

### **1) Explain the main purpose of an operating system?**

Operating systems exist for two main purposes. One is that it is designed to make sure a computer system performs well by managing its computational activities. Another is that it provides an environment for the development and execution of programs.

### **2) What is demand paging?**

Demand paging is referred when not all of a process's pages are in the RAM, then the OS brings the missing(and required) pages from the disk into the RAM.

### **3) What are the advantages of a multiprocessor system?**

With an increased number of processors, there is a considerable increase in throughput. It can also save more money because they can share resources. Finally, overall reliability is increased as well.

### **4) What is kernel?**

A kernel is the core of every operating system. It connects applications to the actual processing of data. It also manages all communications between software and hardware components to ensure usability and reliability.

### **5) What are real-time systems?**

Real-time systems are used when rigid time requirements have been placed on the operation of a processor. It has well defined and fixed time constraints.

### **6) What is a virtual memory?**

Virtual memory is a memory management technique for letting processes execute outside of memory. This is very useful especially if an executing program cannot fit in the physical memory.

### **7) Describe the objective of multiprogramming.**

The main objective of multiprogramming is to have a process running at all times. With this design, CPU utilization is said to be maximized.

### **8) What is time-sharing system?**

In a Time-sharing system, the CPU executes multiple jobs by switching among them, also known as multitasking. This process happens so fast that users can interact with each program while it is running.

#### **9) What is SMP?**

SMP is a short form of Symmetric Multi-Processing. It is the most common type of multiple-processor systems. In this system, each processor runs an identical copy of the operating system, and these copies communicate with one another as needed.

#### **10) How are server systems classified?**

Server systems can be classified as either computer-server systems or file server systems. In the first case, an interface is made available for clients to send requests to perform an action. In the second case, provisions are available for clients to create, access and update files.

#### **11) What is asymmetric clustering?**

In asymmetric clustering, a machine is in a state known as hot standby mode where it does nothing but to monitor the active server. That machine takes the active server's role should the server fails.

#### **12) What is a thread?**

A thread is a basic unit of CPU utilization. In general, a thread is composed of a thread ID, program counter, register set, and the stack.

#### **13) Give some benefits of multithreaded programming.**

- there is increased responsiveness to the user
- resource sharing within the process
- economy
- utilization of multiprocessing architecture

#### **14) Briefly explain FCFS.**

FCFS stands for First-come, first-served. It is one type of scheduling algorithm. In this scheme, the process that requests the CPU first is allocated the CPU first. Implementation is managed by a FIFO queue.

#### **15) What is RR scheduling algorithm?**

RR (round-robin) scheduling algorithm is primarily aimed for time-sharing systems. A circular queue is a setup in such a way that the CPU scheduler goes around that queue, allocating CPU to each process for a time interval of up to around 10 to 100 milliseconds.

**16) What are necessary conditions which can lead to a deadlock situation in a system?**

Deadlock situations occur when four conditions occur simultaneously in a system: Mutual exclusion; Hold and Wait; No preemption; and Circular wait.

**17) Enumerate the different RAID levels.**

RAID 0 – Non-redundant striping  
RAID 1 – Mirrored Disks  
RAID 2 – Memory-style error-correcting codes  
RAID 3 – Bit-interleaved Parity  
RAID 4 – Block-interleaved Parity  
RAID 5 – Block-interleaved distributed Parity  
RAID 6 – P+Q Redundancy

**18) Describe Banker's algorithm**

*Bankers Algorithm*

Banker's algorithm is one form of deadlock-avoidance in a system. It gets its name from a **banking** system wherein the bank never allocates available cash in such a way that it can no longer satisfy the needs of all of its customers.

**19) What factors determine whether a detection-algorithm must be utilized in a deadlock avoidance system?**

One is that it depends on how often a deadlock is likely to occur under the implementation of this algorithm. The other has to do with how many processes will be affected by deadlock when this algorithm is applied.

**20) State the main difference between logical from physical address space.**

Logical address refers to the address that is generated by the CPU. On the other hand, physical address refers to the address that is seen by the memory unit.

**21) How does dynamic loading aid in better memory space utilization?**

With dynamic loading, a routine is not loaded until it is called. This method is especially useful when large amounts of code are needed in order to handle infrequently occurring cases such as error routines.

