<u>NATIONAL UNIVERSITY OF MODERN LANGUAGES</u>

<u>ISLAMABAD</u>

Operating System (LAB Task 1)

Submitted to

Dr messum raza

Submitted By

Junaid Asif

(BSAI-144)

Adeel Naeem

(BSAI-146)

Syed Qasim Ali

(BSAI-161)

Submission Date: October 13, 2024

a. What is the file system used by Linux?

A file system is a method used to store and organize files on storage devices. Linux supports various file systems, some of which are tailored to different needs. Key file systems used by Linux include:

1. **ext4 (Fourth Extended Filesystem):**

   o **Most commonly used** file system in modern Linux distributions.

   o Offers improvements over its predecessors (ext2, ext3) in terms of performance, reliability, and scalability.

   o Features: journaling, support for large file sizes (up to 16 TB), and larger volumes (up to 1 exabyte).

2. **ext3 (Third Extended Filesystem):**

   o An older journaling file system, now largely replaced by ext4.

   o Provides data integrity by recording changes before they are applied to the file system.

3. **Btrfs (B-Tree File System):**

   o A modern file system designed for scalability and advanced features like snapshots, sub-volumes, and checksumming for data integrity.

   o Ideal for large-scale storage systems.

4. **XFS:**

   o High-performance journaling file system designed for handling large files efficiently.

   o Commonly used in enterprise environments.

5. **ZFS:**

   o Known for its advanced features, including snapshots, replication, and high data integrity.

   o Popular in server environments and file servers.

6. **Other File Systems:**

   o **FAT32, exFAT, and NTFS:** Used for compatibility with Windows systems.

- **ReiserFS:** An older file system designed for small files and fast access (less commonly used today).

b. Name two types of boot loaders available.

A bootloader is a small program responsible for initializing the system during boot and loading the operating system kernel into memory. Common Linux bootloaders include:

1. **GRUB (GRand Unified Bootloader):**

   - **Most widely used bootloader** in Linux distributions.

   - Supports booting multiple operating systems and kernels.

   - Features a command-line interface and configuration files (e.g., /boot/grub/grub.cfg).

   - Capabilities:

     - Booting from various file systems and disk partitions.

     - Graphical menus for selecting operating systems.

     - Chain-loading for booting other bootloaders.

2. **LILO (Linux Loader):**

   - An older bootloader, now largely replaced by GRUB.

   - Simpler and less flexible compared to GRUB.

   - Does not support dynamic configuration (requires manual reconfiguration after changes).

   - Still used in some legacy systems.

3. **Other Boot Loaders:**

   - **Syslinux:** Lightweight bootloader for embedded systems.

   - **systemd-boot:** A modern bootloader that integrates well with the systemd init system.

c. What are the names of partitions created for Linux?

Linux requires specific partitions to function effectively. Commonly used partitions include:

1. **Root Partition (/):**

   o Contains the core operating system files, including binaries, libraries, configuration files, and system utilities.

   o Essential for booting and running the Linux OS.

2. **Swap Partition:**

   o Used for virtual memory to extend the system's RAM.

   o The system swaps out inactive processes to the swap partition when physical memory is full.

   o Recommended size:

     ▪ Equal to the size of RAM for systems with less than 4 GB RAM.

     ▪ Half the size of RAM for systems with larger RAM.

3. **Optional Partitions:**

   o **/home:** Stores user data (e.g., documents, downloads, and settings).

   o **/boot:** Contains bootloader files, kernels, and initial RAM disk images.

   o **/var:** Stores variable data like logs, cache, and spool files.

   o **/tmp:** Temporary files used by applications.

   o **/usr:** Stores user programs and libraries.

4. **Special Partitions:**

   o **EFI System Partition (ESP):** Required for UEFI systems, used to store bootloaders and configuration files.

   o **/data:** A custom partition for storing data files or specific application needs.