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1.1 Introduction to Ubuntu-18

"Ubuntu-18 represents a significant point in the evolution of the Ubuntu Linux distribution. This release, designated as a Long Term Support (LTS) version, aimed to provide a stable and reliable platform for both desktop and server environments.

While it has since reached its end of standard support, understanding the features, architecture, and administration of Ubuntu-18 remains valuable for those working with legacy systems or studying the history of Linux operating systems.

It is critical to acknowledge that using Ubuntu-18 without ongoing security updates presents significant risks, and migration to a supported version or alternative operating system is strongly recommended."

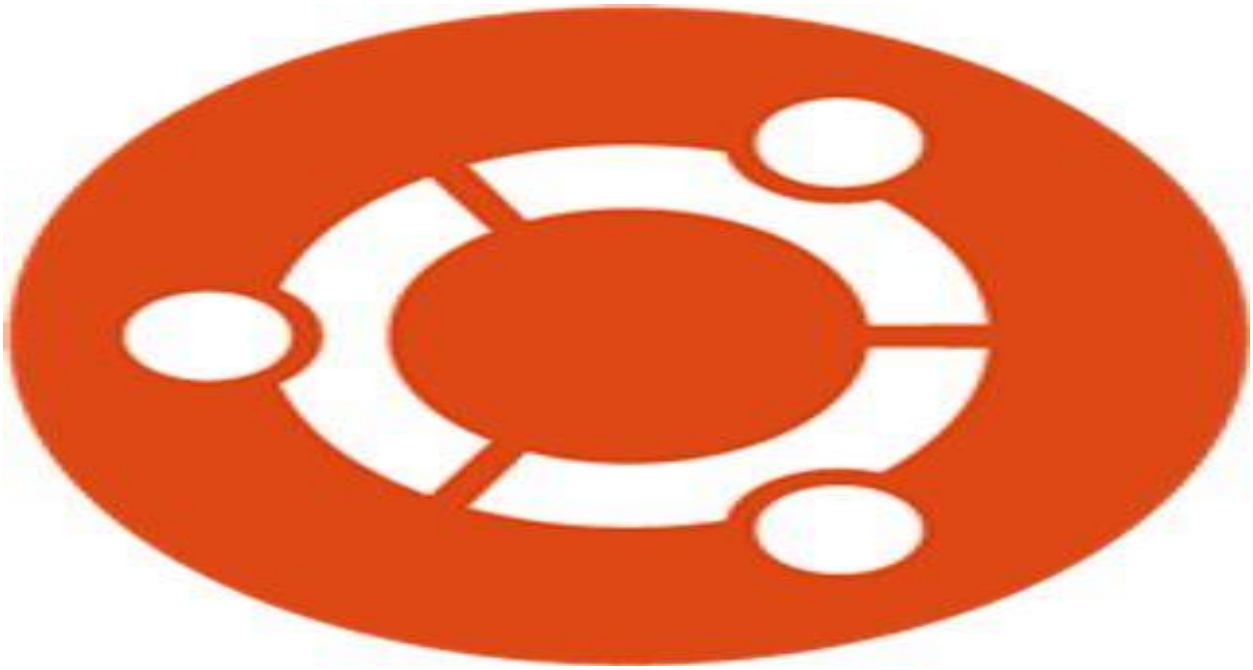

image 1.1 logo of ubntu-18(circle of friend)

The difference between "18.04" and "18" when referring to Ubuntu is primarily about specificity and common usage.

"18.04" (e.g., Ubuntu 18.04 LTS): This is the precise version number of the Ubuntu release. It signifies the year and month of the release. "18" indicates the year 2018, and "04" indicates the month April. When you see "18.04", it unambiguously refers to the "Bionic Beaver" release. and "18" (e.g., Ubuntu-18): This is a shorthand notation often used to refer to the Ubuntu release family from 2018.

1.1.1 Background of Ubuntu-18

The Ubuntu "18" release marked a significant shift in the Ubuntu landscape. It represented a strategic effort to provide a Long Term Support (LTS) version that balanced stability with modern features. The decision-making behind "18" centered around offering a reliable foundation for both individual users and enterprise environments, emphasizing long-term predictability and ease of maintenance.

A key aspect of its development was the return to the GNOME desktop environment, signaling a focus on a familiar and widely-used interface. The release incorporated key technological advancements to optimize hardware support and provide a streamlined user experience. While "18" has since reached its end of standard support, its development choices and design principles provide valuable insight into the evolution of Ubuntu as a leading Linux distribution.

1.1.2 Evolution of Ubuntu-18

Ubuntu '18' represents a crucial turning point in the evolution of the Ubuntu operating system. It marked a return to GNOME as the default desktop environment, a significant decision that steered the user experience in a new direction after several years with UnityKey updates to the kernel and core system components ensured improved hardware support and performance. While the active support period for '18' has ended, studying its design choices and implementation details offers valuable insights into how Ubuntu has evolved and adapted to meet the needs of its diverse user base over time.

Here's what's added/emphasized:

- "Crucial turning point": Highlights the importance of this release in Ubuntu's history.
- "Return to GNOME...": Directly addresses the desktop environment shift.

- "Adapting to the changing landscape...": Indicates that the release was influenced by broader trends in the Linux world.

- "How Ubuntu has evolved...": Clearly states that understanding this release contributes to understanding the overall evolution of Ubuntu.

1.1.3 Motivation for Ubuntu-18

"Ubuntu '18' was a Long Term Support (LTS) release driven by several key motivations: to provide a stable and predictable platform for a wide range of users, from home desktops to enterprise servers; to offer a solution with five years of security updates and long-term maintainability, appealing to organizations seeking a reliable foundation; and to consolidate the Ubuntu user base around a unified desktop experience with the return to GNOME, addressing fragmentation caused by the previous Unity interface.

Its development also aimed to leverage advancements in kernel technology and Here's what's added:

- driven by several key motivations Makes it clear that the release was intentional and purpose-driven.

- to provide a stable and predictable platform Highlights the LTS aspect and the desire for a reliable base.

- offering a solution with five years Further reinforces the LTS goal.

1.2 Objectives of Ubuntu-18

Ubuntu 18 LTS was meticulously crafted with a multi-faceted set of objectives, each designed to contribute to a robust and enduring operating system experience. These objectives extended beyond mere functionality, encompassing strategic decisions, user experience enhancements, and a commitment to long-term value.

1. Foundation of Stability and Reliability as an LTS Release:

The fundamental objective was to establish a truly stable and dependable Long Term Support release. This wasn't just about offering a snapshot in time, but creating an ecosystem designed for resilience and longevity. The commitment to five years of support for the server edition (three years for the desktop) represented a contract with users: Ubuntu would provide a consistent, secure, and predictable platform for mission-critical tasks.

2. Unifying the Desktop Experience Through the Return to GNOME:

The decision to revert to GNOME as the default desktop environment was a strategic move to address the fragmentation created by the previous Unity interface. While Unity had been a bold experiment, it ultimately divided the Ubuntu user base, leading to inconsistencies and increased development overhead.

- GNOME provided a mature and well-supported desktop environment with a large community, ensuring a steady stream of updates, bug fixes, and new features. This allowed Ubuntu to focus its resources on core system improvements rather than maintaining a custom desktop environment.

3. Fortifying Security and Protecting User Data:

- **Proactive Security Measures**: Security was not an afterthought but a core.
- **Regular Updates and Patching:** The LTS commitment guaranteed regular security updates and patches for five years (for servers). This ensured that users would receive timely protection against newly discovered security flaws, minimizing the risk of exploitation.
- **AppArmor** and Other Security Enhancements: Ubuntu 18 incorporated security technologies like AppArmor to restrict the capabilities of applications and prevent them from accessing sensitive data or system resources without explicit permission.

1.3 Requirements of ubutu-18

For Ubuntu "18" (Ubuntu 18.04 LTS), the hardware and software requirements are generally as follows:

1.3.1 Hardware Requirements :

1 Processor (CPU):

- **Minimum**: A single-core processor clocked at 1 GHz or higher. This will allow the system to boot and run basic applications, but the performance will likely be sluggish, especially with the GNOME desktop environment.

- **Recommended**: A dual-core processor clocked at 2 GHz or higher. This provides a much smoother and more responsive user experience, especially when running multiple applications or performing resource-intensive tasks.
- Architecture: Primarily designed for x86-64 (amd64) architecture. Limited support for ARM-based systems.

2 Memory (RAM):

- **Minimum**: 1 GB of RAM. This is the absolute bare minimum and will likely result in significant performance issues, especially when running graphical applications or multiple programs simultaneously. The system will rely heavily on swap space, which can slow things down.
- **Recommended**: 4 GB of RAM or more. This is the sweet spot for most desktop users. It allows you to run multiple applications smoothly, browse the web with several tabs open, and perform basic multimedia tasks without significant performance degradation.
- **Server Use**: For server deployments, the amount of RAM required will depend on the specific workloads you plan to run. Web servers, database servers, and other resource-intensive applications may require 8 GB, 16 GB, or even more RAM for optimal performance.

3 Storage (Disk Space):

- **Minimum:** 25 GB of free disk space. This is sufficient for installing the base Ubuntu system and a few basic applications. However, you'll quickly run out of space if you plan to install a lot of software or store large files.
- **Recommended**: 50 GB or more of free disk space. This provides ample room for installing a wide range of applications, storing personal files, and creating a swap partition.
- **Storage Type**: Using an SSD (Solid State Drive) is highly recommended. SSDs offer significantly faster read and write speeds compared to traditional HDDs (Hard Disk Drives), which can dramatically improve boot times, application launch times, and overall system responsiveness.

4 Graphics:

- **Minimum**: Graphics card and monitor capable of supporting a resolution of 1024x768 or higher.
- **Recommended**: A dedicated graphics card with at least 256 MB of VRAM (Video RAM) for a smoother desktop experience, especially when running graphically intensive applications or games.
- **Desktop Environment:** The GNOME desktop environment used in Ubuntu 18.04 can be relatively resource-intensive, so a dedicated graphics card is beneficial, especially on systems with limited RAM.

4 Connectivity:

- A network adapter (Ethernet or Wi-Fi) is required for connecting to the internet and accessing network resources.
- Ethernet is generally preferred for server deployments due to its greater stability and higher bandwidth.

