Operating Systems

1. **What is an operating system?**

An operating system is a program that acts as an intermediary between the user and the computer hardware. The purpose of an OS is to provide a convenient environment in which user can execute programs in a convenient and efficient manner. It is a resource allocator responsible for allocating system resources and a control program which controls the operation of the computer hardware.

2. **Why paging is used?**

Paging is solution to external fragmentation problem which is to permit the logical Address space of a process to be noncontiguous, thus allowing a process to be allocating physical memory wherever the latter is available.

3. **Explain the concept of the batched operating systems?**

In batched operating system the users gives their jobs to the operator who sorts the Programs according to their requirements and executes them. This is time consuming but Makes the CPU busy all the time.

4. **What is purpose of different operating systems?**

The machine purpose workstation individual usability &resources utilization mainframe Optimize utilization of hardware PC support complex games, business application Hand Held PCs Easy interface & min. power consumption.

5. **What is virtual memory?**

Virtual memory is hardware technique where the system appears to have more memory That it actually does. This is done by time-sharing, the physical memory and storage parts Of the memory one disk when they are not actively being used.

6. What is Throughput, Turnaround time, waiting time and Response time?

- **Throughput:** number of processes that complete their execution per time unit.
- **Turnaround time:** amount of time to execute a particular process.
- **waiting time:** amount of time a process has been waiting in the ready queue.
- **Response time:** amount of time it takes from when a request was submitted until

The first response is produced, not output (for time-sharing environment).

7. What are the various components of a computer system?

- The hardware
- The operating system
- The application programs
- The users.

8. What is a Real-Time System?

A real time process is a process that must respond to the events within a certain time Period. A real time operating system is an operating system that can run real time Processes successfully.

9. Explain the concept of the Distributed systems?

Distributed systems work in a network. They can share the network resources, communicate with each other.

10. What is SCSI?

SCSI - Small computer systems interface is a type of interface used for computer Components such as hard drives, optical drives, scanners and tape drives. It is a Competing technology to standard IDE (Integrated Drive Electronics).

11. What is a sector?

Smallest addressable portion of a disk.

12. What are the different operating systems?

- Batched operating systems
- Multi-programmed operating systems
- Timesharing operating systems
- Distributed operating systems
- Real-time operating systems.

13. What is busy waiting?

The repeated execution of a loop of code while waiting for an event to occur is called busy waiting.

14. What are system calls?

System calls provide the interface between a process and the operating system. System calls for modern Microsoft windows platforms are part of the win32 API, which is available for all the compilers written for Microsoft windows.

15. What are various scheduling queues?

- Job queue
- Ready queue
- Device queue

16. What are java threads?

Java is one of the small number of languages that support at the language level for the creation and management of threads. However, because threads are managed by the java virtual machine (JVM), not by a user-level library or kernel, it is difficult to classify Java threads as either user- or kernel-level.

17. What are types of threads?

- User thread
- Kernel thread

18. What is a semaphore?

It is a synchronization tool used to solve complex critical section problems. A semaphore is an integer variable that, apart from initialization, is accessed only through two standard atomic operations: Wait and Signal.

19. What is a deadlock?

Deadlock is a situation where a group of processes are all blocked and none of them can become unblocked until one of the other becomes unblocked. The simplest deadlock is two processes each of which is waiting for a message from the other.

20. What is cache memory?

Cache memory is random access memory (RAM) that a computer microprocessor can access more quickly than it can access regular RAM. As the microprocessor processes data, it looks first in the cache memory and if it finds the data there (from a previous reading of data), it does not have to do the more time-consuming reading of data.

21. What is thrashing?

It is a phenomenon in virtual memory schemes when the processor spends most of its time swapping pages, rather than executing instructions. This is due to an inordinate number of page faults.

22. **What are the states of a process?**

- New
- Running
- Waiting
- Ready
- Terminated

22. What is a binary semaphore?

A binary semaphore is one, which takes only 0 and 1 as values. They are used to implement mutual exclusion and synchronize concurrent processes.

23. What is a job queue?

When a process enters the system it is placed in the job queue.

24. What is a ready queue?

The processes that are residing in the main memory and are ready and waiting to execute are kept on a list called the ready queue.

25. What are turnaround time and response time?

Turnaround time is the interval between the submission of a job and its completion. Response time is the interval between submission of a request, and the first response to that request.

26. What are the operating system components?

- Process management
- Main memory management
- File management
- I/O system management
- Secondary storage management
- Networking
- Protection system
- Command interpreter system

27. What is mutex?

Mutex is a program object that allows multiple program threads to share the same resource, such as file access, but not simultaneously. When a program is started a mutex is created woth a unique name. After this stage, any thread that needs the resource must lock the mutex from other threads while it is using the resource. the mutex is set to unlock when the data is no longer needed or the routine is finished.

28. What is Marshalling?

The process of packaging and sending interface method parameters across thread or process boundaries.

29. What are residence monitors?

Early operating systems were called residence monitors.

30. Why thread is called as a lightweight process?

It is called light weight process to emphasize the fact that a thread is like a process but is more efficient and uses fewer resources(n hence “lighter”)and they also share the address space.

