	It is one of the most popular Desktop Distributions available out there. It launched in 2006 and is now considered to be the fourth most used Operating system in the computing world.
		OpenSUSE	It is an easy to use and a good alternative to MS Windows. It can be easily set up and can also run on small computers with obsolete configurations.
		RedHat enterprise	Another popular Enterprise based Linux Distribution is Red Hat Enterprise. It has evolved from Red Hat Linux which was discontinued in 2004. It is a commercial Distro and very popular among its clientele.
		Slackware	Slackware is one of the oldest Linux kernel based OS's . It is another easy desktop Distribution. It aims at being a ' Unix like ' OS with minimal changes to its kernel.
		Ubuntu	This is the third most popular desktop operating system after Microsoft Windows and Apple Mac OS. It is based on the Debian Linux Distribution , and it is known as its desktop environment .
Installation Steps			

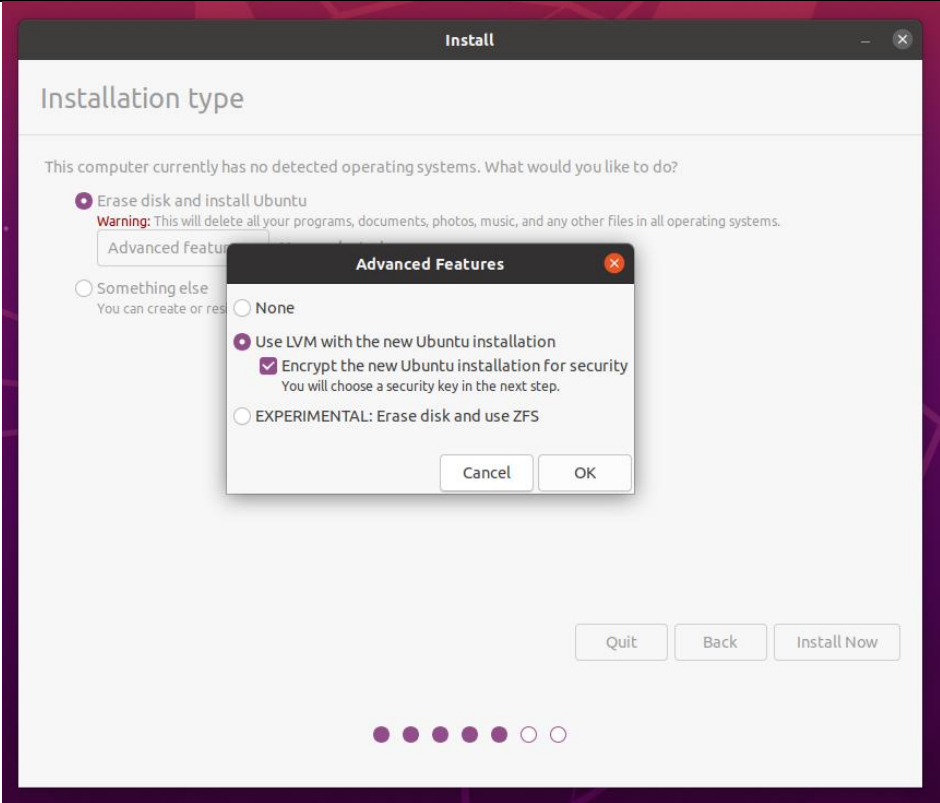
	<p>Step-1 : Download an Ubuntu Image</p> <p>Download image of the Ubuntu 20.04 LTS release.(https://ubuntu.com/download/desktop)</p>
	 <p>The screenshot shows the Ubuntu Desktop download page. The header includes the Canonical logo, the Ubuntu logo, and navigation links for Enterprise, Developer, Community, and Download. There is also a search bar and a 'Sign in' link. The main heading is 'Download Ubuntu Desktop'. Below this, there are two sections for downloading Ubuntu Desktop. The first section is for 'Ubuntu 20.04.3 LTS', which includes a 'Download' button and a link to 'Ubuntu 20.04 LTS release notes'. The second section is for 'Ubuntu 21.10', which also includes a 'Download' button and a link to 'Alternative downloads and torrents'. Both sections provide recommended system requirements.</p>
	<p>Step-2 : Create a Bootable USB stick</p> <p>To install Ubuntu Desktop, you need to write your downloaded ISO to a USB stick to create the installation media. This is not the same as copying the ISO, and requires some bespoke software.</p> <p>Use balenaEtcher, as it runs on Linux, Windows and Mac OS. Choose the version that corresponds to your current operating system, download and install the tool.</p>