5 Optical Drive/USB Port:

- A DVD drive or a USB port is needed for booting from the installation media (DVD or USB drive).

1.3.2 Software Requirements (Detailed):

1 Installation Media:

- An Ubuntu "18" ISO image (available from archive repositories).
- A blank DVD or a USB drive with sufficient capacity (at least 4 GB).

2 Bootable USB Creation Tool:

- Software to create a bootable USB drive from the Ubuntu ISO image. Popular options include:
- Rufus (Windows).
- Etcher (Windows, macOS, Linux).
- UNetbootin (Windows, Linux).

3 Partitioning Tool (Optional):

- If you plan to manually partition your hard drive, you may need a partitioning tool. However, the Ubuntu installer includes a built-in partitioning tool that is sufficient for most users.

- Popular partitioning tools include
- GParted (GUI-based).
- fdisk (command-line).

4 Internet Connection:

- While not strictly required for installation, an internet connection is highly recommended.
- An internet connection allows you to download the latest updates, drivers, and language packs during the installation process.
- It also allows you to install additional software and access online resources after the installation is complete.

5 Virtualization Software (if virtualizing):

- If you plan to run Ubuntu "18" within a virtual machine, you'll need virtualization software.
- Popular virtualization software options include:
- VirtualBox (free and open-source).
- VMware Workstation Player (free for personal use).
- KVM (Kernel-based Virtual Machine) - Linux-specific.

6 Firmware: Ensure your system's BIOS or UEFI firmware is up-to-date for best compatibility.

1.4 Important Considerations

Those are the important consideration that we need to know about Ubuntu 18:

- **End-of-Life:** Remember that Ubuntu 18 LTS is no longer officially supported, so it won't receive security updates or bug fixes. Using it in a production environment is strongly discouraged.

- **Resource Intensive Applications**: If we plan to run resource-intensive applications (e.g., video editing software, games, scientific simulations), you'll likely need more powerful hardware than the minimum or recommended specifications.

- **32-bit vs. 64-bit:** While Ubuntu 18 primarily targeted 64-bit architectures (amd64), there might have been 32-bit versions available. Ensure your hardware is

compatible with the architecture you choose. However, for most modern systems, the 64-bit version is the preferred choice.

1.5 Installation steps

Before install Ubuntu 18 we have to know about the fllowing points;

the standard long-term support period for Ubuntu 18.04 LTS ended in April 2023 for the desktop version, and in April 2023 for the server version. this means:

- Past Tense: It had long-term support, but that support has expired.
- No More Security Updates: It is no longer receiving security updates or bug fixes from Canonical (the company behind Ubuntu).
- Using it is Risky: Running Ubuntu 18.04 now is highly discouraged, especially in internet-connected environments, due to the lack of security support.

but as long as we have the ISO image for Ubuntu 18.04, you can create a virtual machine and install the operating system within that virtual environment. So to run the installation process follow the following steps;

Step 1: Download Software

- Download VMware Workstation Player (or Pro).
- Download the Ubuntu ISO file.

Step 2: Install VMware Workstation

- Run the VMware Workstation installer.
- Follow the on-screen prompts to complete the installation.
- Restart your computer if prompted.

Step 3: Create a New Virtual Machine

- Open VMware Workstation.
- Click "Create a New Virtual Machine."
- Select the Ubuntu ISO file as the installation source.
- Choose "Linux" and the appropriate Ubuntu version (64-bit or 32-bit).

- Name the virtual machine and choose a location for its files.
- Specify the virtual disk size (minimum 20GB, recommend more). Choose single or split file.
- Customize Hardware (RAM, CPU cores). Allocate at least 2GB RAM and 1-2 CPU cores.
- Finish creating the virtual machine.

Step 4: Install Ubuntu Inside the VM

- Power on the virtual machine.
- The Ubuntu installer will start. Follow the on-screen prompts:
  - Choose your language.
  - Select keyboard layout.
  - Choose normal/minimal installation and updates.
  - Select "Erase disk and install Ubuntu" (this erases the virtual disk).
  - Set your time zone.
  - Create a user account and password.
- Wait for the installation to complete.

Step 5: Restart the Virtual Machine

- Restart the virtual machine when prompted.
- Disconnect the ISO file from the virtual machine.

Step 6: Install VMware Tools

- After Ubuntu boots, in VMware, select "VM" -> "Install VMware Tools."
- Open a terminal in Ubuntu.
- Extract the VMware Tools archive from the virtual CD-ROM.
- Run the vmware-install.pl script with sudo.
- Accept the defaults during the VMware Tools installation.

- Restart the Ubuntu virtual machine.

Those steps are shown in the following snipped images;

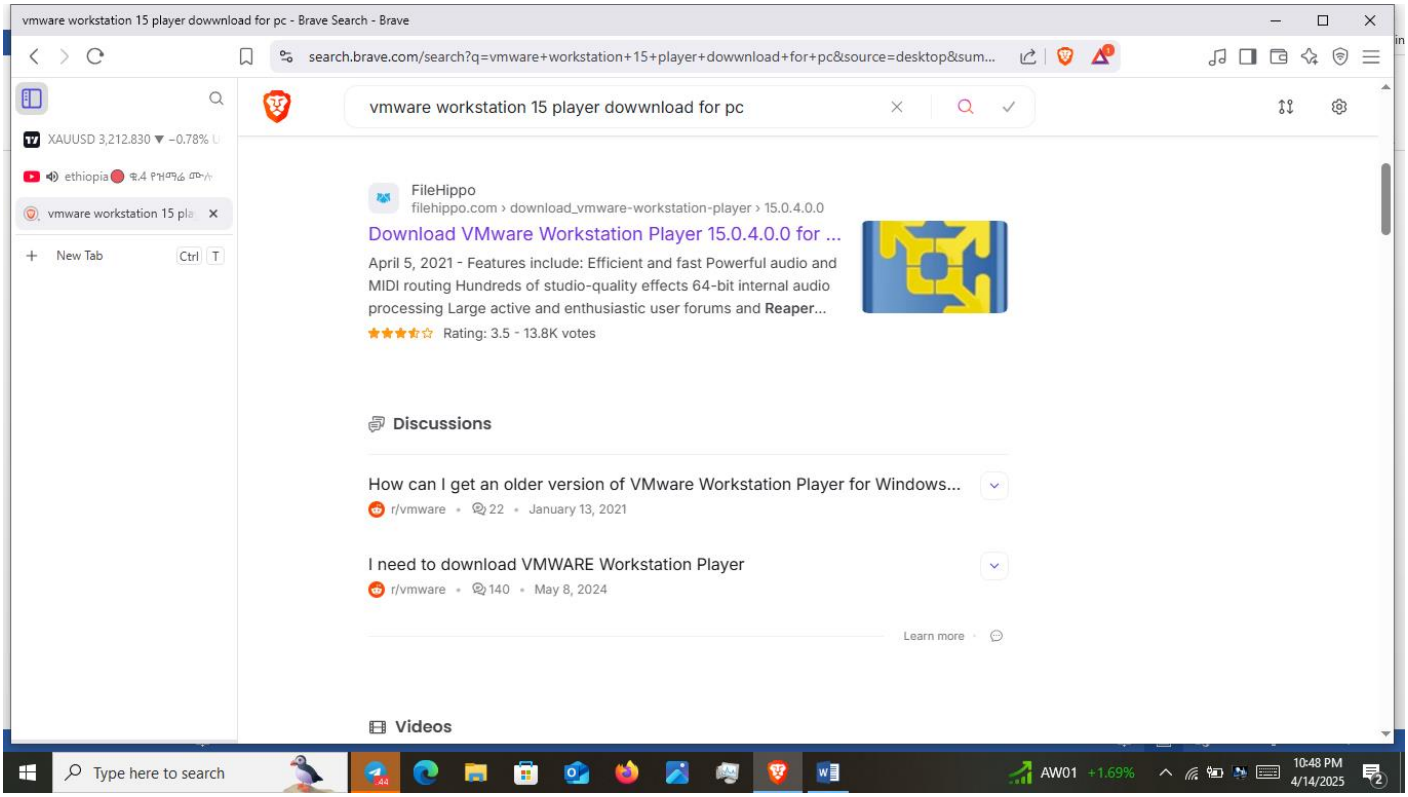

Image 1.2 downloading vmware player on broser.

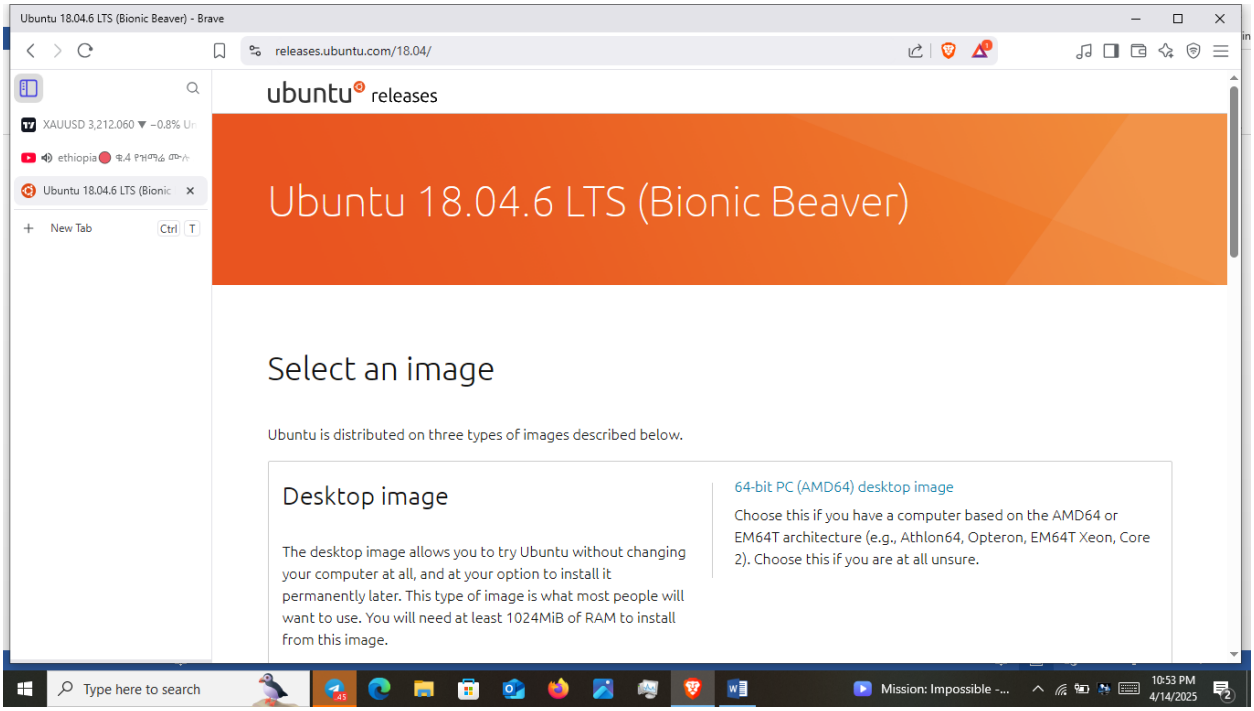

Image 1.3 downloading the Ubuntu iso file.

