4ITRC2 Operating System Lab

Lab Assignment 1

Linux

Linux is an open-source operating system kernel first developed by Linus Torvalds in 1991. It is based on UNIX principles and has since evolved into a powerful, secure, and highly customizable OS. Various distributions (distros) of Linux cater to different user needs, from personal computing to enterprise servers and embedded systems.

Brief History of Linux

- **1991**: Linus Torvalds develops the first Linux kernel as a hobby project.
- **1992**: Linux adopts the GNU General Public License (GPL), allowing open-source contributions.
- **1993–2000**: Various Linux distributions emerge, including Red Hat, Debian, and SUSE.
- **2000s**: Linux gains popularity in enterprise environments (e.g., servers, cloud computing).
- **Present**: Linux is widely used in supercomputers, IoT, Android devices, and even AI-driven applications.

Ubuntu

Ubuntu is one of the most popular Linux distributions, developed by Canonical Ltd. It is based on **Debian** and focuses on user-friendliness, stability, and security. Ubuntu is widely used by beginners, professionals, and developers for desktop and server applications.

History of Ubuntu

- **2004**: Ubuntu was introduced by Mark Shuttleworth and Canonical Ltd.
- **2006**: Ubuntu Server Edition was launched.
- **2010**: The Unity desktop environment was introduced (later replaced by GNOME in 2017).
- **2020s**: Ubuntu becomes the preferred OS for cloud computing, AI development, and IoT.

Ubuntu Versions

Ubuntu follows a **six-month release cycle** with two main types of releases:

1. **Regular Releases** (every six months, supported for nine months)

2. **Long-Term Support (LTS) Releases** (every two years, supported for five years)

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
- **Ubuntu 24.04 LTS ("Noble Numbat")** – Expected in April 2024

LTS versions are recommended for stability, while regular releases offer newer features.

Features of Ubuntu

Ubuntu is known for its user-friendly interface, security, and strong community support. Below are some of its key features:

1. Open-Source and Free

Ubuntu is completely free to use, modify, and distribute, making it accessible for individuals and businesses.

2. User-Friendly Interface

- Uses the **GNOME** desktop environment (since Ubuntu 17.10) for a modern and intuitive UI.
- Customizable interface with multiple desktop environments available (KDE, XFCE, etc.).

3. Regular Updates and LTS Support

- Ubuntu follows a **six-month release cycle** for new features.
- **Long-Term Support (LTS) versions** provide stability and security updates for **five years**.

4. Strong Security and Privacy

- Built-in **firewall (UFW)** and security updates.
- **AppArmor** security module for application isolation.
- **Minimal data tracking** compared to proprietary OS like Windows or macOS.

5. Software and Package Management

- Uses **APT (Advanced Package Tool)** to install and manage software.
- **Snap and Flatpak** support for easy software installation.
- Access to thousands of applications via the **Ubuntu Software Center**.

6. High Performance and Efficiency

- Lightweight and optimized for speed, making it ideal for old and new hardware.
- Low system resource consumption compared to Windows.

7. Terminal and Command-Line Power

- Comes with a powerful **Bash shell** for advanced users.
- Supports automation, scripting, and server management.

8. Compatibility and Versatility

- Runs on various architectures: **x86, ARM, PowerPC**, etc.
- Supports **Windows applications via Wine** and virtualization with VirtualBox or KVM.

9. Cloud and Server Capabilities

- Ubuntu Server is widely used in cloud computing, with support for **AWS, Azure, and Google Cloud**.
- Includes **LXD/LXC containers** and **Docker** support for virtualization.

10. Community Support and Documentation

- Large, active community providing free support via **Ubuntu forums** and Ask Ubuntu.
- Extensive official documentation for troubleshooting and learning.

Difference Between Ubuntu and Windows

Ubuntu and Windows are two widely used operating systems, but they differ significantly in terms of architecture, usability, security, and customization. Here's a comparison:

Feature	Ubuntu	Windows
Cost	Free and open-source	Paid (Windows 10/11 require a license)
Source Code	Open-source (Linux-based)	Closed-source (proprietary)
User Interface	GNOME (default), but customizable (KDE, XFCE, etc.)	Fixed UI with limited customization
Security	More secure, fewer viruses, built-in firewall (UFW), AppArmor	More vulnerable to malware and viruses
Software Installation	Uses APT, Snap, and Flatpak package managers	Uses .exe and .msi installers via Microsoft Store or third-party websites
Hardware Requirements	Lightweight, runs on older hardware	Higher system requirements
Performance	Faster and more efficient, especially on older PCs	Can slow down over time due to bloatware and updates
Customization	Highly customizable (themes, UI, desktop environments)	Limited customization (only wallpapers, themes)
Gaming Support	Limited, but improving with Steam Proton, Wine, and Lutris	Excellent gaming support with native DirectX
Software Compatibility	Mostly open-source apps, but can run Windows apps via Wine	Supports most commercial software (MS Office, Adobe Suite)
Command Line	Powerful terminal (Bash, Zsh) for automation and scripting	Command Prompt (CMD) and PowerShell, but less powerful
File System	Ext4, XFS, Btrfs (does not support NTFS natively)	NTFS, FAT32, exFAT
Updates and Stability	Regular updates (LTS for stability, rolling releases for latest features)	Frequent updates, sometimes causing performance issues
Target Audience	Developers, IT professionals, ethical hackers, and Linux enthusiasts	General users, businesses, and gamers