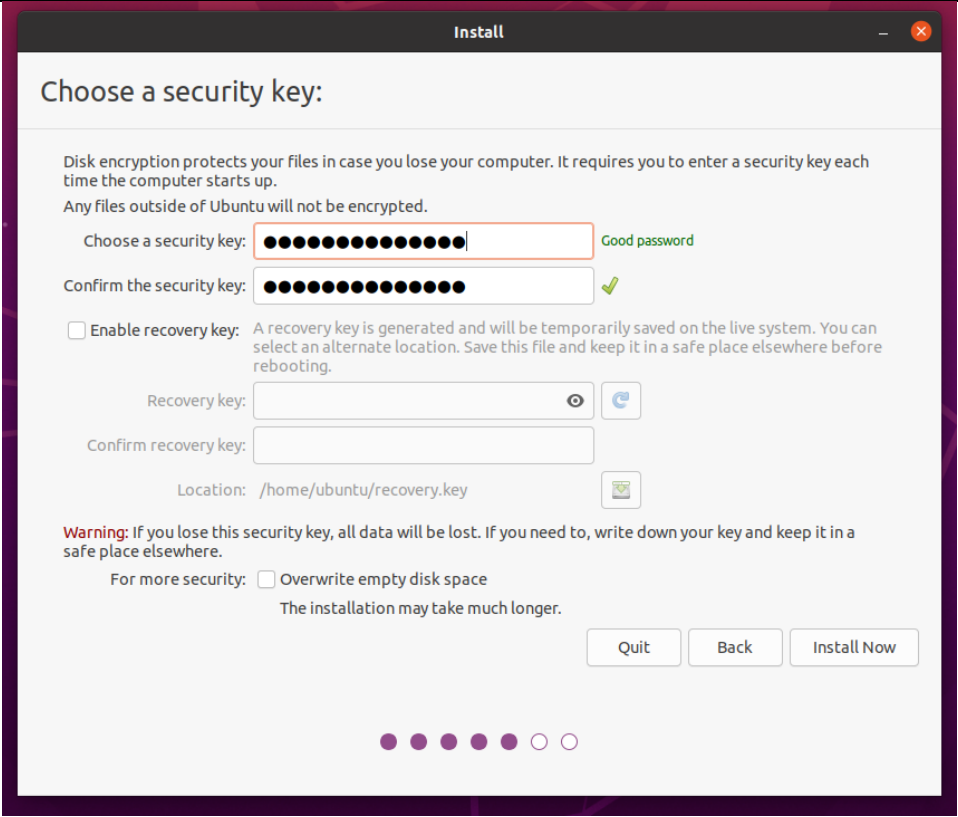
	<p>Step-3 : Boot from USB flash drive</p> <p>Insert the USB flash drive into the laptop or PC you want to use to install Ubuntu and boot or restart the device. It should recognise the installation media automatically. If not, try holding F12 during startup and selecting the USB device from the system-specific boot menu.</p> <p>You should now see the welcome screen inviting you to either try or install Ubuntu.</p>
	 <p>The screenshot shows the 'Install' window titled 'Welcome'. On the left is a list of languages: English (highlighted), Español, Esperanto, Euskara, Français, Gàelghe, Galego, Hrvatski, Íslenska, Italiano, Kurdî, Latviski, Lietuviškai, Magyar, Nederlands, No localization (UTF-8), and Norsk bokmål. In the center, there are two icons: a CD-ROM labeled 'Try Ubuntu' and a laptop with the Ubuntu logo labeled 'Install Ubuntu'. Below these icons, text explains that you can try Ubuntu without changes or install it alongside your current system. At the bottom, there is a progress bar with six circles, the first of which is filled.</p>
	<p>To proceed, click Install Ubuntu.</p> <p>You will be asked to select your keyboard layout. Once you've chosen one, click Continue.</p>

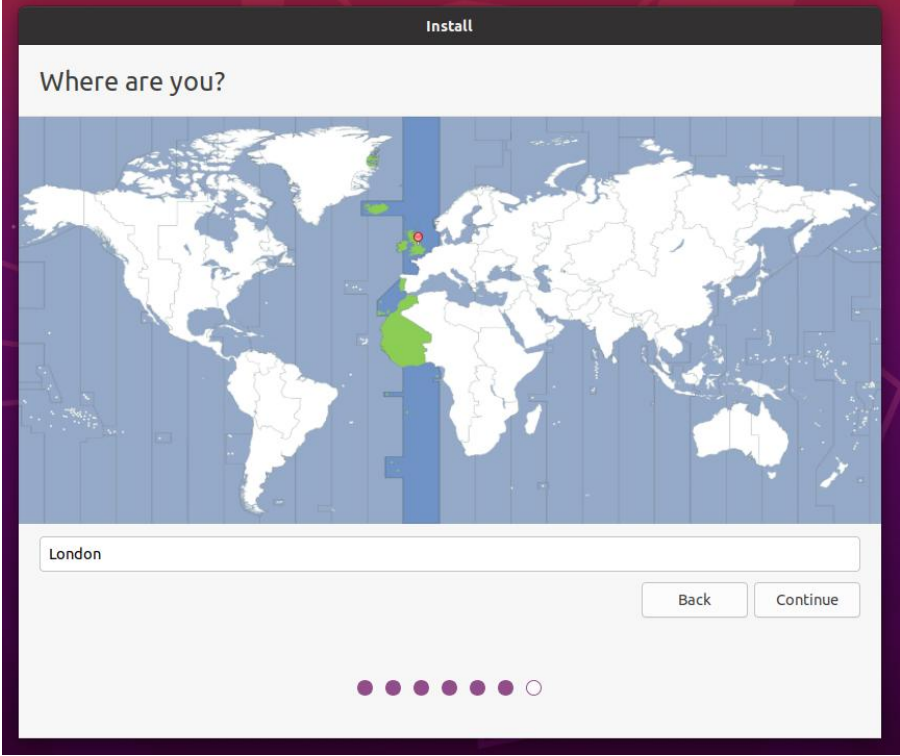
	<p>Step-4 : Installation Setup</p> <p>Next, you will be prompted to choose between the Normal installation and Minimal installation options. The minimal installation is useful for those with smaller hard drives or who don't require as many pre-installed applications.</p> <p>In Other options, you will be prompted to download updates as well as third-party software that may improve device support and performance (for example, Nvidia graphics drivers) during the installation. It is recommended to check both of these boxes.</p> <p>If you are not currently connected to the internet, you will be prompted to do so at this point. Ensure you are able to remain connected throughout the installation.</p>