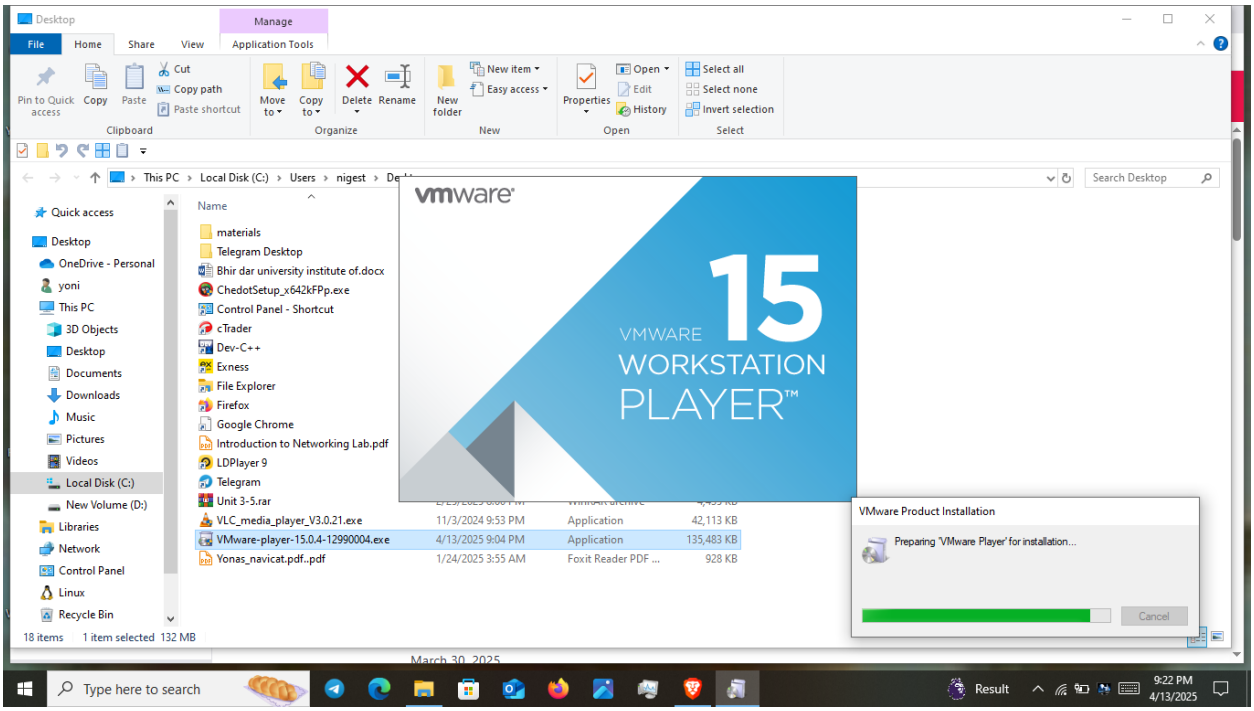

Image1.4 istalling vmware workstation.

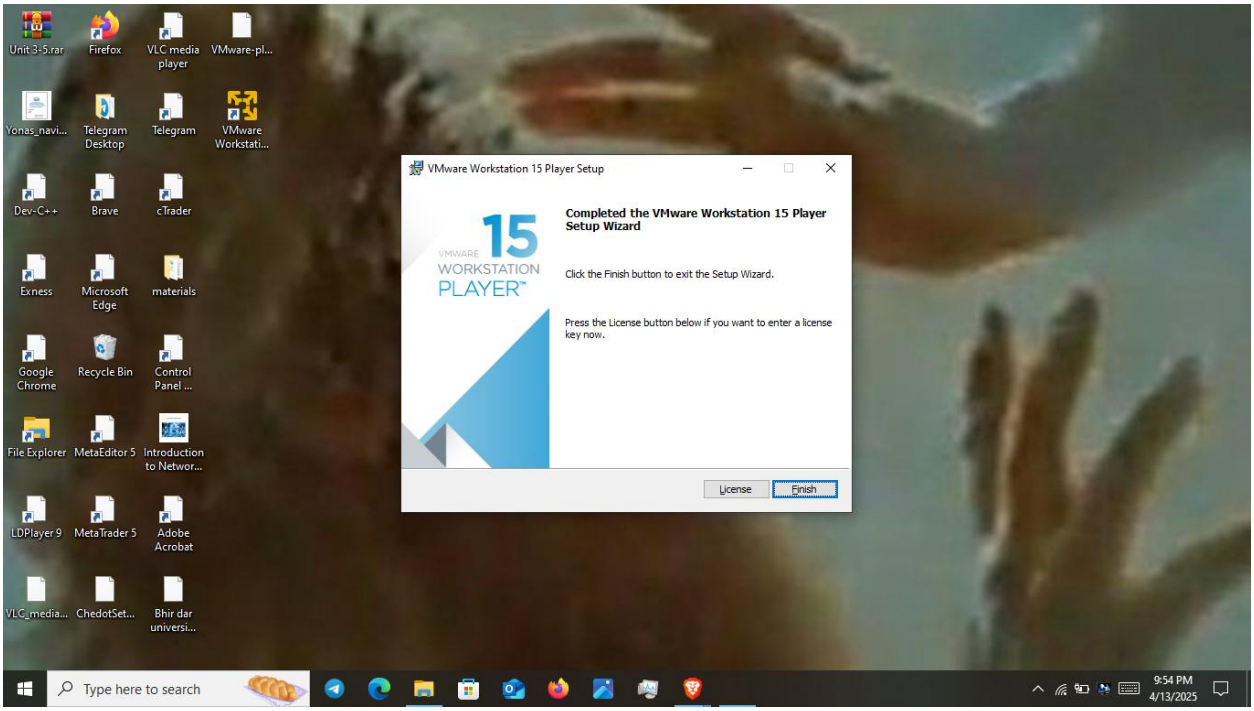

Image 1.5 opening vmware workstation.

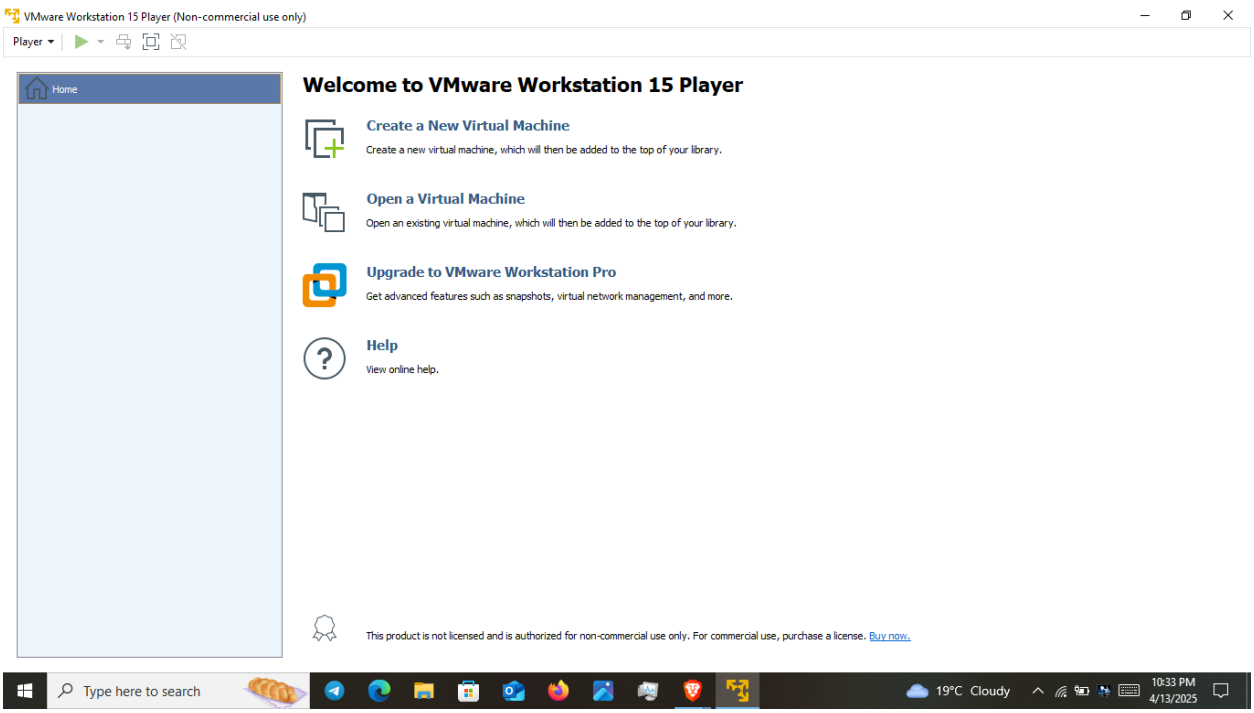

Image 1.6 interface of vmware workstation.