31. What are operating system services?

- Program execution
- I/O operations
- File system manipulation
- Communication
- Error detection
- Resource allocation

- Accounting
- Protection

32. What is a process?

A program in execution is called a process. Or it may also be called a unit of work. A process needs some system resources as CPU time, memory, files, and i/o devices to accomplish the task. Each process is represented in the operating system by a process control block or task control block (PCB).Processes are of two types

- Operating system processes
- User processes

33. What are the different job scheduling in operating systems?

Scheduling is the activity of the deciding when process will receive the resources they request.

- **FCFS** FCSFS stands for First Come First Served. In FCFS the job that has been waiting the longest is served next.
- **Round Robin Scheduling** Round Robin scheduling is a scheduling method where each process gets a small quantity of time to run and then it is preempted and the next process gets to run. This is called time-sharing and gives the effect of all the processes running at the same time
- **Shortest Job First** The Shortest job First scheduling algorithm is a nonpreemptive scheduling algorithm that chooses the job that will execute the shortest amount of time.
- **Priority Scheduling** Priority scheduling is a scheduling method where at all times the highest priority process is assigned the resource.

34. What is dual-mode operation?

In order to protect the operating systems and the system programs from the malfunctioning programs the two mode operations were evolved

- System mode
- User mode.

35. What is a device queue?

A list of processes waiting for a particular I/O device is called device queue.

36. What are the different types of Real-Time Scheduling?

Hard real-time systems required to complete a critical task within a guaranteed amount of time. Soft real-time computing requires that critical processes receive priority over less fortunate ones.

37. What is starvation ?

Starvation is a resourcemanagement problem where a process does not get the resources it needs for a long time because the resources are being allocated to other processes.

38. What is a long term scheduler & short term schedulers?

Long term schedulers are the job schedulers that select processes from the job queue and load them into memory for execution.

The Short term schedulers are the CPU schedulers that select a process form the ready queue and allocate the CPU to one of them.

39. What is fragmentation?

Fragmentation occurs in a dynamic memory allocation system when many of the free blocks are too small to satisfy any request.

41.**What is context switching?**

Transferring the control from one process to other process requires saving the state of the old process and loading the saved state for new process. This task is known as context switching.

42**. What is relative path and absolute path?**

- **Absolute path** - Exact path from root directory.
- **Relative path** - Relative to the current path.

43.**What are the disadvantages of context switching?**

Time taken for switching from one process to other is pure over head. Because the system does no useful work while switching. So one of the solutions is to go for threading when ever possible.

44. **What is the state of the processor, when a process is waiting for some event to occur?**

Waiting state

45.What is the difference between Primary storage and secondary storage?

- **Main memory** - only large storage media that the CPU can access directly.
- **Secondary storage** - extension of main memory that provides large nonvolatile storage capacity.

46. **What is process synchronization?**
A situation, where several processes access and manipulate the same data concurrently and the outcome of the execution depends on the particular order in which the access takes place, is called race condition. To guard against the race condition we need to ensure that only one process at a time can be manipulating the same data. The technique we use for this is called process synchronization.

47**. What is a data register and address register?**

- **Data registers** - can be assigned to a variety of functions by the programmer. They can be used with any machine instruction that performs operations on data.
- **Address registers** - contain main memory addresses of data and instructions or they contain a portion of the address that is used in the calculation of the complete addresses.

48. **What are deadlock prevention techniques?**

- Mutual exclusion
- Hold and wait
- No preemption
- Circular wait

49. **What is the difference between Complier and Interpreter?**
An interpreter reads one instruction at a time and carries out the actions implied by that instruction. It does not perform any translation. But a compiler translates the entire instructions.

50. **What is a Safe State and what is its use in deadlock avoidance?**
When a process requests an available resource, system must decide if immediate allocation leaves the system in a safe state. System is in safe state if there exists a safe sequence of all processes. Deadlock Avoidance : ensure that a system will never enter an unsafe state.

51. **What is the difference between microkernel and macro kernel?**

- **Micro-Kernel :** A micro-kernel is a minimal operating system that performs only the essential functions of an operating system. All other operating system functions are performed by system processes.
- **Monolithic :** A monolithic operating system is one where all operating system code is in a single executable image and all operating system code runs in system

mode.

52. **What is DRAM?**
Dynamic Ram stores the data in the form of Capacitance, and Static RAM stores the data in Voltages.

53. **What are the different functions of Scheduler?**
Scheduler deals with the problem of deciding which of the process in the ready queue is to be allocated the CPU. Short Term Schedulers, Long Term Schedulers

54. **What is a trap and trapdoor?**
Trapdoor is a secret undocumented entry point into a program used to grant access without normal methods of access authentication. A trap is a software interrupt, usually the result of an error condition.

55. **What are local and global page replacements?**
Local replacement means that an incoming page is brought in only to the relevant process' address space. Global replacement policy allows any page frame from any process to be replaced. The latter is applicable to variable partitions model only.

56. **What is cache-coherency?**
In a multiprocessor system there exist several caches each may containing a copy of same variable A. Then a change in one cache should immediately be reflected in all other caches this process of maintaining the same value of a data in all the caches s called cache-coherency.

57. **What are the benefits of multithreaded programming?**

- Responsiveness
- Resources sharing
- Economy
- Utilization of multiprocessor architectures.

58. **While running DOS on a PC, which command would be used to duplicate the entire**

diskette? ·
diskcopy.