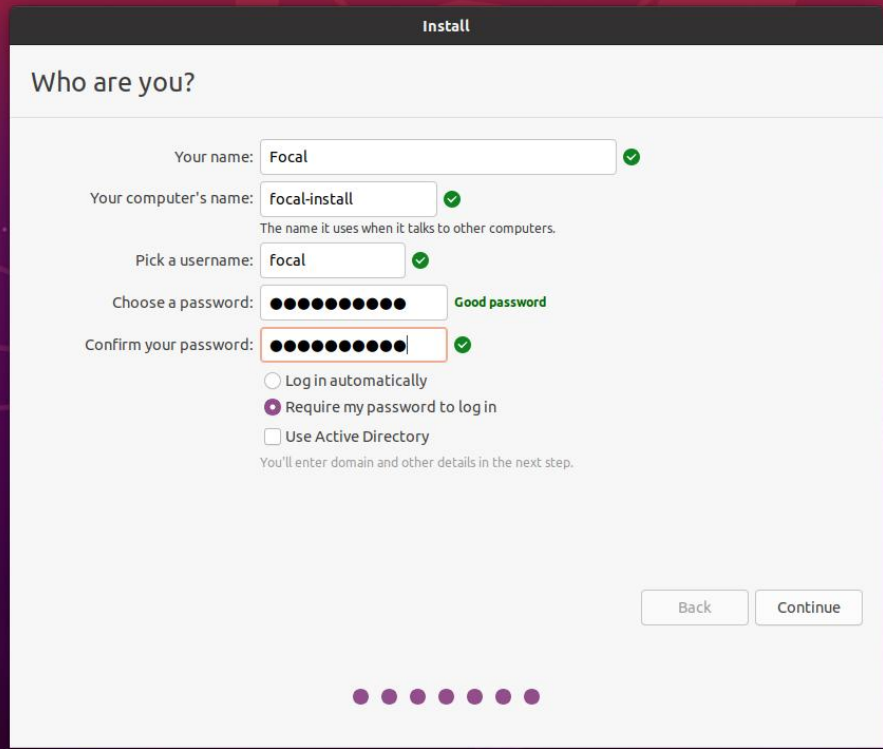
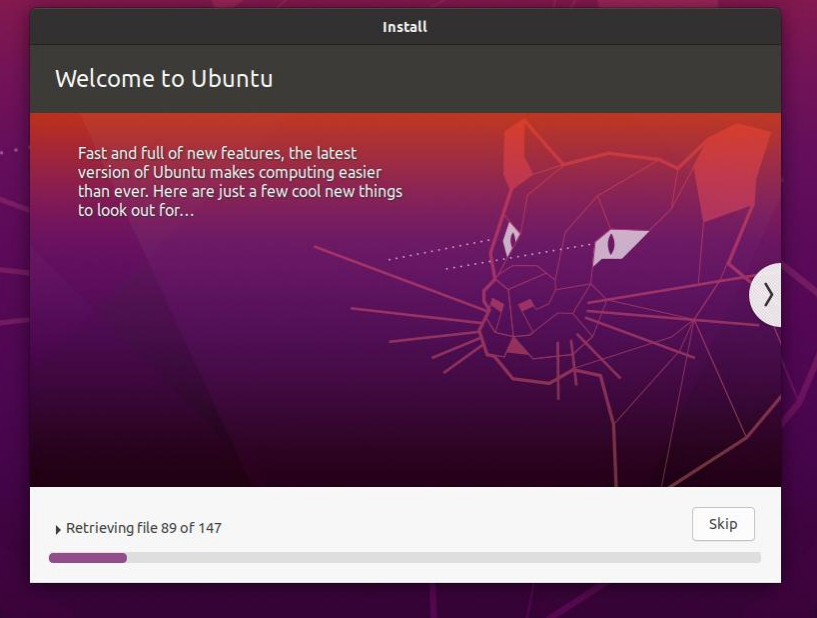
	
	<p>Step-5 Drive Management</p> <p>This screen allows you to configure your installation. If you would like Ubuntu to be the only operating system on your device, select Erase disk and install Ubuntu.</p>

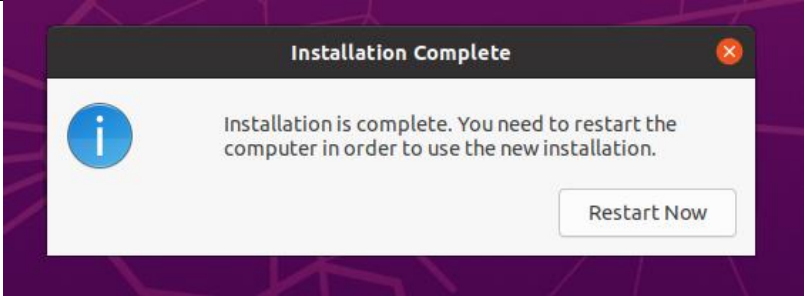

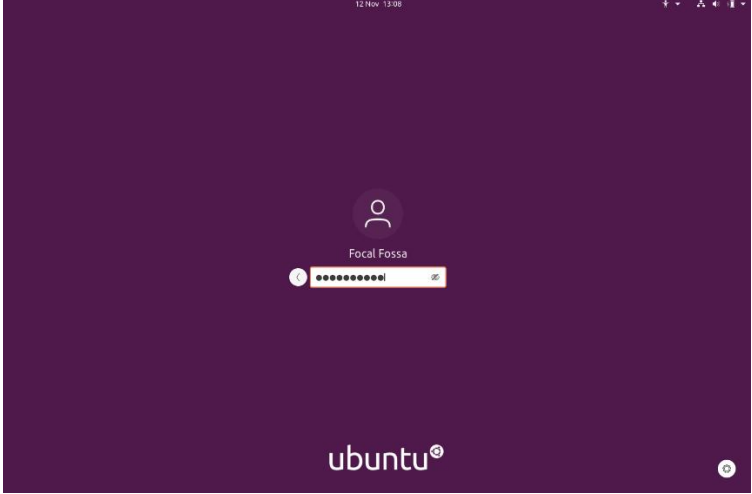
	
	<p>If you are happy to continue the installation <i>without</i> enabling encryption, click Install Now and confirm the changes with Continue. Otherwise keep reading.</p>
	