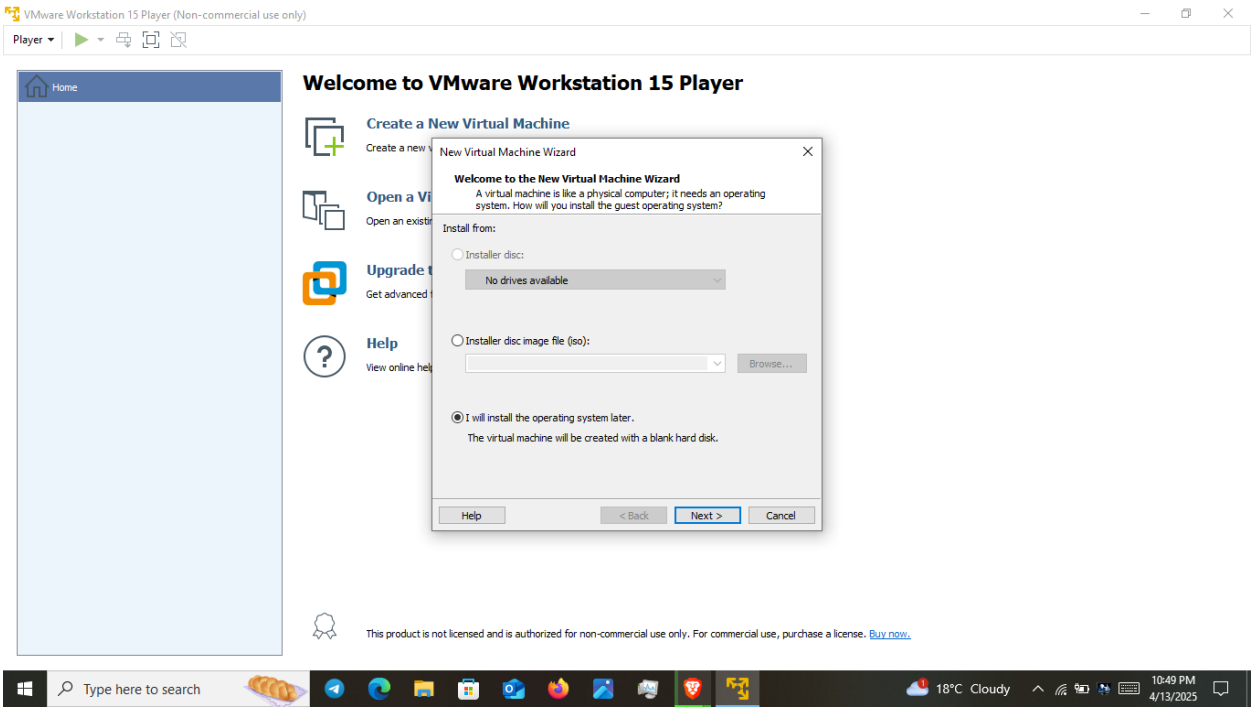

Image 1.8 creating a virtual machine on vmware.

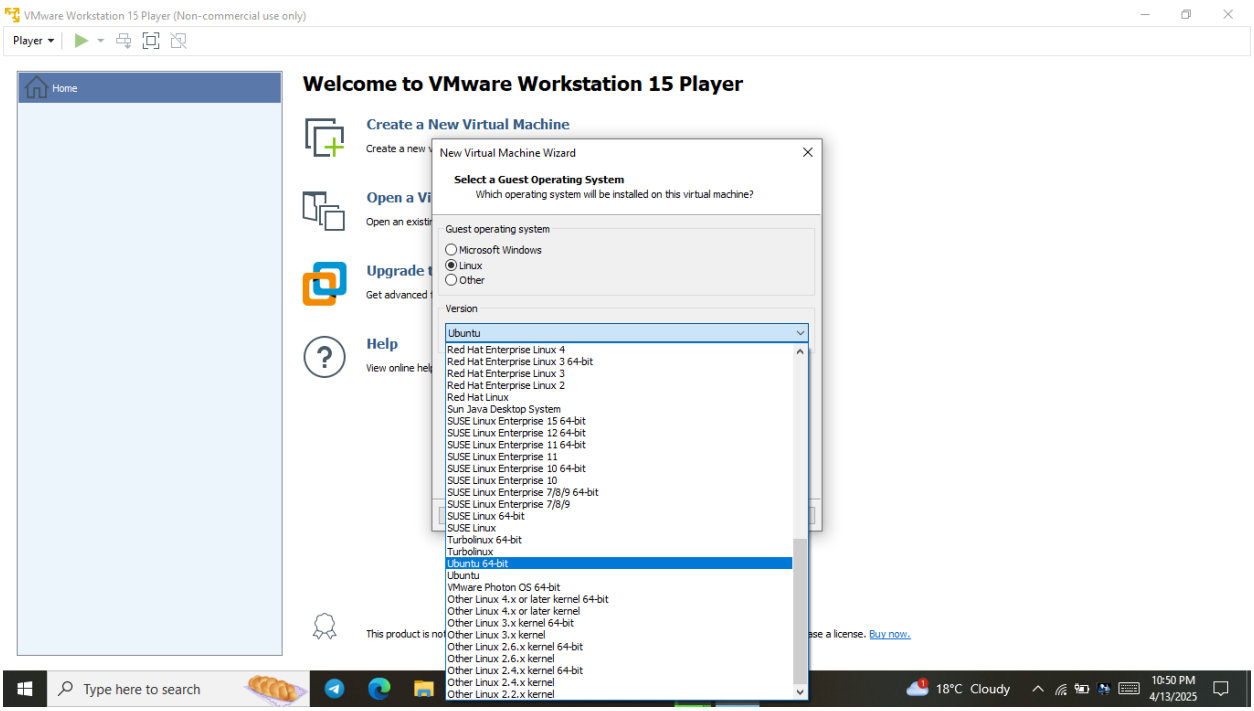

Image 1.9 chooseing linux and select Ubuntu version 64 bit.

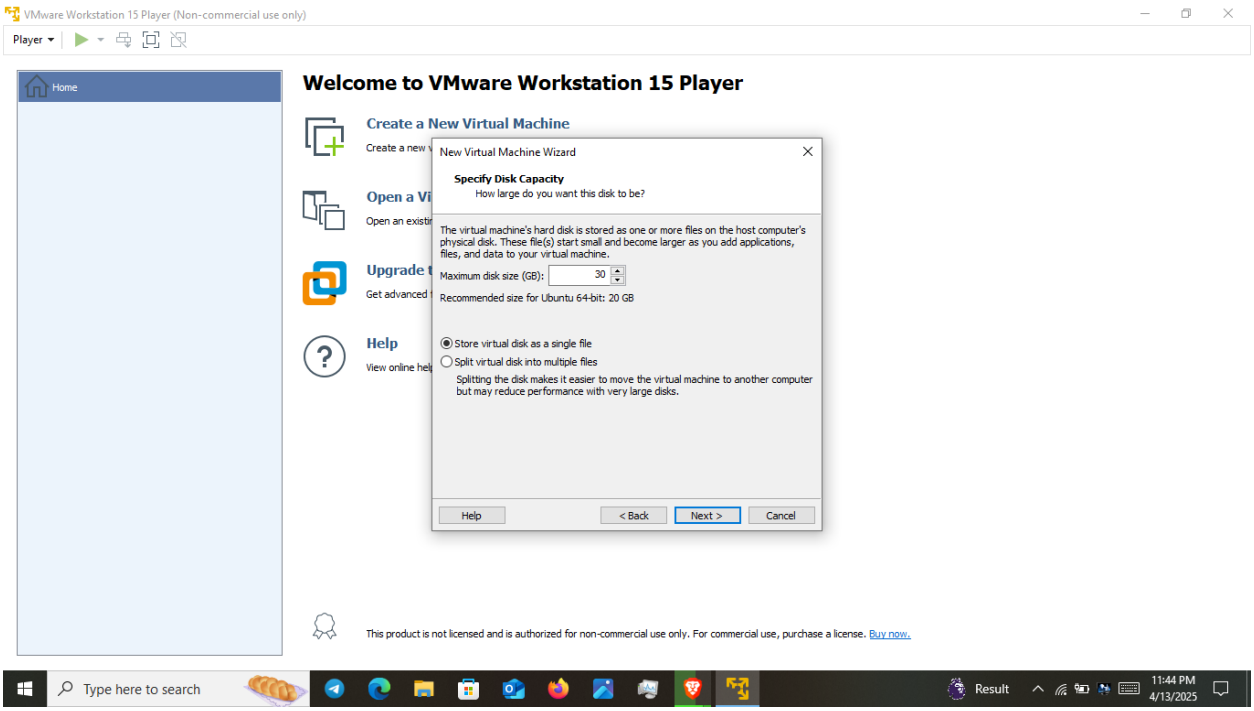

Image 2.1 specifing the virtual disk size to 30GB.

