Lab Assignment 1: Study of Ubuntu OS

**Introduction**

* Linux

Linux is an open-source, Unix-like operating system kernel that was initially developed by Linus Torvalds in 1991. It is widely used in various computing environments, including personal computers, servers, mobile devices, and embedded systems. Unlike proprietary operating systems such as Windows, Linux is free to use, modify, and distribute. Due to its stability, security, and performance, Linux is the foundation for many popular operating systems, including Ubuntu.

* Ubuntu

Ubuntu is a Linux-based operating system developed and maintained by Canonical Ltd. It is one of the most widely used Linux distributions, designed

to provide a user-friendly and secure computing experience. Ubuntu is built on Debian, another popular Linux distribution, and it comes with a pre-installed set of applications, including web browsers, office suites, and multimedia tools. Ubuntu aims to offer an open-source alternative to Windows and macOS while being highly customizable and efficient.

# History of Ubuntu

* **2004**: Mark Shuttleworth and Canonical Ltd. released the first version of Ubuntu, called Ubuntu 4.10 (Warty Warthog). It was designed to be more user-friendly than traditional Linux distributions.
* **2006**: Ubuntu introduced Long-Term Support (LTS) versions, providing five years of support and updates for enterprise and personal use.
* **2011**: Ubuntu switched from the GNOME desktop to the Unity interface, aiming to improve usability.
* **2017**: Canonical reverted to GNOME as the default desktop environment for Ubuntu 17.10 (Artful Aardvark).
* **Present**: Ubuntu continues to evolve with a strong focus on security, cloud computing, and enterprise applications, making it one of the most preferred operating systems worldwide.

# Ubuntu Versions

* Ubuntu follows a structured release cycle with two main types of versions:
* **Long-Term Support (LTS) Releases**: Released every two years and supported for five years. Examples include Ubuntu 20.04 LTS (Focal Fossa) and Ubuntu 22.04 LTS (Jammy Jellyfish).
* **Interim Releases**: Released every six months with the latest features but only supported for nine months. Examples include Ubuntu 23.04 (Lunar Lobster).
* Ubuntu is available in different flavors, such as:
* **Ubuntu Desktop** – Designed for personal computers and laptops.
* **Ubuntu Server** – Optimized for server environments.
* **Ubuntu Core** – A minimal version used in IoT and embedded systems.
* **Ubuntu Studio, Lubuntu, Kubuntu, and Xubuntu** – Variants with different desktop environments and purposes.

Features of Ubuntu

* **Free and Open Source**: Ubuntu is completely free to use and modify, making it a cost-effective alternative to proprietary operating systems.
* **Security**: It includes built-in security features such as automatic updates, firewall configuration, and encryption.
* **User-Friendly Interface**: The GNOME desktop environment provides a clean and intuitive user experience.
* **Regular Updates**: Ubuntu follows a release cycle, offering both Long-Term Support (LTS) versions (every two years) and interim releases.
* **Software Repository**: Ubuntu provides access to thousands of applications through the APT package manager and Snap Store.
* **Customization**: Users can modify and personalize the system extensively, from the desktop environment to kernel-level configurations.
* **Compatibility**: It supports a wide range of hardware, making it suitable for desktops, laptops, and servers.
* **Lightweight and Performance-Oriented**: Unlike Windows, Ubuntu runs efficiently on older hardware with lower system requirements.
* **Multi-User Support**: Ubuntu allows multiple users to work on the same system without interfering with each other’s data.
* **Built-in Virtualization**: Ubuntu supports tools like KVM (Kernel-based Virtual Machine) for running virtual environments efficiently.
* **Cloud Integration**: Ubuntu is widely used in cloud computing and supports cloud services like OpenStack.
* **Extensive Driver Support**: The OS includes a broad range of drivers, allowing seamless integration with hardware components.
* **Live Boot Feature**: Users can run Ubuntu directly from a USB drive without installing it on their system.
* **Energy Efficiency**: Ubuntu optimizes power consumption, making it ideal for laptops and energy-conscious users.
* **Gaming Support**: With Steam for Linux and Proton compatibility, Ubuntu is increasingly supporting gaming experiences.

