
CHAPTER 7

Operating Systems

Review Questions

1. The operating system controls the access of hardware by users. Application programs use the computer hardware to solve the users' problems.
2. Thanks to networking and internetworking, resources such as files and even CPUs can be shared by computers that are miles apart.
3. In monoprogramming, only a single job is in memory at any one time. With multiprogramming, several jobs are in memory at a time and the resources of the computer are only assigned to the jobs that need them.
4. The components of an operating system are: memory manager, process manager, device manager, file manager, and the user interface.
5. With partitioning, memory is divided into variable length sections, each of which hold one complete program. In paging, memory is divided into much smaller fixed length sections as is the program itself. The program does not have to be contiguous in memory.
6. In paging, a page is the fixed length section of a program and a frame is the fixed length section of memory.
7. In regular paging the entire program must be in memory at the same time in order for the program to execute. With demand paging, the pages of a program can be loaded into memory one by one so that the entire program does not need to be in memory at the same time. This means that with demand paging, more programs can use the computer's resources at any given time.
8. Demand segmentation is similar to demand paging except the program is divided into variable sized sections that match the programming modules.
9. Physical memory is the amount of main memory in the computer and is determined by the computer hardware. Virtual memory is the sum of the total sizes of all the programs that are currently being executed.
10. A program is a non-active set of instructions stored on a disk and does not become a job until it is selected for execution. A job is a program that is scheduled for execution and does not become a process until it actually gets loaded into memory and

starts executing. All processes are programs and jobs but not all programs or jobs are processes. All jobs are programs but not all programs are jobs.

11. A process resides, at least in part, in main memory. Programs and jobs reside on a disk.
12. A state diagram is used to illustrate all of the possible states of a given entity.
13. A process can be in the ready, running, or waiting state.
14. A job can be in any of the states that a process can be in if it is currently a process, or in the hold or terminated state if it is not currently a process.
15. From a running state, a process can go to a waiting state if it needs I/O; it can go into a ready state if it exhausts its allocated slot of time, or it can be terminated.
16. The job scheduler moves a job from the hold state to the ready state or from the running state to the terminated state. The process scheduler moves a process from ready to running, from running to either waiting or ready, or from waiting to ready.
17. An operating system needs to use queues because there can be many jobs and processes active at the same time. In order to share all of the resources, queues are necessary to make sure that jobs and processes all get access to the resources that they need.
18. Deadlock happens when processes are all waiting for resources held by other processes: they are all waiting for each other. This happens when the operating system does not put resource restrictions on processes. Starvation happens when the operating system puts too many resource restrictions on a process. If a process must wait until it can get all of the resources that it needs before it starts to execute, it may never start.
19. The functions of a device manager are to keep track of the availability of all of the I/O devices, to maintain a queue for each I/O device, and to control the access policy for each of the I/O devices.
20. The functions of a file manager are to control access to files, supervise the creation, deletion and modification of files, control the naming of files, control how and where the files are stored, and control archiving and backups.

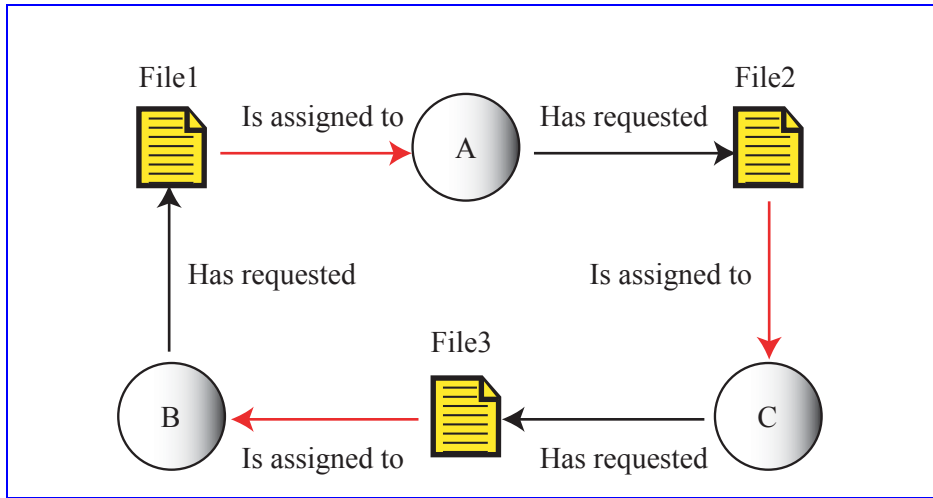
Multiple-Choice Questions

21. a
22. a
23. a
24. d
25. b
26. d
27. c
28. c
29. a
30. a
31. a

- 32. a
- 33. d
- 34. c
- 35. c
- 36. c
- 37. a
- 38. d
- 39. a
- 40. b
- 41. d
- 42. a
- 43. d
- 44. c
- 45. b

Exercises

- 46. 60 MB
- 47. 50 MB
- 48. 87.5%
- 49. The total memory used is 55.5 MB. The total memory wasted is 4.5 MB. 7.5% of the memory is wasted.
- 50. The total memory used is 40 MB. The total memory wasted is 20 MB. 33.33% of the memory is wasted.
- 51.
 - a. 4
 - b. 3
 - c. 7
 - d. 1
 - e. 4 MB
 - f. 6.66%
- 52. 110 programs can run concurrently.
- 53.
 - a. running
 - b. ready
 - c. ready
 - d. waiting
 - e. waiting
- 54. This is a deadlock situation (see Figure 7.1).

Figure 7.1 Exercise 54

55. This is not a deadlock situation (see Figure 7.2). When process A finishes with file 1, it will release the file and process B can have it, releasing file 2. Process C can then have file 2.

Figure 7.2 Exercise 55