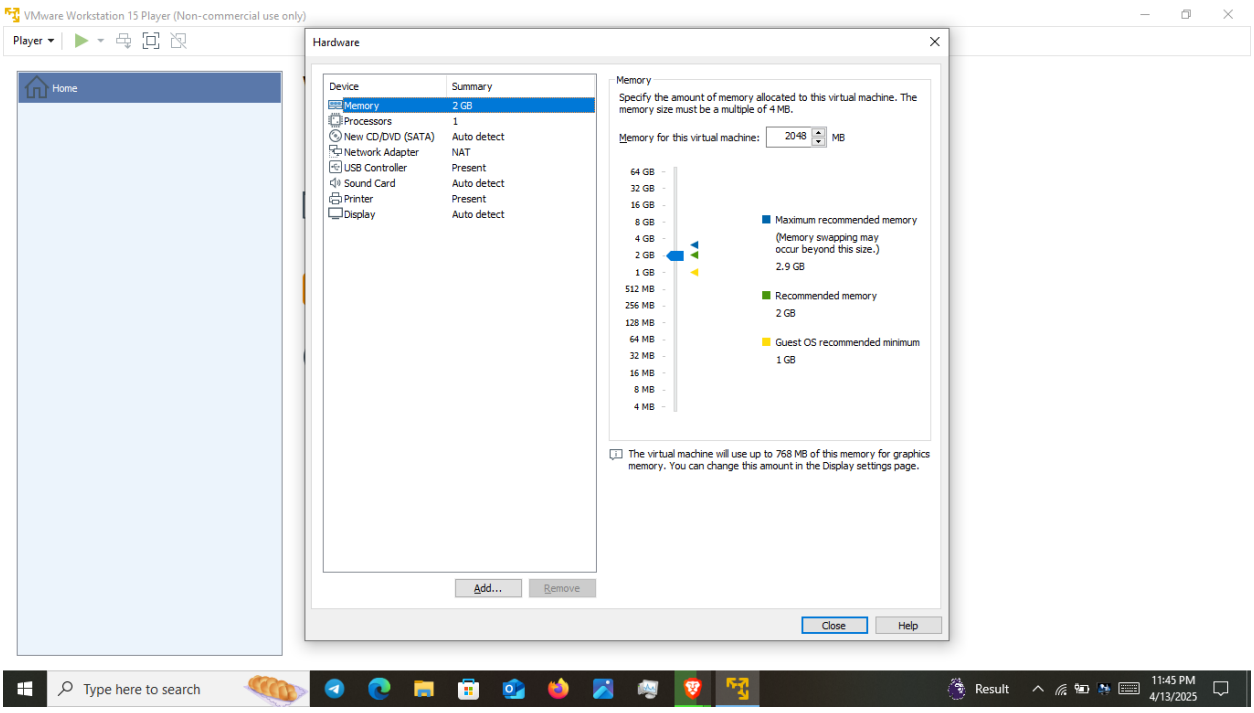

Image 2.2 allocateing cpu as 2 cores and RAM to 4GB

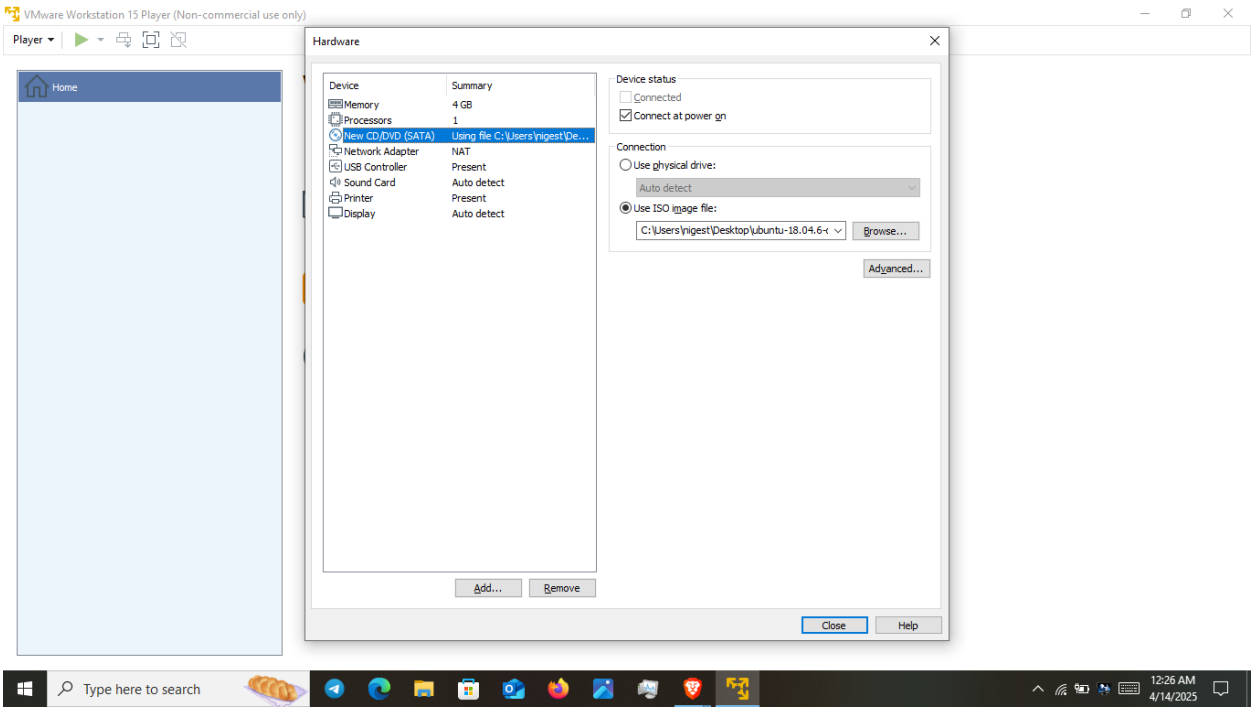

Image 2.3 broseing Ubuntu file adrese and fishing creating vm.

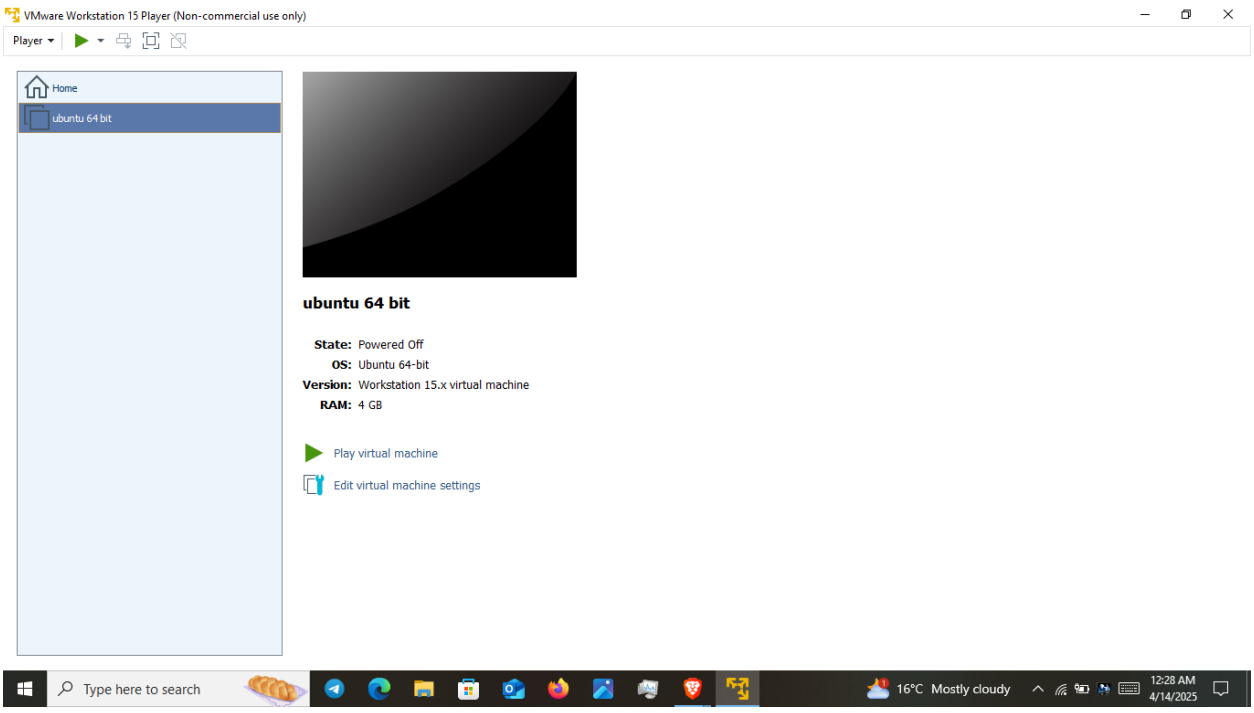

Image 2.4 palying or power on the virtual machine.

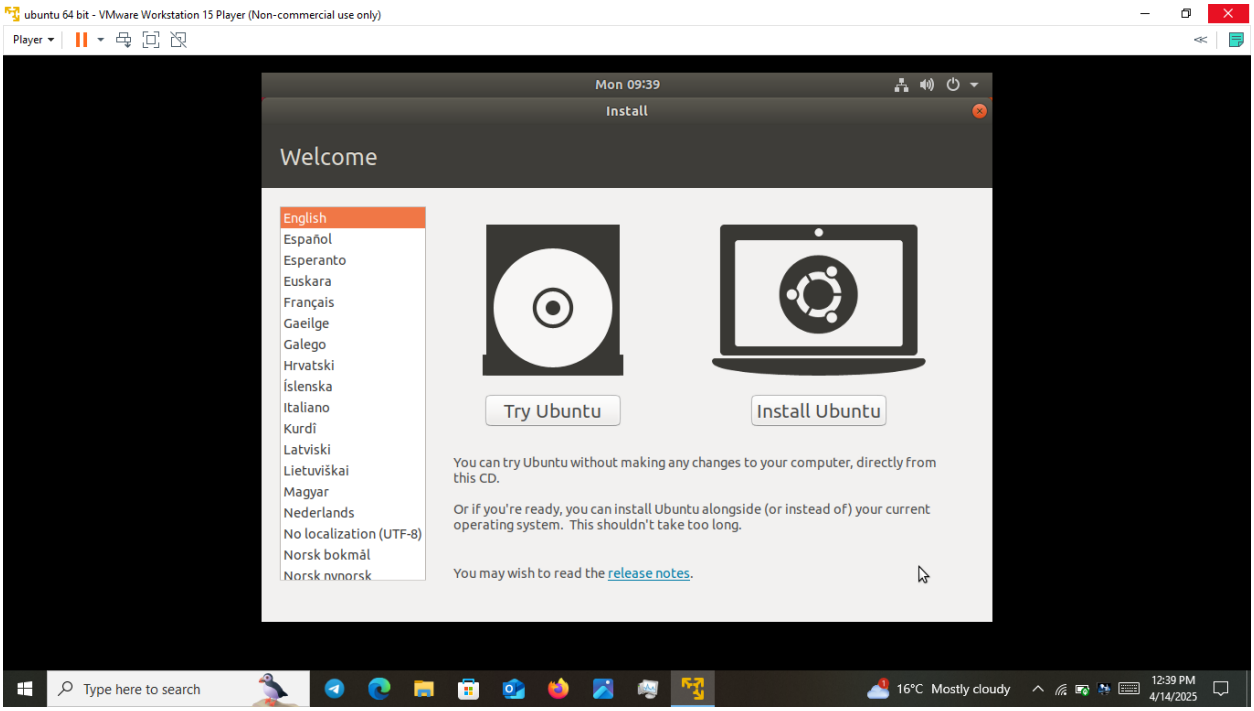

Image 2.5 chooseing language.

