

Operating Systems Advanced Exercise

1. Briefly explain what an operating system is.
2. A computer can be looked at as having four levels: User (at the upper level), Applications, Operating System and Hardware (at the lowest level). Explain.
3. Name and briefly describe three user-interfaces.
4. Name four types of operating systems and describe them.
5. Name two different network architectures and give a brief description of them.
6. Explain Batch processing and Transaction processing.
7. Name the five main functions of an operating system.
8. Explain the following terms: process, pre-emption, dispatch, dispatcher, dispatch latency and context switch.
9. State and give a brief description of the three states of a process.
10. Write and explain three objectives of a process scheduler.
11.
 - a. What do we mean by process scheduling?
 - b. Name five scheduling algorithms and describe two of them.
12.
 - a. Explain the following terms: (i) deadlock, (ii) critical region and (iii) circular wait.
 - b. What solution is used to avoid concurrent execution by critical regions?
 - c. If a process is in the middle of a critical region can it be pre-empted?
13. Name and explain the conditions that should hold to create a deadlock.
14. What is a resource allocation graph?
15. There are four methods of handling deadlocks. Name and explain them briefly.
16. Describe the following terms: (i) uniprogramming, (ii) kernel, (iii) logical and physical addresses, (iv) relocation, (v) process control block
- 17.

- a. "Performance is poor if the OS has to load a process each time it is scheduled." Explain.
 - b. Therefore, what can be done to improve the performance of a computer?
18. "The OS sees that processes do not reference memory locations belonging to other processes." Explain.
19. Explain what is meant by (i) shared memory, (ii) logical and physical organisation
20.
 - a. What is memory overlaying?
 - b. Name one disadvantage of memory overlaying.
21.
 - a. What is memory partitioning?
 - b. Issues with memory partitioning are (i) fragmentation (internal and external), (ii) placement, (iii) replacement and (iv) free space management. Explain them briefly.
22. Describe two problems associated with fixed partitioning.
23.
 - a. What is Segmentation?
 - b. Explain the terms (i) hardware exception, (ii) segmentation fault.
24. In segmentation a logical address is expressed as (s, d). Explain.
25. Four placement algorithms used with segmentation are the following: best fit, worst fit, first fit and next fit. Describe them briefly and list them in order of efficiency.
26.
 - a. Why is compaction used?
 - b. What is a relative address?
 - c. What is address translation (address mapping)?
27.
 - a. How does the paging system work (virtual memory)?
 - b. What is a virtual address?
 - c. What is a page fault?
 - d. Name and explain four replacement algorithms used to choose the page to be swapped.

28. Give a brief description of the following basic file organisations: (i) serial file, (ii) sequential file, (iii) indexed file, (iv) indexed sequential file, (v) direct file, (vi) byte-stream files.
29. What is the difference between the following file directory structures: (i) single-level, two-level and tree-structured.
30. Name three access rights on files that may be given to users.
31. What does a file manipulation system do?
32.
 - a. What do we mean by (i) a block (physical record) and (ii) a logical record?
 - b. One meaning of 'blocking' refers to the process of packing logical records into physical blocks on secondary storage. What is the meaning of a blocking factor of 3?
 - c. What do we mean by the terms (i) deblocking, (ii) portion?
33. Name three blocking methods.
34. When managing the secondary storage the operating system designer has two management issues: (i) file allocation and (ii) free space management. Explain.
35. Describe three file-allocation methods.
36.
 - a. What does the Disk Allocation Table contain?
 - b. Name and describe three ways in which this table can contain its information.
37.
 - a. Define (i) efficiency, (ii) reliability, (iii) security and (iv) fault tolerance.
 - b. Mention one technique that enhances efficiency when reading or writing to secondary storage.
 - c. Mention and explain three techniques that raise the level of fault tolerance.
38. Describe the two I/O addressing modes.
39. What do we mean by handshaking in digital communications?
40.
 - a. What do we mean by an interrupt?
 - b. What is the name of the program that is executed when an interrupt is signalled to the processor?

- c. What is the difference between a hardware and a software interrupt?
 - d. What is an IRQ?
41. What are the steps that the processor performs when it receives an interrupt?
42. What is an interrupt-driven system?
43. What is the difference between polled and vectored interrupts?
44. What is an interrupt vector table?
45. What is a system stack?
- 46.
- a. What two techniques can be applied with multiple interrupts?
 - b. What is interrupt latency?
- 47.
- a. What is the purpose of the interrupt mask register?
 - b. How does it work?
- 48.
- a. What is the purpose of the DMA?
 - b. Describe an alternative for the DMA.