## **22) What are overlays?**

Overlays are used to enable a process to be larger than the amount of memory allocated to it. The basic idea of this is that only instructions and data that are needed at any given time are kept in memory.

## **23) What is the basic function of paging?**

Paging is a memory management scheme that permits the physical address space of a process to be noncontiguous. It avoids the considerable problem of having to fit varied sized memory chunks onto the backing store.

## **24) What is fragmentation?**

Fragmentation is memory wasted. It can be internal if we are dealing with systems that have fixed-sized allocation units, or external if we are dealing with systems that have variable-sized allocation units.

## **25) How does swapping result in better memory management?**

During regular intervals that are set by the operating system, processes can be copied from main memory to a backing store, and then copied back later. Swapping allows more operations to be run that can fit into memory at one time.

## **26) Give an example of a Process State.**

- New State – means a process is being created
- Running – means instructions are being executed
- Waiting – means a process is waiting for certain conditions or events to occur
- Ready – means a process is waiting for an instruction from the main processor
- Terminate – means a process is stopped abruptly

## **27) What is a socket?**

A socket provides a connection between two applications. Each endpoint of a communication is a socket.

### **28) What is Direct Access Method?**

Direct Access method is based on a disk model of a file, such that it is viewed as a numbered sequence of blocks or records. It allows arbitrary blocks to be read or written. Direct access is advantageous when accessing large amounts of information.

### **29) When does thrashing occur?**

Thrashing refers to an instance of high paging activity. This happens when it is spending more time paging instead of executing.

### **30) What is the best page size when designing an operating system?**

The best paging size varies from system to system, so there is no single best when it comes to page size. There are different factors to consider in order to come up with a suitable page size, such as page table, paging time, and its effect on the overall efficiency of the operating system.

### **31) When designing the file structure for an operating system, what attributes are considered?**

Typically, the different attributes for a file structure are naming, identifier, supported file types, and location for the files, size, and level of protection.

### **32) What is root partition?**

Root partition is where the operating system kernel is located. It also contains other potentially important system files that are mounted during boot time.

### **33) What are device drivers?**

Device drivers provide a standard means of representing I/O devices that maybe manufactured by different companies. This prevents conflicts whenever such devices are incorporated in a systems unit.

### **34) What are the primary functions of VFS?**

VFS, or Virtual File System, separate file system generic operations from their implementation by defining a clean VFS interface. It is based on a file-representation structure known as vnode, which contains a numerical designator needed to support network file systems.

**35) What are the different types of CPU registers in a typical operating system design?**

- Accumulators
- Index Registers
- Stack Pointer
- General Purpose Registers

**36) What is the purpose of an I/O status information?**

I/O status information provides information about which I/O devices are to be allocated for a particular process. It also shows which files are opened, and other I/O device state.

**37) What is multitasking?**

Multitasking is the process within an operating system that allows the user to run several applications at the same time. However, only one application is active at a time for user interaction, although some applications can run “behind the scene”.

**38) Explain pros and cons of a command line interface?**

A command line interface allows the user to type in commands that can immediately provide results. Many seasoned computer users are well accustomed to using the command line because they find it quicker and simpler.

However, the main problem with a command line interface is that users have to be familiar with the commands, including the switches and parameters that come with it. This is a downside for people who are not fond of memorizing commands.

**39) What is caching?**

Caching is the processing of utilizing a region of fast memory for a limited data and process. A cache memory is usually much efficient because of its high access speed.

**40) What is spooling?**

Spooling is normally associated with printing. When different applications want to send an output to the printer at the same time, spooling takes all of these print jobs into a disk file and queues them accordingly to the printer.

#### **41) What is an Assembler?**

An assembler acts as a translator for low-level language. Assembly codes written using mnemonic commands are translated by the Assembler into machine language.

#### **42) What are interrupts?**

Interrupts are part of a hardware mechanism that sends a notification to the CPU when it wants to gain access to a particular resource. An interrupt handler receives this interrupt signal and “tells” the processor to take action based on the interrupt request.

#### **43) What is GUI?**

GUI is short for Graphical User Interface. It provides users with an interface wherein actions can be performed by interacting with icons and graphical symbols. People find it easier to interact with the computer when in a GUI especially when using the mouse. Instead of having to remember and type commands, users click on buttons to perform a process.