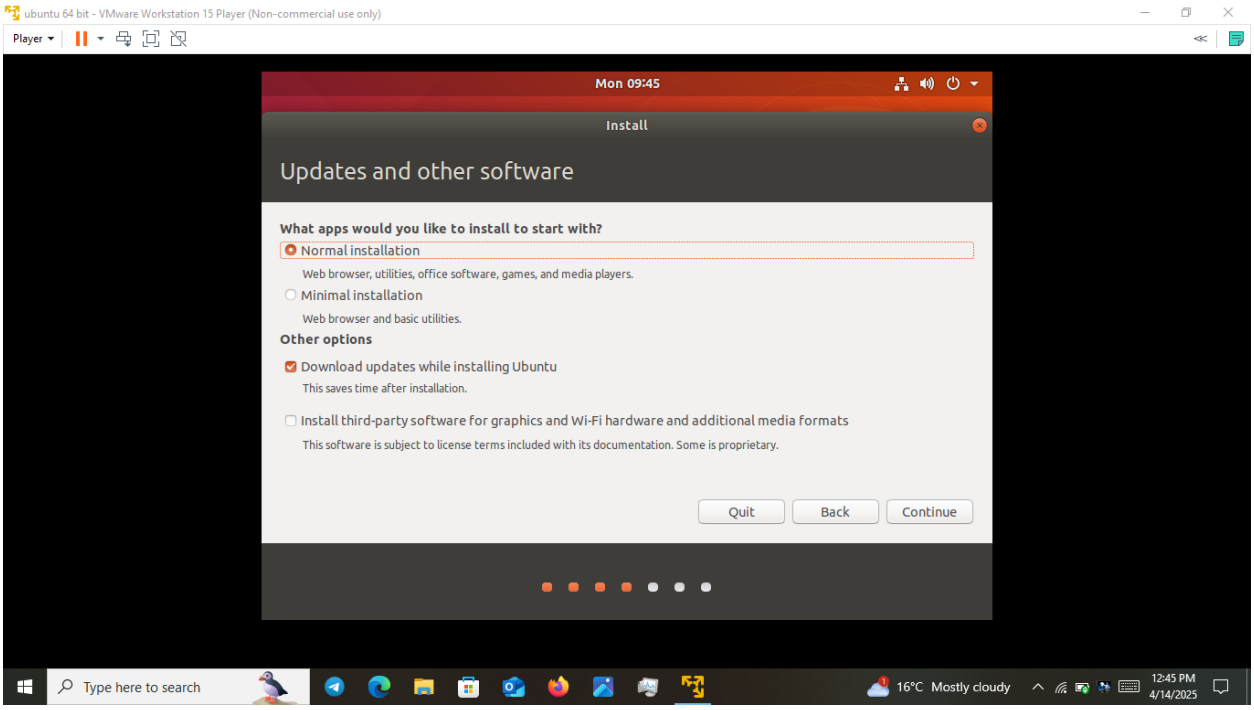

Image 2.6 following some process.

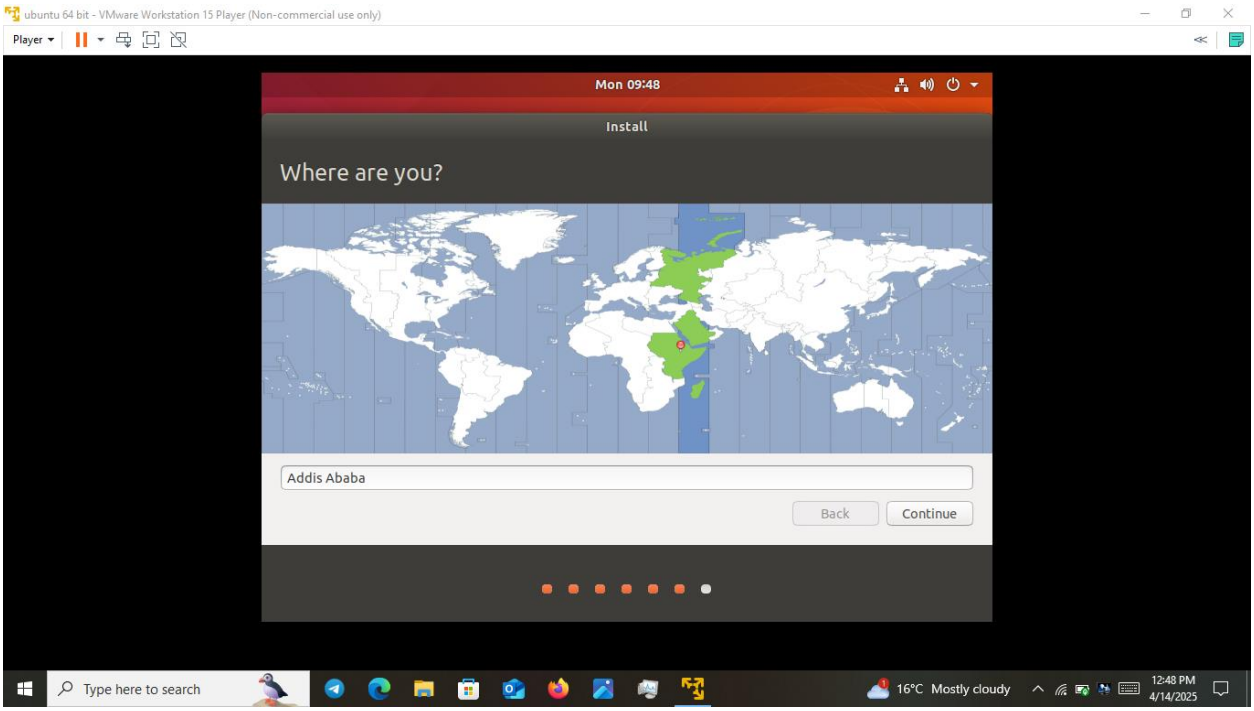

Image 2.7 seting address and time time zone.

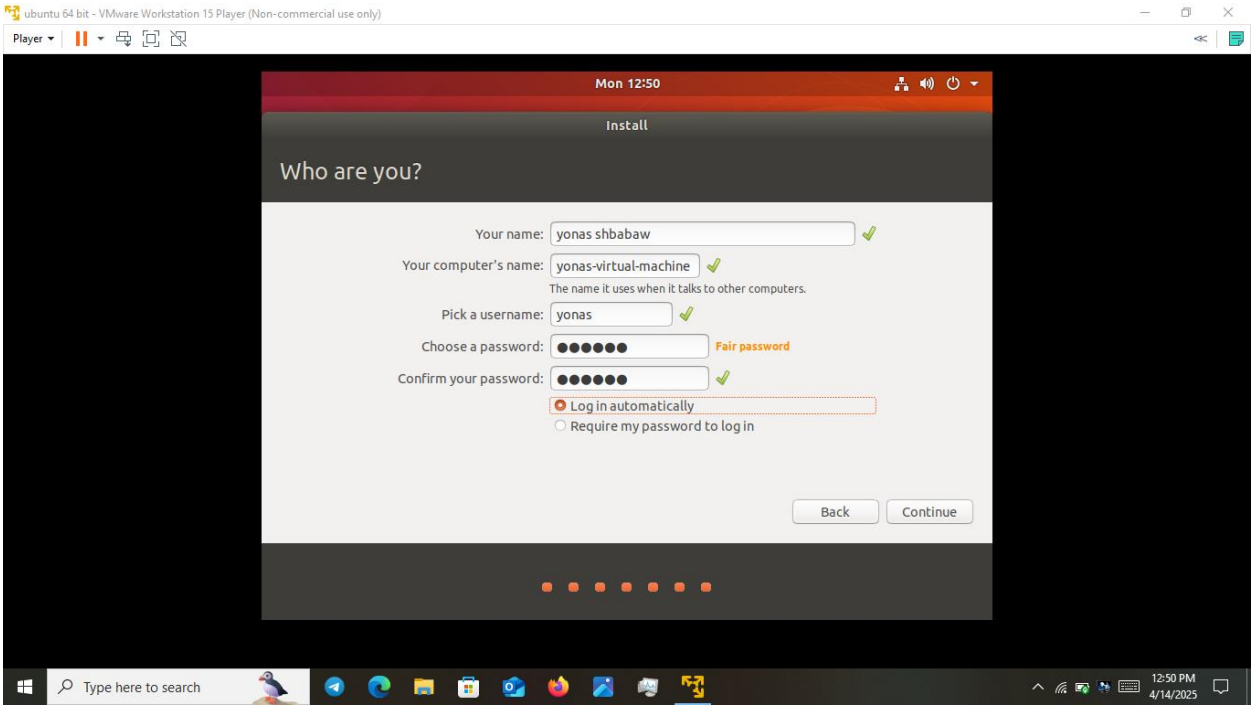

Image 2.8 creating user account using my full name and password.