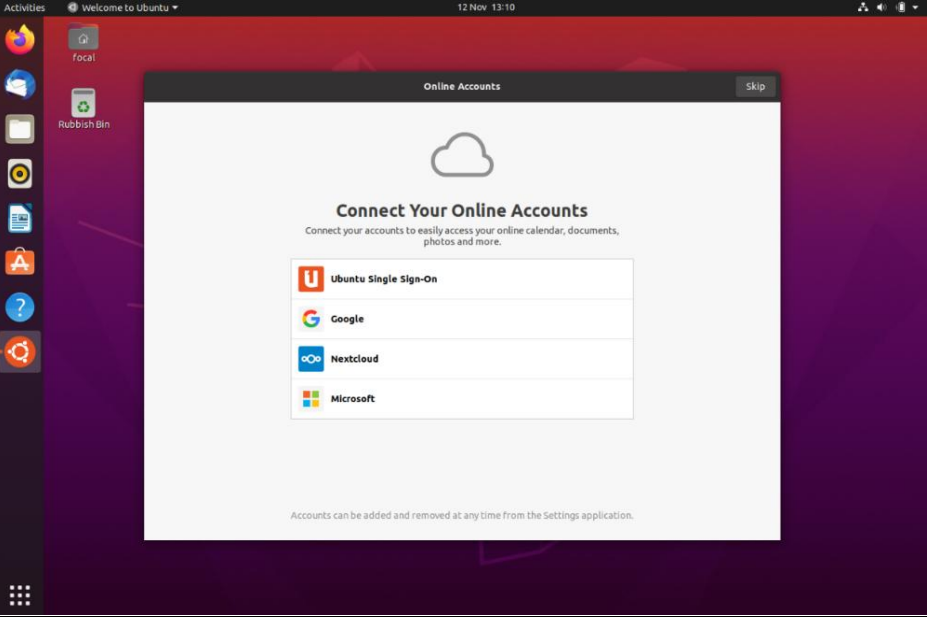
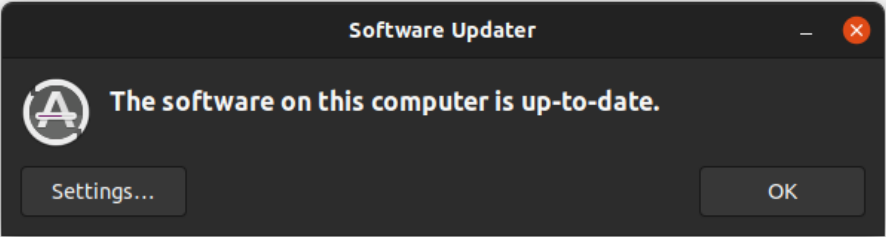
	<p>Step-6 :(Optional) Enable Encryption</p> <p>If you would like to encrypt your device, select Advanced features... > Use LVM with the new Ubuntu installation > Encrypt the new Ubuntu installation for security.</p>
	 <p>The screenshot shows the 'Install' window titled 'Installation type'. It asks 'This computer currently has no detected operating systems. What would you like to do?'. There are three main options: 'Erase disk and install Ubuntu' (selected), 'Advanced features...', and 'Something else'. The 'Advanced features...' dialog is open, showing 'Use LVM with the new Ubuntu installation' (selected), 'Encrypt the new Ubuntu installation for security' (checked), and 'EXPERIMENTAL: Erase disk and use ZFS'. The 'Encrypt the new Ubuntu installation for security' option has a note: 'You will choose a security key in the next step.' At the bottom of the 'Install' window are buttons for 'Quit', 'Back', and 'Install Now'. A progress bar at the very bottom shows 6 steps, with the first 5 being filled and the 6th being empty.</p>
	<p>You will be prompted to create a security key once you click Install Now.</p>

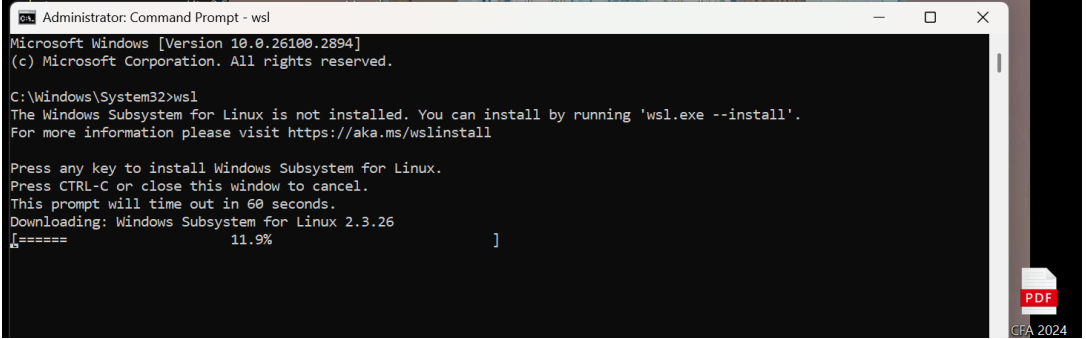
	
	Click Install Now and confirm the changes with Continue.
	Step-7 : Choose your Location Select your location and timezone from the map screen and click Continue. This information will be detected automatically if you are connected to the internet.

