

## TWO MARKS

1. What is an operating system?

An operating system is a program that manages the computer hardware. It act as an intermediate between a users of a computer and the computer hardware. It controls and coordinates the use of the hardware among the various application programs for the various users.

2. What are the three main purposes of an operating system?

- To provide an environment for a computer user to execute programs on computer hardware in a convenient and efficient manner.
- To allocate the separate resources of the computer as needed to solve the problem given.
- As a control program it serves two major functions:
  - (1) supervision of the execution of user programs to prevent errors and improper use of the computer, and
  - (2) management of the operation and control of I/O devices.

3. What is the kernel?

A more common definition is that the OS is the one program running at all times on the computer, usually called the kernel, with all else being application programs.

4. What are batch systems?

Batch systems are quite appropriate for executing large jobs that need little interaction. The user can submit jobs and return later for the results. It is not necessary to wait while the job is processed.

5. What are the main differences between operating systems for mainframe computers and personal computers?

Generally, operating systems for batch systems have simpler requirements than for personal computers. Batch systems do not have to be concerned with interacting with a user as much as a personal computer. As a result, an operating system for a PC must be concerned with response time for an interactive user. Batch systems do not have such requirements. A pure batch system also may have not to handle time sharing, whereas an operating system must switch rapidly between different jobs.

6. List the advantages of parallel or multiprocessor systems.

- Increased throughput
  - Speed up ratio with N processor is less than N
- Economical
  - save more money
- Increased reliability

7. What is graceful degradation?

In multiprocessor systems, failure of one processor will not halt the system, but only slow it down by sharing the work of failure system by other systems. This ability to continue providing service is proportional to the surviving hardware is called graceful degradation.

8. Differentiate Tightly coupled systems and loosely coupled systems?

### Loosely coupled systems

- Each processor has its own local memory
- Each processor can communicate with other all through communication lines

### Tightly coupled systems

- Common memory is shared by many processors
- No need of any special communication lines

9. What is a real-time system?

A real-time system has well-defined, fixed time constraints. Processing must be done within the defined constraints, or the system will fail. It is often used as a control device in a dedicated application.

10. How does the distinction between kernel mode and user mode function as a rudimentary form of protection (security) system?

Certain instructions could be executed only when the CPU is in kernel mode. Similarly, hardware devices could be accessed only when the program is executing in kernel mode. Control over when interrupts could be enabled or disabled is also possible only when the CPU is in kernel mode. Consequently, the CPU has very limited capability when executing in user mode, thereby enforcing protection of critical resources.

11. Describe the differences between symmetric and asymmetric multiprocessing. What are three advantages and one disadvantage of multiprocessor systems?

Symmetric multiprocessing treats all processors as equals, and I/O can be processed on any CPU. Asymmetric multiprocessing has one master CPU and the remainder CPUs are slaves. The master distributes tasks among the slaves, and I/O is usually done by the master only. Multiprocessors can save money by not duplicating power supplies, housings, and peripherals. They can execute programs more quickly and can have increased reliability. They are also more complex in both hardware and software than uniprocessor systems.

12. List the advantages of distributed systems

- Resources Sharing
- Computation speed up – load sharing
- Reliability
- Communications

13. What are privileged instructions?

Some of the machine instructions that may cause harm to a system are designated as privileged instructions. The hardware allows the privileged instructions to be executed only in monitor mode.

14. What do you mean by system calls?

System calls provide the interface between a process and the operating system. When a system call is executed, it is treated as by the hardware as software interrupt.

15. What are the five major activities of an operating system in regard to process management?

- The creation and deletion of both user and system processes
- The suspension and resumption of processes
- The provision of mechanisms for process synchronization
- The provision of mechanisms for process communication
- The provision of mechanisms for deadlock handling

16. What are the three major activities of an operating system in regard to memory management?

- Keep track of which parts of memory are currently being used and by whom.
- Decide which processes are to be loaded into memory when memory space becomes available.
- Allocate and deallocate memory space as needed.

17. What are the three major activities of an operating system in regard to secondary-storage management?

- Free-space management.
- Storage allocation.
- Disk scheduling.

18. What are the five major activities of an operating system in regard to file management?

- The creation and deletion of files
- The creation and deletion of directories
- The support of primitives for manipulating files and directories
- The mapping of files onto secondary storage
- The backup of files on stable (nonvolatile) storage media

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

It reads commands from the user or from a file of commands and executes them, usually by turning them into one or more system calls. It is usually not part of the kernel since the command interpreter is subject to changes.

20. List five services provided by an operating system

- Program execution.
- I/O operations.
- File-system manipulation.
- Communications.
- Error detection.

21. What is the purpose of system programs?

System programs can be thought of as bundles of useful system calls. They provide basic functionality to users and so users do not need to write their own programs to solve common problems.

22. What is the main advantage of the layered approach to system design?

The system is easier to debug and modify because changes affect only limited sections of the system rather than touching all sections of the operating system. Information is kept only where it is needed and is accessible only within a defined and restricted area, so any bugs affecting that data must be limited to a specific module or layer.