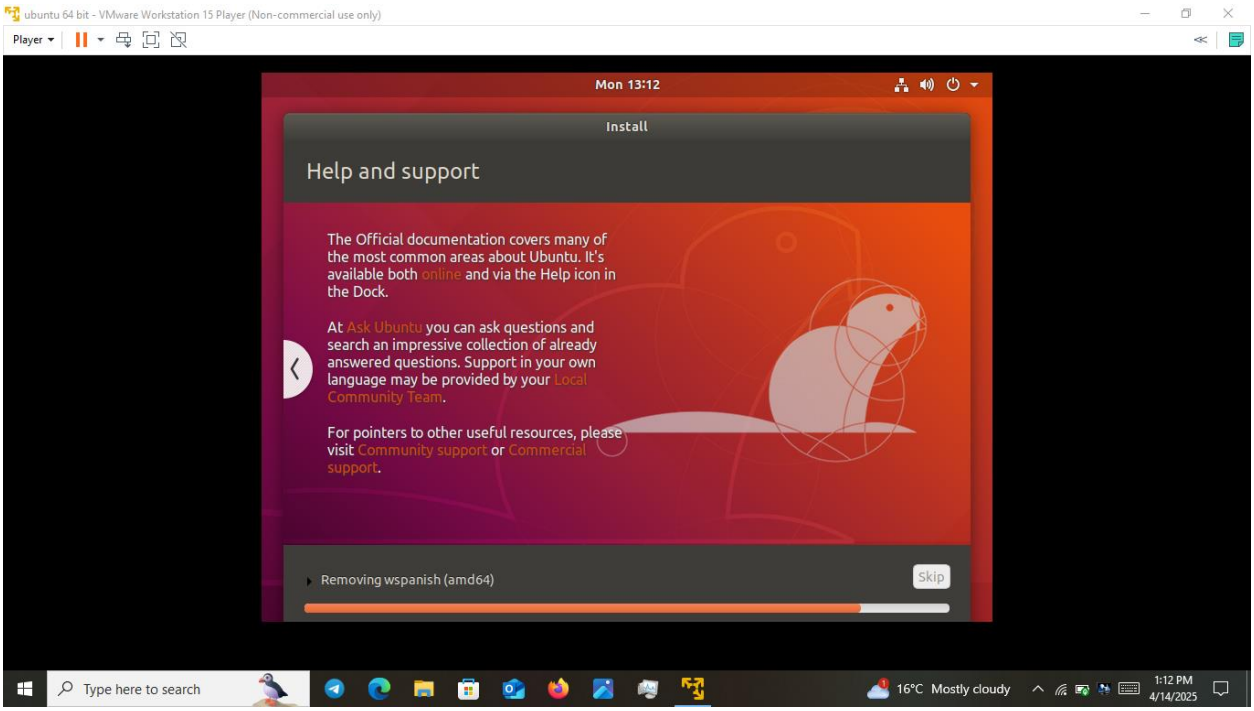

Image 2.9 waiting for the installation to complete.

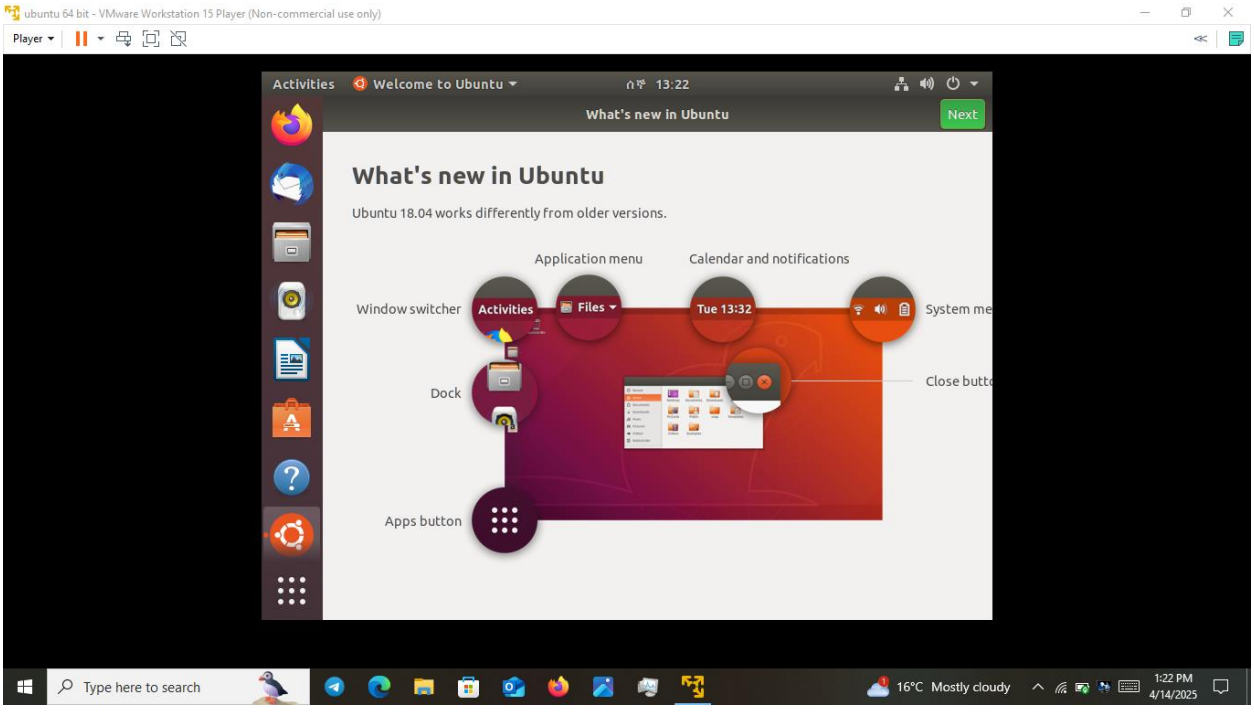

Image 3.1 interface of ubuntu18 after restarting the virtual machine.

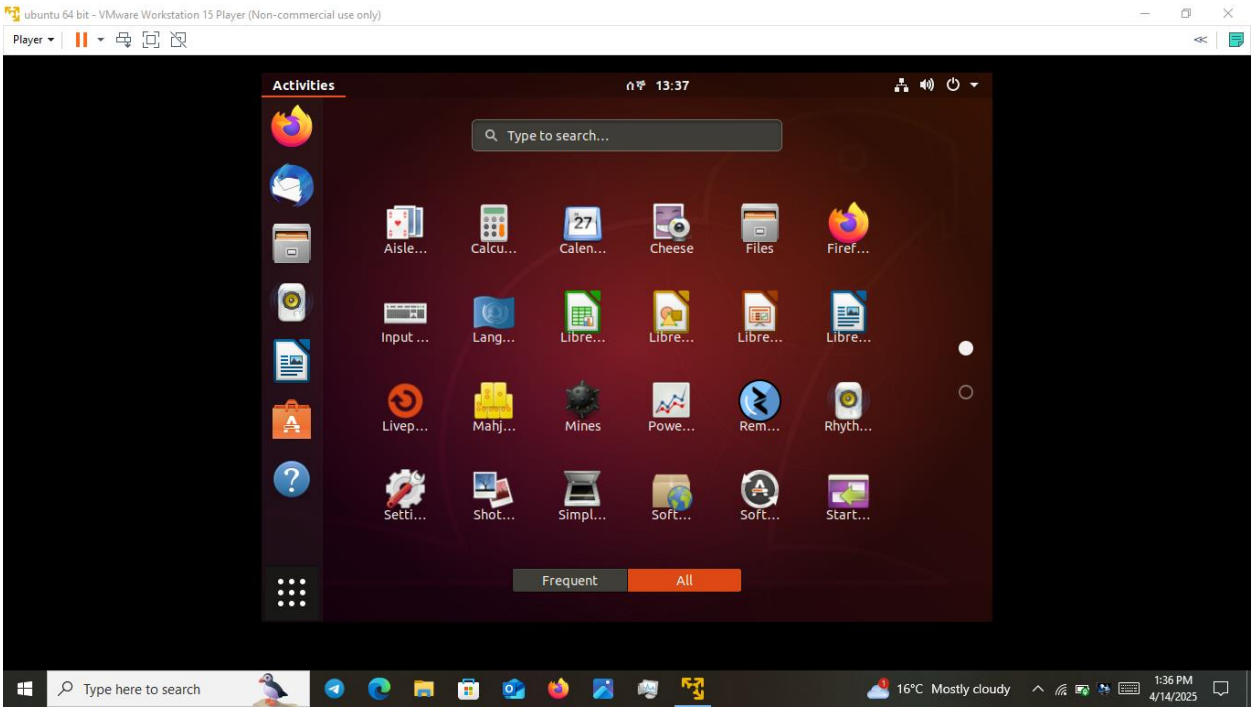

Image 3.2 the application inside ubuntu18.

Image 3.3 final out look of ubuntu18 after chooseing good background.

1.6 Issues or problem faced when istalling ubuntu18

When installing Ubuntu 18.04, we are encounter the following issues or problems:

1. Hardware Incompatibility:

- **Graphics Card Issues**: Older or less common graphics cards sometimes lack proper driver support in the default Ubuntu installation, resulting in display problems, flickering, or resolution issues. Nvidia cards were a frequent culprit, but that is less common now.

- **Wi-Fi Adapter Problems**: Some Wi-Fi adapters, especially newer models, might not have readily available drivers, preventing you from connecting to Wi-Fi during or after the installation.

2. Device/Credential Guard Conflict (with VMware and other virtualization)

- **Error Message:** "VMware Player and Device/Credential Guard are not compatible." This is a very common issue when running Ubuntu 18.04 in VMware (or other virtualization software like Hyper-V) on Windows.

- **Cause**: Device Guard and Credential Guard are Windows security features that conflict with virtualization software

3. Secure Boot Interference:

- **Installation Failure**: Secure Boot, a security feature in computers, can sometimes prevent Ubuntu from booting or installing correctly.

4. Low Disk Space:

- **Installation Failure or Performance Issues**: If you don't allocate enough disk space to the virtual machine or partition during installation, you may run out of space quickly, leading to installation failures or performance problems after installation. The recommended minimum is 20 GB, but 30-40GB is better.

- **Missing Features or Poor Performance**: Failing to install VMware Tools after installing Ubuntu in VMware can result in poor graphics performance, lack of shared folders, and other integration issues.

- **Installation Errors**: Sometimes, the VMware Tools installation process can encounter errors due to missing dependencies or permissions problems.

1.7 Solution for the problems

The solutions for those problems listed above are;

1. Resource Allocation:

- Solution: Ensure sufficient disk space (min. 20GB, rec. 30-40GB) and RAM (min. 2GB, rec. 4GB+) for the installation.

2. Hardware Conflicts:

- Solution:
    - Disable conflicting Windows features (e.g., Device/Credential Guard).
    - Disable Secure Boot in BIOS/UEFI (temporarily).
    - Update or install proprietary drivers after installation.

3. Network Issues:

- Solution: Verify network settings (NAT recommended in VMs). Check firewall rules.

4. Graphics Problems:

- Solution: Install or update graphics drivers. Install VMware Tools (if in a VM). Adjust display settings.

1.8 Filesystem support for ubutu18

Ubuntu 18.04 natively supports the following filesystems from the list you provided:

- **ext4**: This is the default filesystem used by Ubuntu 18.04 for the root partition (/) during installation.
- **FAT32:** Ubuntu 18.04 has read and write support for FAT32.
- **NTFS**: Ubuntu 18.04 has good read and write support for NTFS (using the ntfs-3g driver), which is often used for Windows partitions.

