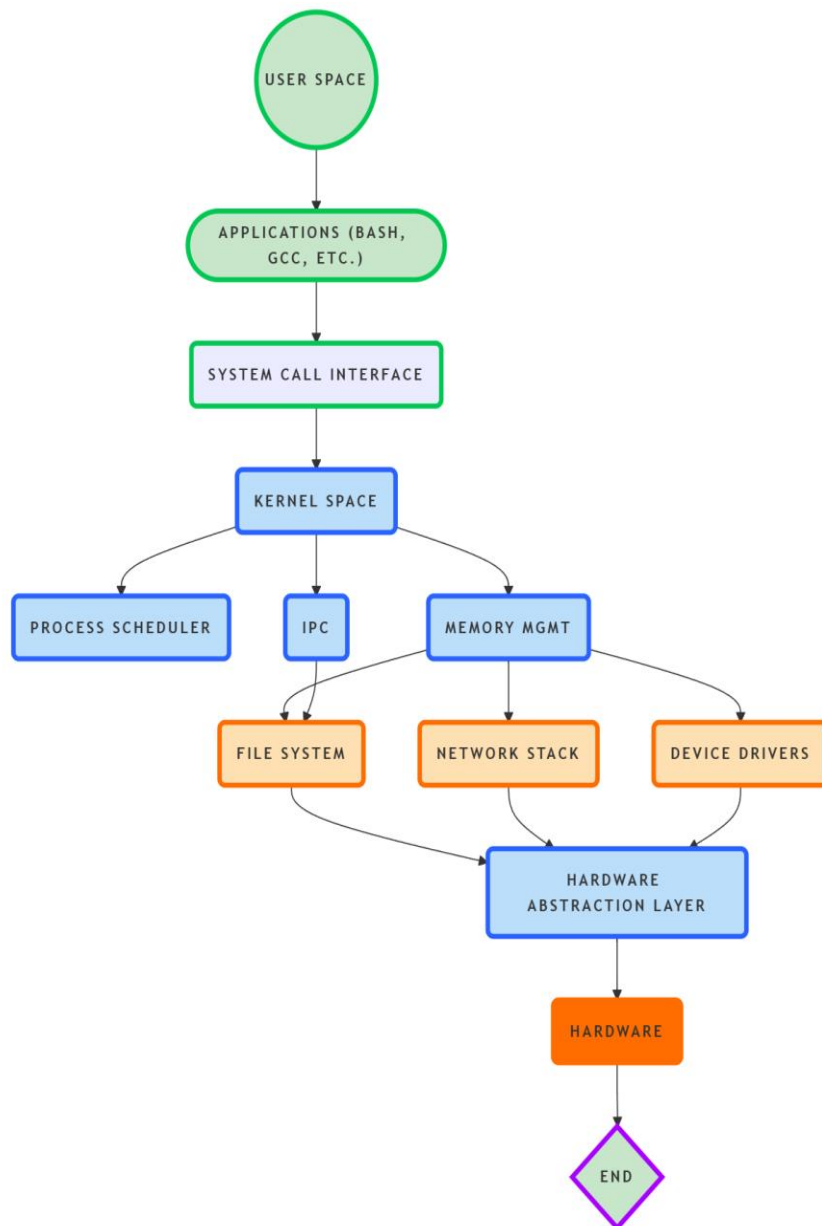


Task 1

Kernel Architecture Diagram - Draw a detailed diagram of the Linux kernel architecture. Label and write a short description (2-3 sentences) for each major component like Scheduler, File System, Network Stack, etc.

Flow Diagram –



Conceptual diagram of the Linux kernel architecture



Key Components Explained:

1. System Call Interface

The gateway between user applications and kernel services, providing controlled access to hardware/resources via ~400 syscalls.

2. Process Scheduler

Manages CPU time allocation using algorithms like CFS (Completely Fair Scheduler), ensuring multitasking and process prioritization.

3. Memory Management

Handles virtual memory, paging, swapping, and memory allocation via buddy system and slab allocator.

4. Virtual File System (VFS)

Abstraction layer that unifies access to different filesystems (Ext4, NTFS, etc.) through common interfaces.

5. Network Stack

Implements TCP/IP protocols, sockets, firewalls (netfilter), and network device drivers for communication.

6. Device Drivers

Kernel modules that interface with hardware devices (storage, USB, GPU, etc.) through standardized APIs.

7. IPC (Inter-Process Communication)

Mechanisms like pipes, shared memory, and message queues for process coordination.

8. Security Modules

Framework for mandatory access control (e.g., SELinux) and capability-based security.

9. Arch-Specific Code

Low-level hardware-dependent code for different CPU architectures (x86, ARM, etc.).