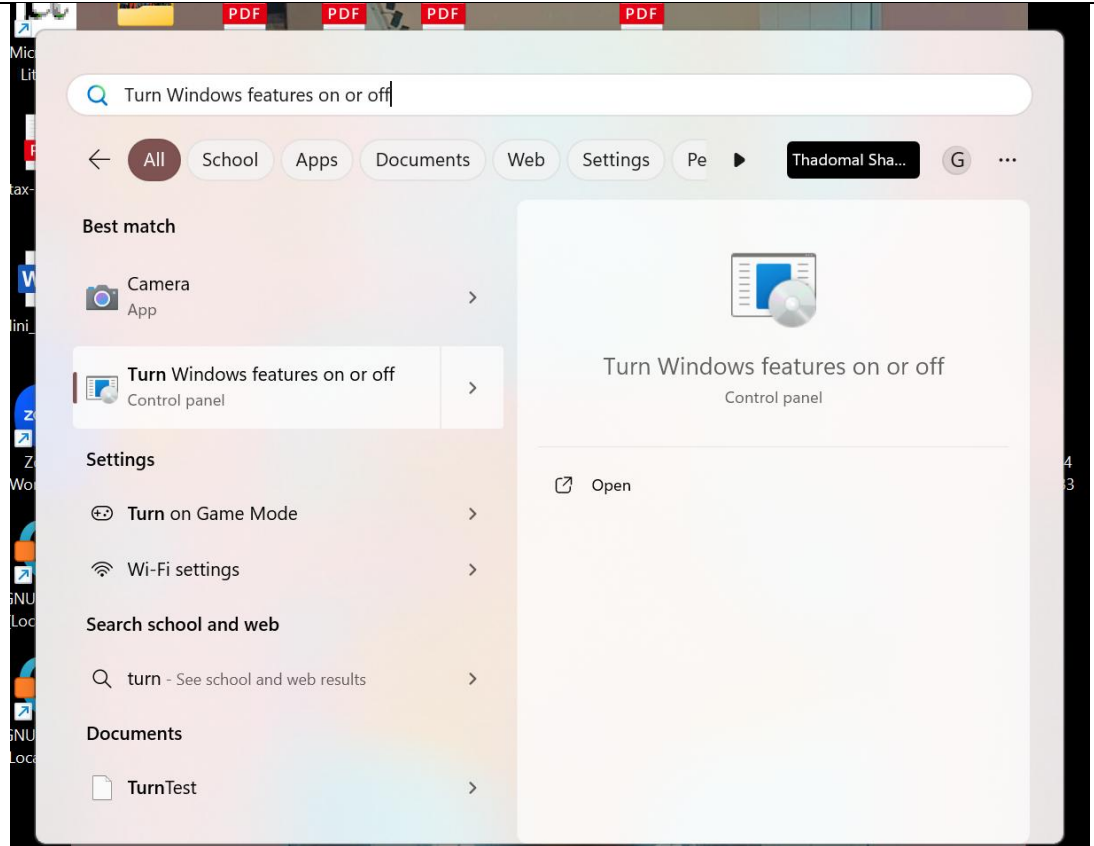
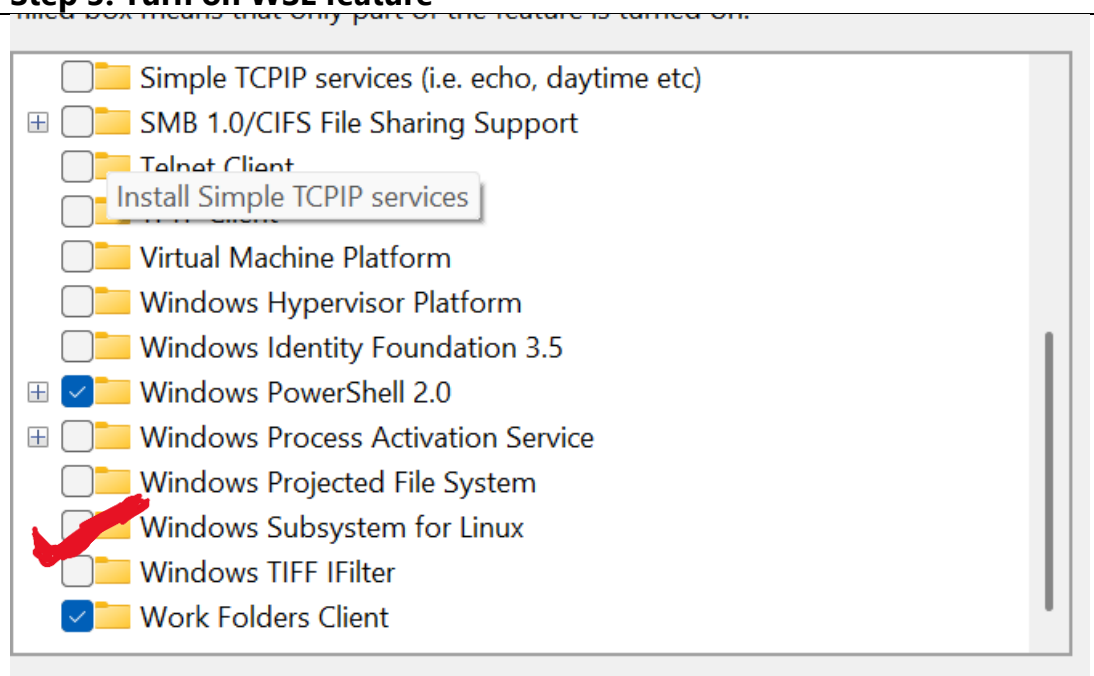
	