- **Btrfs:** Ubuntu 18.04 has support for Btrfs, although it's not the default and has historically had some caveats in terms of stability. Its use is possible, but not necessarily recommended for a beginner.

- **ZFS:** Ubuntu 18.04 included native support for ZFS.

It has limited or no native support for:

- **exFAT**: Ubuntu 18.04 can be easily configured to support exFAT. You typically need to install the exfat-fuse and exfat-utils packages.

- **HFS+:** Ubuntu 18.04 can read HFS+ filesystems and has limited write support (which may require additional steps to enable and can be unreliable). It's generally best to use it for read-only access.

- **APFS:** Ubuntu 18.04 has very limited (if any useful) support for APFS, which is Apple's newer filesystem. You'd likely need to rely on third-party tools, and support might be incomplete or unreliable.

Why are these filesystems supported?

- **ext4 (Fourth Extended Filesystem):**

  - It is a robust and well-established filesystem designed for Linux. It offers good performance, reliability, and features like journaling (which helps prevent data loss in case of crashes). Its a good general-purpose filesystem for most Linux use cases.

  - Reliability and Performance: Optimized for performance and data integrity.

  - Journaling: Reduces the risk of data corruption.

  - Wide Adoption: Universally supported across Linux distributions.

- **FAT32 (File Allocation Table 32-bit):**

  - Reason for Support: FAT32 is a very old and widely compatible filesystem. It's commonly used for USB drives, SD cards, and other portable storage devices. Supporting FAT32 allows Ubuntu to easily read and write data to these devices.

  - Compatibility: Highly compatible with various operating systems.

  - Portability: Commonly used on removable media.

- Limitations: File size limit of 4GB, maximum partition size of 2TB.

- **NTFS (New Technology File System):**

- Reason for Support: NTFS is the primary filesystem used by Windows. Because many users dual-boot Ubuntu with Windows or need to access files on Windows partitions, Ubuntu provides read and write support for NTFS.

- Windows Compatibility: Primary filesystem for Windows.

- Data Integrity: Offers journaling and other features for data protection.

- Security Features: Supports file permissions and access control lists.

- **Btrfs (B-tree file system):**

- Modern Features: Btrfs is a modern filesystem that offers advanced features like snapshots, copy-on-write, and built-in volume management. While supported, it's not the default due to potential stability issues and is more appropriate for experienced users.

- Snapshots: Easy creation of system backups.

- Copy-on-Write: Prevents data corruption.

- Volume Management: Simplifies storage management.

- **ZFS (Zettabyte File System)**:

- Advanced Features: ZFS is another advanced filesystem with features like copy-on-write, snapshots, and built-in RAID-like functionality. Ubuntu 18.04 included native ZFS support, making it easier to use ZFS for root partitions and other storage needs.

- Data Integrity: Built-in data protection.

- Scalability: Designed for very large storage systems.

- Volume Management: Integrated volume management.

- **exFAT (Extended File Allocation Table):**

- Reason for Support (with installation): exFAT is a newer filesystem designed for flash drives and SD cards.

- **HFS+ (Hierarchical File System Plus):**

- Reason for Limited Support: HFS+ is the filesystem used by older versions of macOS. Ubuntu provides limited read support for HFS+ to allow users to access files on macOS partitions or external drives. Write support is less reliable.

- macOS Compatibility: Filesystem for older macOS versions.

- Limited Write Support: Write support may be unstable

- **APFS (Apple File System):**

- Reason for Limited Support: APFS is the newer filesystem used by recent versions of macOS. Support for APFS in Linux is still under development and may be incomplete or unreliable. It's difficult to reliably mount and access APFS volumes from Ubuntu.

- Modern macOS: Filesystem for current macOS versions.

- Limited Linux Support: Experimental support only.

1.9 Advanteges and disadvantages of ubuntu18

here's are some advantages and disadvantages of using Ubuntu 18.04:

1.9.1 Advantages of Ubuntu 18.04 LTS:

- **Long Term Support (LTS):** Ubuntu 18.04 was an LTS release, meaning it received 5 years of security updates and maintenance from Canonical (the company behind Ubuntu). This provided stability and predictability.

- **Stability:** LTS releases prioritize stability over cutting-edge features, making them well-suited for production environments or for users who prefer a more predictable experience.

- **User-Friendly**: Ubuntu is known for being user-friendly, making it a good choice for beginners. The GNOME desktop environment (default in 18.04) is relatively intuitive.

- **Customization**: Ubuntu is highly customizable, allowing you to change the desktop environment, appearance, and other settings to suit your preferences..

- **GNOME Desktop Environment**: The GNOME desktop offered a modern and visually appealing interface.

- **Pre-Installed Tools**: Came with essential tools for everyday tasks, such as a web browser, office suite, and media player..

1.9.2 Disadvantages of Ubuntu 18.04 LTS:

- **End of Life:** As of April 2023, Ubuntu 18.04 has reached its end of life (EOL). This means it no longer receives security updates or maintenance from Canonical. Using an EOL operating system is a significant security risk.

- **Outdated Software:** Since it's an older release, the software packages available in the default repositories are also older. This might mean you're missing out on newer features or performance improvements.

- **Hardware Support Limitations**: While Ubuntu generally has good hardware support, newer hardware released after 18.04 might not be fully supported or might require manual driver installation.

- **Lack of Modern Features**: Compared to newer Ubuntu releases or other modern Linux distributions, Ubuntu 18.04 lacks some of the latest features and improvements.

In Summary:

While Ubuntu 18.04 was a solid and reliable operating system in its time, its end-of-life status makes it unsuitable for use in production or for anyone who values security. The primary disadvantage is the lack of security updates, which outweighs any advantages it might offer in terms of stability or familiarity.

2.1 Conclusion

Ubuntu 18.04 LTS (Bionic Beaver) was a significant and well-regarded Long Term Support release of the Ubuntu operating system. It offered a stable and user-friendly environment built upon the GNOME desktop, providing a solid foundation for both desktop and server deployments. Key advantages included its five-year support lifecycle, extensive software availability, strong community backing, and excellent hardware compatibility.

However, Ubuntu 18.04 reached its End of Life (EOL) in April 2023. This critical fact renders it unsuitable for production environments or any scenario where security

is a priority. The absence of ongoing security updates exposes systems to a growing range of vulnerabilities, making them increasingly susceptible to exploits.

2.2 Future outlook/recommendations

Given that Ubuntu 18.04 LTS reached its End of Life (EOL) in April 2023, the future outlook is straightforward: there is no future for Ubuntu 18.04 in terms of active use or development.

Recommendations:

1. Immediate Migration is Essential: The most urgent recommendation is to migrate away from Ubuntu 18.04 immediately. Continued use poses significant security risks due to the lack of security updates.

2. Choose a Supported Alternative: Select a currently supported Ubuntu release (e.g., 20.04 LTS or 22.04 LTS) or another actively maintained Linux distribution that meets your needs. Consider factors like:

3. Planning the Migration: A migration should involve a careful plan that includes:

- Backup: Create a full backup of your existing Ubuntu 18.04 systems before making any changes.
- Testing: Thoroughly test the new operating system and applications in a non-production environment before deploying it to live systems.
- Documentation: Document the migration process to ensure a smooth transition.
- Training: Provide training to users on the new operating system if necessary.

4. Focus on Modernization: Consider the migration as an opportunity to modernize your IT infrastructure and adopt newer technologies and practices.

In conclusion, the future of Ubuntu 18.04 is solely within the realm of historical reference. Active usage of Ubuntu 18.04 is strongly discouraged due to the critical security risks associated with running an unsupported operating system. The only viable path forward is to migrate to a supported alternative and ensure a secure and maintainable IT environment.

2.3 virtualization in modern operating system

virtualization in modern operating systems, covering what it is, why it's used, and how it works those are;

2.3.1 What is Virtualization:

Virtualization is a technology that allows you to run multiple instances of an operating system (or even different operating systems) on a single physical computer (host machine). Each instance runs within its own isolated environment, called a virtual machine (VM). It is the creation of a virtual — rather than actual — version of something, such as an operating system, a server, a storage device or network resources.

2.3.2 Why is Virtualization Used

- Resource Optimization: Efficiently utilize hardware resources. Instead of having underutilized servers, virtualization allows you to consolidate multiple workloads onto a single, powerful machine.
- Cost Savings: Reduces hardware costs, power consumption, and cooling requirements.
- Isolation and Security: VMs are isolated from each other, preventing conflicts and enhancing security. If one VM is compromised, it doesn't necessarily affect the others.
- Testing and Development: Quickly create and test different operating systems and application configurations without affecting the host system.

2.3.3 How Does Virtualization Work

Virtualization works by inserting a layer of software, called a hypervisor (or Virtual Machine Monitor - VMM), between the physical hardware and the operating systems. The hypervisor manages the hardware resources and allocates them to the VMs. There are two main types of hypervisors:

- **Type 1 (Bare-Metal)**: Runs directly on the hardware. Examples include VMware ESXi, Citrix Hypervisor (formerly XenServer), and Microsoft Hyper-V Server (in some configurations). The hypervisor acts as the operating system.

- **Type 2 (Hosted):** Runs on top of an existing operating system. Examples include VMware Workstation, VMware Player, Oracle VirtualBox, and Parallels Desktop. The hypervisor is a software application.

Here's a simplified breakdown of the process:

1. Hardware Abstraction: The hypervisor abstracts the underlying hardware resources (CPU, memory, storage, network) and presents them as virtual resources to the VMs.

2. Resource Allocation: The hypervisor allocates a portion of the physical hardware resources to each VM. The amount of resources allocated can be configured based on the needs of the VM.

3. Isolation: The hypervisor ensures that each VM runs in its own isolated environment, preventing interference from other VMs.

4. Guest Operating System: Each VM runs its own guest operating system (e.g., Windows, Linux, macOS), which interacts with the virtualized hardware resources as if they were real.

In essence, virtualization allows us to create virtual versions of physical hardware, enabling you to run multiple operating systems and applications simultaneously on a single machine, optimizing resource utilization, improving security, and simplifying management.