1 Background of UNIX Operating System

Before presenting the UNIX operating system, we describe the fundamental purpose of operating systems, different types of operating systems, and which type of operating systems UNIX belongs to. Then we discuss the development history of the UNIX, along with introducing different types of the UNIX.

1.1 Introduction of Operating System

An operating system (or OS) is usually sitting between the user’s application programs and the computer hardware, which exploits the computer hardware resources to provide a set of services to the computer system users. The hierarchical view of a typical computer system is shown in Figure 1.1.

![Fig. 1.1 The hierarchical view of a computer system.](image)

The operating system functions as an interface between a user and a com-
puter. Usually, a common user is concerned about the applications rather than the architecture of computer. The application programs are developed by application programmers who develop the programs generally without responsibility of how to control the computer hardware. The reason beneath this is that there is an overwhelmingly complex task related to the computer hardware control, especially when it comes to the portability of the application programs from one computer system to another different one. To ease this task, a set of system programs should be built. Some of these system programs are frequently used as facilities, which implement functions, such as the file creation and management, I/O devices management, etc. An application programmer can use those functions to develop an application program. And once it is developed and executed in the environment where there are system programs, the application program can call some of the system programs to perform its own functions. And it is just the operating system that consists of a set of these system programs to take the responsibility of the details of the solution to the control and management of different computer resources, and builds a convenient software environment and interface for the application programmers to develop their applications for end users of computer systems.

Usually, the operating system provides some typical services for its users:

• Execute a program: When a program is executed, the operating system must load the instructions and data of the program into the main memory, initialize files and I/O devices, and prepare some other resources for its need.
• Create a program: The operating system should provide platforms and tools, such as editors, to assist the programmer in creating, editing and debugging programs.
• Operate files: For file management, the operating system must know not only the types of different files but also the characters of different storage devices. It also should provide the share and protection mechanisms of files.
• Control I/O devices: As there are so many types of I/O devices in the computer system and each of them has its own control instructions, the operating system must control I/O devices accurately when the application programs need them.
• Manage system and users: For multi-user computer systems, the operating system can not only let its users share system resources but also protect system resources, including CPU, primary memory, I/O devices and data, in order to make the execution of the operating system and applications smooth and proper. It also needs to make an account for each user in the system in order to collect some usage statistics and monitor the system performance.
• Detect and respond errors: As some errors can occur when the computers running, the operating system must detect errors and give an appropriate response in time. Different errors should be tackled in different ways, so