#### **44) What is preemptive multitasking?**

Preemptive multitasking allows an operating system to switch between software programs. This, in turn, allows multiple programs to run without necessarily taking complete control over the processor and resulting in system crashes.

#### **45) Why partitioning and formatting is a prerequisite to installing an operating system?**

Partitioning and formatting create a preparatory environment on the drive so that the operating system can be copied and installed properly. This includes allocating space on the drive, designating a drive name, determining and creating the appropriate file system and structure.

#### **46) What is plumbing/piping?**

It is the process of using the output of one program as an input to another. For example, instead of sending the listing of a folder or drive to the main screen, it can be piped and sent to a file, or sent to the printer to produce a hard copy.

#### **47) What is NOS?**

NOS is short for Network Operating System. It is a specialized software that will allow a computer to communicate with other devices over the network, including file/folder sharing.

**48) Differentiate internal commands from external commands.**

Internal commands are built-in commands that are already part of the operating system. External commands are separate file programs that are stored in a separate folder or directory.

**49) Under DOS, what command will you type when you want to list down the files in a directory, and at the same time pause after every screen output?**

- a) `dir /w`
- b) `dir /p`
- c) `dir /s`
- d) `dir /w /p`

Answer: d) `dir /w /p`

**50) How would a file name EXAMPLEFILE.TXT appear when viewed under the DOS command console operating in Windows 98?**

The filename would appear as EXAMPL~1.TXT . The reason behind this is that filenames under this operating system are limited to 8 characters when working under DOS environment.

**51) What is a folder in Ubuntu?**

There is no concept of Folder in Ubuntu. Everything included in your hardware is a FILE.

**52) Explain why Ubuntu is safe and not affected by viruses?**

- It does not support malicious e-mails and contents, and before any e-mail is opened by users it will go through many security checks
- Ubuntu uses Linux, which is a super secure O.S system
- Unlike other O.S, countless Linux users can see the code at any time and can fix the problem if there is any
- Malware and viruses are coded to take advantage of the weakness in Windows

**53) Explain what is Unity in Ubuntu? How can you add new entries to the launcher?**



In Ubuntu, Unity is the default graphical shell. On the left side of the Ubuntu, it introduces the launcher and Dash to start programs.

In order to add new entries to the launcher, you can create a file name like **.desktop** and then drag the file on the launcher.

#### **54) Explain the purpose of using a libaio package in Ubuntu?**

Libaio is Linux Kernel Asynchronous I/O (A/O). A/O allows even a single application thread to overlap I/O operations with other processing, by providing an interface for submitting one or more I/O requests in one system call without waiting for completion. And a separate interface to reap completed I/O operations associated with a given completion group.

#### **55) What is the use of behavior tab in Ubuntu?**

Through behaviors tab, you can make many changes on the appearance of the desktop

- Auto-hide the launcher: You can use this option to reveal the launcher when moving the pointer to the defined hot spot.
- Enable workspaces: By checking this option, you can enable workspace
- Add show desktop icon to the launcher: This option is used to display the desktop icon on the launcher

#### **56) What is the meaning of “export” command in Ubuntu?**

Export is a command in Bash shell language. When you try to set a variable, it is visible or exported to any subprocess started from that instance of bash. The variable will not exist in the sub-process without the export command.

#### **57) Explain how you can reset Unity Configuration?**

To reset the unity configuration the simplest way to do is to hit open a Terminal or hit Alt-F2 and run the command `# unity --reset`

#### **58) Explain how to access Terminal?**

To access terminal, you have to go under Application **Menu -> Accessories -> Terminal**.

### **1) What is an operating system?**

The operating system is a software program that facilitates computer hardware to communicate and operate with the computer software. It is the most important part of a computer system without it computer is just like a box.

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## 2) What is the main purpose of an operating system?

There are two main purposes of an operating system:

- It is designed to make sure that a computer system performs well by managing its computational activities.
  - It provides an environment for the development and execution of programs.
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## 3) What are the different operating systems?

- Batched operating systems
  - Distributed operating systems
  - Timesharing operating systems
  - Multi-programmed operating systems
  - Real-time operating systems
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## 4) What is a socket?

A socket is used to make connection between two applications. Endpoints of the connection are called socket.