	<p>Step-8 : Create Your Login Details</p> <p>On this screen, you will be prompted to enter your name and the name of your computer as it will appear on the network. Finally, you will create a username and a strong password.</p> <p>You can choose to log in automatically or require a password. If you are using your device whilst travelling, it's recommended to keep automatic login disabled.</p>

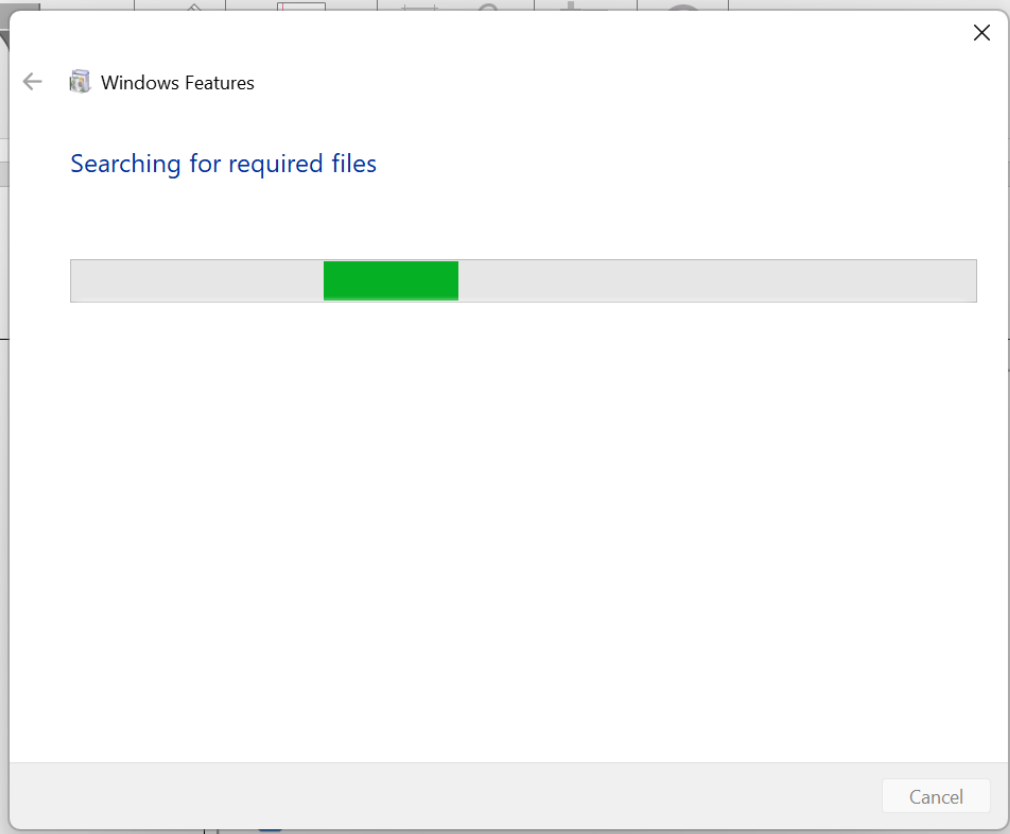
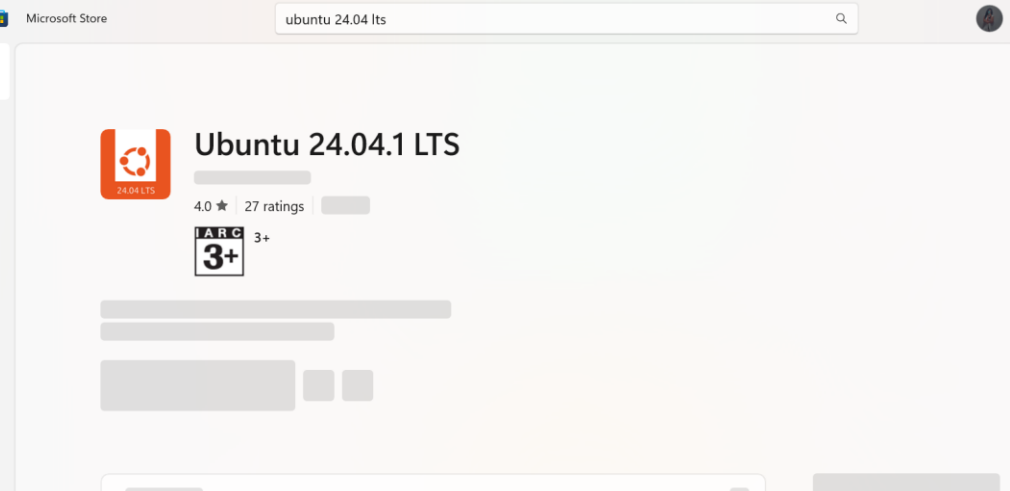
	
Step-10 : Complete the Installation	
	
	Once the installation has completed, you will be prompted to restart your machine. Click Restart Now.

