**CHAPTER 1**

* 1. **OS STRUCTURE**

**Practice Exercises**

1 What is the purpose of system calls?

2 What are the ﬁve major activities of an operating system with regard to process Management?

3 What are the three major activities of an operating system with regard to memory management?

4 What are the three major activities of an operating system with regard to secondary-storage management?

5 What is the purpose of the command interpreter? Why is it usually separate from the kernel?

6 What systemcalls have to be executed by a command interpreter or shell in order to start a new process?

7 What is the purpose of system programs?

8 What is the main advantage of the layered approach to system design? What are the disadvantages of the layered approach?

9 List ﬁve services provided by an operating system, and explain howeach creates convenience for users. In which cases would it be impossible for user-level programs to provide these services? Explain your answer.

10 Why do some systems store the operating system in ﬁrmware, while others store it on disk?

11 How could a system be designed to allow a choice of operating systems from which to boot? What would the bootstrap program need to do?

**Exercises**

12 The services and functions provided by an operating system can be divided into two main categories. Brieﬂy describe the two categories, and discuss how they differ.

13 Describe three general methods for passing parameters to the operating system.

14 Describe how you could obtain a statistical proﬁle of the amount of time spent by a program executing different sections of its code. Discuss the importance of obtaining such a statistical proﬁle.

15 What are the ﬁve major activities of an operating system with regard to ﬁle management?

16 What are the advantages and disadvantages of using the same system call interface for manipulating both ﬁles and devices?

17 Would it be possible for the user to develop a new command interpreter using the system-call interface provided by the operating system?

18 What are the two models of interprocess communication? What are the strengths and weaknesses of the two approaches?

19 Why is the separation of mechanism and policy desirable?

20 It is sometimes difﬁcult to achieve a layered approach if two components of the operating systemare dependent on each other. Identify a scenario in which it is unclear how to layer two system components that require tight coupling of their functionalities.

21 What is the main advantage of the microkernel approach to system design? How do user programs and system services interact in a microkernel architecture? What are the disadvantages of using the microkernel approach?

22 What are the advantages of using loadable kernel modules?

23 How are iOS and Android similar? How are they different?

24 Explain why Java programs running on Android systems do not use the standard Java API and virtual machine.

25 The experimental Synthesis operating system has an assembler incorporated in the kernel. To optimize system-call performance, the kernel assembles routines within kernel space to minimize the path that the systemcallmust take through the kernel. This approach is the antithesis of the layered approach, inwhich the path through the kernel is extended to make building the operating system easier. Discuss the pros and cons of the Synthesis approach to kernel design and system-performance optimization.