23. What are the main advantages of the microkernel approach to system design?

Benefits typically include the following

- (a) adding a new service does not require modifying the kernel,
- (b) it is more secure as more operations are done in user mode than in kernel mode, and
- (c) a simpler kernel design and functionality typically results in a more reliable operating system.

24. What is a process?

A process is a program in execution. It is an active entity and it includes the process stack, containing temporary data and the data section contains global variables.

25. List the various process state.

As a process executes, it changes *state*

- new**: The process is being created.
- running**: Instructions are being executed.
- waiting**: The process is waiting for some event to occur.

- ❑ **ready:** The process is waiting to be assigned to a process.
- ❑ **terminated:** The process has finished execution.

26. What is process control block?

Each process is represented in the OS by a process control block. It contains many pieces of information associated with a specific process like Process state, Program counter, CPU registers, CPU scheduling information, Memory-management information, Accounting information and I/O status information.

27. What is scheduler?

A process migrates between the various scheduling queues throughout its life time. The OS must select processes from these queues in some fashion. This selection process is carried out by a scheduler.

28. What are the uses of job queues, ready queues and device queues?

As a process enters a system they are put into a job queue. These queues consist of all jobs in the system. The processes that are residing in main memory and are ready and waiting to execute are kept on a list called ready queue. The list of processes waiting for a particular I/O device is kept in the device queue.

29. What is meant by context switch?

Switching the CPU to another process requires saving the state of the old process and loading the saved state for the new process. This task is known as context switch.

30. Describe the differences among short-term, medium-term, and long-term scheduling.

**Short-term (CPU scheduler)**—selects from jobs in memory those jobs that are ready to execute and allocates the CPU to them.

**Medium-term scheduler**—used especially with time-sharing systems as an intermediate scheduling level. A swapping scheme is implemented to remove partially run programs from memory and reinstate them later to continue where they left off.

**Long-term (job scheduler)**—determines which jobs are brought into memory for processing. The primary difference is in the frequency of their execution. The short-term must select a new process quite often.

31. Describe the actions a kernel takes to context switch between processes.

In general, the operating system must save the state of the currently running process and restore the state of the process scheduled to be run next. Saving the state of a process typically includes the values of all the CPU registers in addition to memory allocation. Context switches must also perform many architecture-specific operations, including flushing data and instruction caches.

32. What is an independent process?

A process is independent if it cannot affect or be affected by the other processes executing in the system. Any process that does not share data with other processes is an independent process.

33. What is a co-operative process?

A process is co-operating if it can affect or be affected by the other processes executing in the system. Any process that shares data with other processes is a co-operating process.

34. What are the benefits of OS co-operating processes?

- \* Information sharing.
- \* Computation speed up.

- \* Modularity.
- \* Convenience.

35. How can a user program disturb the normal operation of the system?

- \* Issuing illegal I/O operation.
- \* By accessing memory locations within the OS itself.
- \* Refusing to relinquish the CPU.

36. What is the use of inter process communication.

Inter process communication provides a mechanism to allow the co-operating process to communicate with each other and synchronise their actions without sharing the same address space. It is provided a message passing system.

37. List the Properties of communication link in direct communication.

- Links are established automatically.
- A link is associated with exactly one pair of communicating processes.
- Between each pair there exists exactly one link.
- The link may be unidirectional, but is usually bi-directional.

38. List the Properties of communication link in Indirect communication.

- Link established only if processes share a common mailbox
- A link may be associated with many processes.
- Each pair of processes may share several communication links.
- Link may be unidirectional or bi-directional.

39. What is a thread?

A thread otherwise called a lightweight process (LWP) is a basic unit of CPU utilization, it comprises of a thread id, a program counter, a register set and a stack. It shares with other threads belonging to the same process its code section, data section, and operating system resources such as open files and signals.

40. What are the benefits of multithreaded programming?

The benefits of multithreaded programming can be broken down into four major categories:

- Responsiveness
- Resource sharing
- Economy
- Utilization of multiprocessor architectures

41. Compare user threads and kernel threads.

#### User threads

- User threads are supported above the kernel and are implemented by a thread library at the user level. Thread creation & scheduling are done in the user space, without kernel intervention. Therefore they are fast to create and manage blocking system call will cause the entire process to block

#### Kernel threads

- Kernel threads are supported directly by the operating system. Thread creation, scheduling and management are done by the operating system. Therefore they are slower to create & manage compared to user threads. If the thread performs a blocking system call, the kernel can schedule another thread in the application for execution

42. What is the use of fork and exec system calls?

- Fork is a system call by which a new process is created. Exec is also a system call, which is used after a fork by one of the two processes to place the process memory space with a new program.

43. Define thread cancellation & target thread.

- The thread cancellation is the task of terminating a thread before it has completed. A thread that is to be cancelled is often referred to as the target thread. For example, if multiple threads are concurrently searching through a database and one thread returns the result, the remaining threads might be cancelled.

44. .What are the different ways in which a thread can be cancelled?

Cancellation of a target thread may occur in two different scenarios:

- Asynchronous cancellation: One thread immediately terminates the target thread is called asynchronous cancellation.
- Deferred cancellation: The target thread can periodically check if it should terminate, allowing the target thread an opportunity to terminate itself in an orderly fashion.