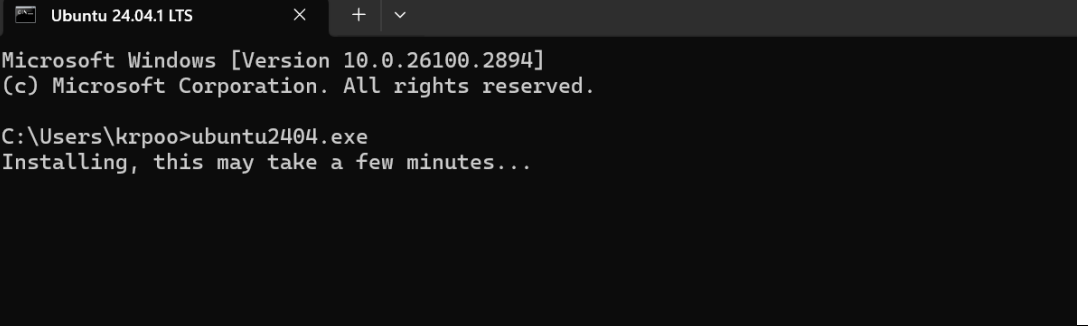
		
	<p>When you restart, you will be prompted to remove your USB flash drive from the device. Once you've done this, press ENTER. Enter your password on the login screen (assuming you selected that option when creating your login details).</p>	
		
	<p>Enter your password on the login screen (assuming you selected that option when creating your login details).</p>	
		
	<p>And that's it, welcome to your new Ubuntu Desktop!</p>	

	
	<p>The welcome widget will help you with some additional setup options, including:</p> <ul style="list-style-type: none">• Connecting your profile to various online accounts.• Configure Livepatch to automatically apply updates to your device (this option is only available when using a long term support [LTS] version of Ubuntu).• Opting into sending device information to Canonical to help improve Ubuntu (by default, Canonical doesn't collect device information).• Activating location services.• Downloading additional apps from Ubuntu Software.
	<p>Step-10 : Don't forget to Update!</p> <p>It's always good practice to ensure your system is up to date, especially after a fresh install.</p> <p>The easiest way to do this is via the Software Updater app. Search for Software Updater via the app menu (the icon with 9 squares in the bottom corner of your window) and it will check for updates and apply them.</p>
	

	<p>You can also update Ubuntu using the terminal.</p> <p>Press CTRL+ALT+T to bring up a Terminal window (or click the terminal icon in the sidebar).</p> <p>Type in:</p> <p>sudo apt update</p> <p>You will be prompted to enter your login password.</p> <p>This will check for updates and tell you if there are any that need applying.</p> <p>To apply any updates, type:</p> <p>sudo apt upgrade</p> <p>Type Y, then press ENTER to confirm to finish the update process.</p>
Installing WSL on windows Operating System	
	WSL or Windows Subsystem for Linux
	Step 1: run wsl command as administrator on your pc
	 A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt - wsl". The window shows the output of the 'wsl' command. It states: "Microsoft Windows [Version 10.0.26100.2894] (c) Microsoft Corporation. All rights reserved. C:\Windows\System32>wsl The Windows Subsystem for Linux is not installed. You can install by running 'wsl.exe --install'. For more information please visit https://aka.ms/wslinstall Press any key to install Windows Subsystem for Linux. Press CTRL-C or close this window to cancel. This prompt will time out in 60 seconds. Downloading: Windows Subsystem for Linux 2.3.26 [===== 11.9%]". A PDF icon is visible in the bottom right corner of the window.
	Step 2: Find the option for turn windows features on or off in Start

	 <p>The screenshot shows a Windows Search interface. The search bar at the top contains the text "Turn Windows features on or off". Below the search bar, there are tabs for "All", "School", "Apps", "Documents", "Web", "Settings", and "Pe". The "All" tab is selected. The search results are divided into two main sections. The left section, titled "Best match", lists several items: "Camera App", "Turn Windows features on or off" (Control panel), "Settings", "Turn on Game Mode", "Wi-Fi settings", "Search school and web", and "Documents". The right section, titled "Turn Windows features on or off" (Control panel), shows a large icon of a computer screen with a blue square and a white circle, and a button labeled "Open".</p>
	Step 3: Turn on WSL feature
	 <p>The screenshot shows the "Windows Features" window. It contains a list of features with checkboxes. The following features are listed: "Simple TCPIP services (i.e. echo, daytime etc)", "SMB 1.0/CIFS File Sharing Support", "Telnet Client", "Install Simple TCPIP services", "Virtual Machine Platform", "Windows Hypervisor Platform", "Windows Identity Foundation 3.5", "Windows PowerShell 2.0", "Windows Process Activation Service", "Windows Projected File System", "Windows Subsystem for Linux", "Windows TIFF IFilter", and "Work Folders Client". The "Windows Subsystem for Linux" feature is checked, and a red checkmark is drawn over the checkbox. The "Work Folders Client" feature is also checked.</p>

	 <p>A screenshot of the Windows 'Windows Features' window. The window title is 'Windows Features'. Below the title bar, there is a back arrow and the text 'Windows Features'. The main content area says 'Searching for required files' in blue text. Below this text is a progress bar with a green segment in the middle. At the bottom right, there is a 'Cancel' button.</p>
	Step 4: Reboot your system
	Step 5: Download Ubuntu 24.04 LTS
	 <p>A screenshot of the Microsoft Store app page for 'Ubuntu 24.04.1 LTS'. The page header shows 'Microsoft Store' and a search bar with 'ubuntu 24.04 lts'. The main content area features the Ubuntu logo, the title 'Ubuntu 24.04.1 LTS', a rating of '4.0 ★ 27 ratings', and an 'ARC 3+' badge. Below the main content, there are several blurred rectangular shapes representing additional information or images.</p>

	 <pre> Microsoft Windows [Version 10.0.26100.2894] (c) Microsoft Corporation. All rights reserved. C:\Users\krpoo>ubuntu2404.exe Installing, this may take a few minutes... </pre>
	<pre> Enter new UNIX username: Pooja_Jain perr: Please enter a username matching the regular expression configured via the NAME_REGEX configuration variable. Use the '--allow-bad-names' option to relax this check or reconfigure NAME_REGEX in configuration. Enter new UNIX username: pooja_kiran_kumar_jain New password: Retype new password: Sorry, passwords do not match. passwd: Authentication token manipulation error passwd: password unchanged Try again? [y/N] y New password: Retype new password: passwd: password updated successfully Installation successful! </pre>
	Then open Ubuntu or cmd >> ubuntu2404.exe for the Linux OS to start.
Questions to be solved	
Q1.	Define Operating System? State Purpose of OS? Give 5 Examples.