Difference Between Ubuntu and Windows OS

Ubuntu and Windows are two widely used operating systems, but they differ

significantly in terms of design, usability, security, performance, and

customization. Below is a detailed comparison:

* 1. **General Overview**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **Developer** | Developed and maintained by Canonical Ltd. | Developed and maintained by Microsoft Corporation. |
| **Source Model** | Open-source (free to use, modify, and distribute). | Proprietary (closed-source, requires a license for full functionality). |
| **Default User Interface (UI)** | Uses GNOME as the default desktop environment (can be changed to KDE, XFCE, etc.). | Uses the Windows Shell and Graphical User Interface (GUI). |
| **Kernel** | Linux Kernel. | Windows NT Kernel. |
| **Target Audience** | Developers, IT professionals, and Linux enthusiasts. | General consumers, businesses, and gamers. |

* 1. **Cost and Licensing**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **Cost** | Free and open-source. | Requires purchasing a license (Windows Home, Pro, Enterprise, etc.). |
| **License Type** | GNU General Public License (GPL). | Proprietary Microsoft License. |
| **Software Cost** | Most applications are free and open-source. | Many applications are paid (Microsoft Office, Adobe Suite, etc.). |

* 1. **User Interface & Customization**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **Customization** | Highly customizable (themes, desktop environments, window managers). | Limited customization without third-party software. |
| **Desktop Environment** | GNOME by default (also supports KDE, XFCE, LXDE, MATE, etc.). | Fixed Windows UI with minimal customization. |
| **Ease of Use** | Requires some learning curve, especially for new Linux users. | User-friendly, designed for ease of use. |

* 1. **Performance & Resource Usage**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **System Requirements** | Lighter on system resources; runs well on old and new hardware. | Heavier on system resources; needs more RAM and CPU power. |
| **Speed & Efficiency** | Faster boot time and better memory management. | Slower boot times, especially with many background processes. |
| **Background Processes** | Fewer background processes, leading to better performance. | Many background processes and services, which can slow down the system. |

* 1. **Security & Privacy**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **Security** | More secure due to Linux’s permissions and user management. | More vulnerable to malware and viruses. |
| **User Privileges** | Requires root (sudo) access for administrative tasks. | Many users operate as administrators by default. |
| **Virus Threats** | Very few viruses target Linux. | High number of malware and virus attacks. |
| **Updates & Patching** | Regular security updates, often faster response to threats. | Patches are released periodically (Patch Tuesday). |
| **Privacy** | No data tracking; respects user privacy. | Collects user data for analytics and personalization. |

* 1. **Software & Compatibility**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **Software Availability** | Open-source software like LibreOffice, GIMP, and VLC. | Proprietary software like Microsoft Office, Photoshop, and AutoCAD. |
| **Compatibility** | Limited support for Windows applications (can use Wine or virtual machines). | Supports almost all commercial and enterprise software. |
| **Gaming** | Fewer games natively supported; Steam’s Proton helps. | Supports all major gaming platforms (Steam, Epic Games, etc.). |
| **Drivers** | Some drivers require manual installation. | Most drivers are included and updated automatically. |

* 1. **Updates & Support**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **Update Frequency** | Regular updates; LTS (Long-Term Support) versions provide 5 years of updates. | Major updates twice a year; security updates monthly. |
| **User Control Over Updates** | Users have full control over updates. | Forced updates in Windows 10 and 11. |
| **Community & Support** | Strong community support; online forums and documentation. | Official Microsoft support; paid enterprise support. |

* 1. **File System & Compatibility**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **Default File System** | Uses ext4 (also supports NTFS, FAT32, XFS, Btrfs). | Uses NTFS (also supports FAT32, exFAT). |
| **File Organization** | Hierarchical directory structure (/, /home, /etc). | Uses drive letters (C:, D:, etc.). |
| **Compatibility with Other OS** | Can read NTFS and FAT32 drives. | Cannot read ext4 without third-party software. |

**9. Command Line & Terminal**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **Command Line Interface (CLI)** | Bash shell (default), supports Zsh, Fish, and others. | Command Prompt (cmd) and PowerShell. |
| **Scripting** | Bash scripting, Python, Perl, etc. | Batch scripting, PowerShell scripting. |
| **Usage** | Preferred by developers, system admins, and power users. | Used mostly for troubleshooting and automation. |

**10. Use Cases**

|  |  |  |
| --- | --- | --- |
| **Feature** | **Ubuntu** | **Windows** |
| **Best For** | Developers, programmers, system administrators, security professionals. | General users, businesses, gamers, enterprise environments. |
| **Enterprise Usage** | Preferred in cloud computing, web servers, and research. | Used in corporate offices, gaming, and commercial software development. |

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  | |  |  |
|  |  |  |
|  |  |  |
|  |  |  |