**Lab Assignment 1: Installation and Study of Ubuntu OS**

**1. Introduction**

Linux is an open-source, Unix-like operating system kernel that serves as the foundation for various distributions (distros). One of the most popular Linux-based distros is **Ubuntu**, which is developed and maintained by **Canonical Ltd.** Ubuntu was first released in **2004** and is based on **Debian**, another widely used Linux distribution. It is known for its user-friendly interface, security, and extensive community support.

Ubuntu has undergone multiple updates and improvements over the years, with **Long-Term Support (LTS) versions** being released every two years, ensuring stability and security for enterprise and personal use. Some of the recent Ubuntu versions include:

* **Ubuntu 22.04 LTS (Jammy Jellyfish)** – Released in April 2022
* **Ubuntu 23.10 (Mantic Minotaur)** – Released in October 2023
* **Upcoming Ubuntu 24.04 LTS (Noble Numbat)** – Expected in April 2024

Ubuntu is widely used for personal computing, servers, cloud environments, and even IoT (Internet of Things) applications due to its stability, security, and open-source nature.

**2. Features of Ubuntu**

Ubuntu is a powerful and flexible operating system that offers numerous features, making it a popular choice among users. Some of its key features include:

**1. Open-Source and Free**

Ubuntu is completely free to use, modify, and distribute. Since it is open-source, users can access the source code and customize it according to their needs.

**2. User-Friendly Interface**

Ubuntu provides a clean and modern **GNOME Desktop Environment**, making it easy for users to navigate. It also supports various other desktop environments like KDE (Kubuntu), Xfce (Xubuntu), and LXQt (Lubuntu).

**3. Security and Stability**

Ubuntu is highly secure due to built-in firewall protection, regular security updates, and a strong permission system. The LTS versions receive security updates for **five years**, ensuring long-term stability.

**4. Software and Package Management**

Ubuntu uses the **APT (Advanced Package Tool)** and the **Snap package manager** for easy software installation and updates. It has access to thousands of free applications through the **Ubuntu Software Center** and repositories.

**5. Lightweight and Efficient**

Unlike Windows, Ubuntu runs efficiently on both high-end and low-end hardware, making it an excellent choice for older computers and servers.

**6. Customization and Flexibility**

Users can fully customize Ubuntu, including themes, icons, desktop environments, and system behavior. It also supports multiple workspaces for better productivity.

**7. Terminal and Command-Line Power**

Ubuntu provides a powerful **command-line interface (CLI)**, allowing users to perform various tasks efficiently. It supports **Bash scripting**, automation, and system management.

**8. Regular Updates and Community Support**

Canonical releases updates regularly, with a dedicated **Ubuntu community** that provides extensive documentation, forums, and online support.

**9. Compatibility and Multiplatform Support**

Ubuntu supports various architectures, including **x86, x64, ARM, and PowerPC**, making it usable on desktops, laptops, servers, and cloud platforms.

**3. Differences Between Ubuntu and Windows OS**

Ubuntu and Windows are two fundamentally different operating systems, each with unique features and advantages. Here’s a detailed comparison:

**1. Open-Source vs Proprietary**

Ubuntu is **open-source and free**, allowing users to modify and distribute it. Windows is **proprietary and paid**, with licensing restrictions.

**2. Security and Privacy**

Ubuntu is inherently more secure due to **strong user permissions, lack of viruses, and open-source transparency**. Windows is more vulnerable to malware and requires third-party antivirus software.

**3. Performance and System Requirements**

Ubuntu is **lightweight and efficient**, running smoothly on both old and new hardware. Windows is more resource-intensive, often requiring higher RAM and CPU power.

**4. Software Availability**

Windows has a vast library of software, especially for gaming and professional applications (e.g., Adobe, Microsoft Office). Ubuntu has **free and open-source alternatives** (e.g., LibreOffice, GIMP) but may not support some proprietary software natively.

**5. Customization and User Control**

Ubuntu offers **extensive customization options**, from UI changes to modifying system behavior. Windows has **limited customization**, mostly restricted to themes and wallpapers.

**6. Command-Line Usage**

Ubuntu heavily relies on **the terminal (CLI)**, making it powerful for developers and system administrators. Windows focuses more on a **Graphical User Interface (GUI)** but includes the PowerShell and Command Prompt.

**7. Updates and System Maintenance**

Ubuntu updates are **lightweight, faster, and don’t force reboots**. Windows updates are **often large, slow, and may require system restarts**.

**8. File System and Structure**

Ubuntu uses file systems like **EXT4, XFS, and Btrfs**, with a structured root directory. Windows primarily uses **NTFS** and has a **drive-letter-based** file system (C:, D:).

**9. Usage and Target Audience**

Ubuntu is preferred by **developers, programmers, and servers** due to its flexibility and security. Windows is **more user-friendly and widely used** in offices, gaming, and general computing.

**Conclusion**

Ubuntu is a powerful and secure operating system, offering a free alternative to Windows with excellent customization, stability, and performance. It is widely used in development, servers, and cloud computing due to its efficiency and open-source nature. Installing Ubuntu on a virtual machine like **VMware or VirtualBox** allows users to explore its features without affecting their primary OS. By learning Ubuntu, users can gain valuable knowledge of Linux-based systems and enhance their technical skills.

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