<p>Ans</p>	<p>Ans: A program that acts as an intermediary between the user and computer hardware is called an operating system.</p> <p>The operating system controls and coordinates the use of hardware for various applications and users.</p> <p>An OS is used for the following:</p> <ol style="list-style-type: none"> ① memory management ② file management ③ Device management ④ Processor management ⑤ Network management ⑥ security of device ⑦ error detecting aids. <p>Some examples of OS are:</p> <ol style="list-style-type: none"> ① linux ② Windows by Microsoft ③ MacOS by Apple ④ Android OS by Google ⑤ Unix
<p>Q2</p>	<p>Which Version of Linux is installed in lab.</p>
<p>Ans</p>	<p>Ans. The linux (Ubuntu) 20.04 version is installed in the lab, preferably using the bootable USB stick.</p>
<p>Q3.</p>	<p>Give the configuration of computer in which Linux is installed</p>

<p>Ans</p>	<p>Ans. The computer system structure has 4 components.</p> <ol style="list-style-type: none"> ① hardware: CPU, memory, I/O devices ② OS: here, linux ③ Application programs: processors, compilers, browsers ④ Users: people and other machines. <p>The hardware req. of linux involve:</p> <ul style="list-style-type: none"> → 1GB Ram for graphical operation → Pentium class processor <p>Application programs include configuration files which say how a program/utility work.</p> <ul style="list-style-type: none"> → /etc/ directory holds these files. 	
<p>Q4.</p>	<p>What is minimum configuration need for Linux OS.</p>	
<p>Ans</p>	<p>The minimum required configurations is:</p> <p>CPU: 1GHz (x86 or x86-64)</p> <p>RAM: 512MB (1GB recommended for GUI)</p> <p>Storage: 5 to 10 GB</p> <p>Display: VGA capable monitor</p> <p>Network: Ethernet or wifi.</p>	
<p>Q5.</p>	<p>List Different Families of Linux OS</p>	
<p>Ans</p>	<p>Ans.</p> <ol style="list-style-type: none"> A. Debian-based (eg: Ubuntu, Linux Mint) B. Red Hat based (eg: RHEL, Fedora) C. Arch based (eg: Arch Linux, Manjaro) D. SUSE-based (eg: openSUSE, SUSE Linux Enterprise) E. Slackware-based (eg: Slackware, Salix) F. Independent Distro (eg: Alpine Linux) 	
<p>Q6</p>	<p>What is Distro? Give example</p>	

Ans	<p>Ans. A distro (distribution) is a complete Linux operating system that includes the Linux kernel, system utilities, libraries and applications</p>																		
Q7	Who Invented Linux and In which Year																		
Ans	<p>Ans. Linus Torvalds in 1991 while he was still a student at University of Helsinki, Finland</p>																		
Q8	State major Different between Linux and Unix																		
Ans	<table><thead><tr><th><u>Feature</u></th><th><u>Linux</u></th><th><u>Unix</u></th></tr></thead><tbody><tr><td>Developer</td><td>Linus Torvalds</td><td>AT&T Bell Labs</td></tr><tr><td>License</td><td>Open Source (GPL)</td><td>Proprietary</td></tr><tr><td>Usage</td><td>PCs, servers, embedded systems</td><td>High end servers mainframes</td></tr><tr><td>Variants</td><td>Multiple distros available</td><td>Different flavours called AIX, Solaris</td></tr><tr><td>Costing</td><td>Usually Free</td><td>Mostly paid.</td></tr></tbody></table>	<u>Feature</u>	<u>Linux</u>	<u>Unix</u>	Developer	Linus Torvalds	AT&T Bell Labs	License	Open Source (GPL)	Proprietary	Usage	PCs, servers, embedded systems	High end servers mainframes	Variants	Multiple distros available	Different flavours called AIX, Solaris	Costing	Usually Free	Mostly paid.
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Q9.	State Main Difference between Windows, MAC and Linux																		

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Features	Windows	Mac Os	Linux																						
Developer	Microsoft	Apple	Open Source Commu.																						
Licence	Proprietary	Proprietary	Open sourced																						
Customization	Limited	Very limited	Highly Customizable																						
Security	Vulnerable	Secure	Very Secure																						
Software support	Wide software compatibility	Best for creatives	Wide but with limitations.																						
Q10.	What is Shell in Linux? List Different types of Shell with there prompt.																								
Ans	<p>Q10. A shell is a command line interface (CLI) that allows users to interact with the operating system.</p> <ol style="list-style-type: none">1) Bash (Bourne again shell) (\$) 2) Sh. (Bourne shell) (\$) 3) C shell (csh) (%) 4) Korn shell (ksh) (\$) 5) Fish Shell (>)																								
Conclusion	Therefore, the basics of Linux OS as well as its different installations were studied and successfully understood along with the subsequent Installation of Linux on Lab PCs as well as personal computers at home.																								

Signature	
Grade	
Date	