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## 5) What is a real-time system?

Real-time system is used in the case when rigid-time requirements have been placed on the operation of a processor. It contains a well defined and fixed time constraints.

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## 6) What is kernel?

Kernel is the core and most important part of a computer operating system which provides basic services for all parts of the OS.

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## 7) What is monolithic kernel?

A monolithic kernel is a kernel which includes all operating system code in a single executable image.

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## 8) What do you mean by a process?

An executing program is known as process. There are two types of processes:

- Operating System Processes
  - User Processes
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## 9) What are the different states of a process?

A list of different states of process:

- New Process
  - Running Process
  - Waiting Process
  - Ready Process
  - Terminated Process
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## 10) What is the difference between micro kernel and macro kernel?

**Micro kernel:** micro kernel is the kernel which runs minimal performance affecting services for operating system. In micro kernel operating system all other operations are performed by processor.

**Macro Kernel:** Macro Kernel is a combination of micro and monolithic kernel.

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### 11) What is the concept of reentrancy?

It is a very useful memory saving technique that is used for multi-programmed time sharing systems. It provides functionality that multiple users can share a single copy of program during the same period.

It has two key aspects:

- The program code cannot modify itself.
  - The local data for each user process must be stored separately.
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### 12) What is the difference between process and program?

A program while running or executing is known as a process.

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### 13) What is the use of paging in operating system?

Paging is used to solve the external fragmentation problem in operating system. This technique ensures that the data you need is available as quickly as possible.

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### 14) What is the concept of demand paging?

Demand paging specifies that if an area of memory is not currently being used, it is swapped to disk to make room for an application's need.

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#### 15) What is the advantage of a multiprocessor system?

As many as processors are increased, you will get the considerable increment in throughput. It is cost effective also because they can share resources. So, the overall reliability increases.

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#### 16) What is virtual memory?

Virtual memory is a very useful memory management technique which enables processes to execute outside of memory. This technique is especially used when an executing program cannot fit in the physical memory.

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#### 17) What is thrashing?

Thrashing is a phenomenon in virtual memory scheme when the processor spends most of its time in swapping pages, rather than executing instructions.

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#### 18) What are the four necessary and sufficient conditions behind the deadlock?

These are the 4 conditions:

1) **Mutual Exclusion Condition:** It specifies that the resources involved are non-sharable.

2) **Hold and Wait Condition:** It specifies that there must be a process that is holding a resource already allocated to it while waiting for additional resource that are currently being held by other processes.

3) **No-Preemptive Condition:** Resources cannot be taken away while they are being used by processes.

4) **Circular Wait Condition:** It is an explanation of the second condition. It specifies that the processes in the system form a circular list or a chain where each process in the chain is waiting for a resource held by next process in the chain.

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#### 19) What is a thread?

A thread is a basic unit of CPU utilization. It consists of a thread ID, program counter, register set and a stack.

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#### 20) What is FCFS?

FCFS stands for First Come, First Served. It is a type of scheduling algorithm. In this scheme, if a process requests the CPU first, it is allocated to the CPU first. Its implementation is managed by a FIFO queue.

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#### 21) What is SMP?

SMP stands for Symmetric MultiProcessing. It is the most common type of multiple processor system. In SMP, each processor runs an identical copy of the operating system, and these copies communicate with one another when required.

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## 22) What is RAID? What are the different RAID levels?

RAID stands for Redundant Array of Independent Disks. It is used to store the same data redundantly to improve the overall performance.

Following are the different RAID levels:

RAID 0 - Stripped Disk Array without fault tolerance

RAID 1 - Mirroring and duplexing

RAID 2 - Memory-style error-correcting codes

RAID 3 - Bit-interleaved Parity

RAID 4 - Block-interleaved Parity

RAID 5 - Block-interleaved distributed Parity

RAID 6 - P+Q Redundancy

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## 23) What is deadlock? Explain.

Deadlock is a specific situation or condition where two processes are waiting for each other to complete so that they can start. But this situation causes hang for both of them.

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## 24) Which are the necessary conditions to achieve a deadlock?

There are 4 necessary conditions to achieve a deadlock:

- **Mutual Exclusion:** At least one resource must be held in a non-sharable mode. If any other process requests this resource, then that process must wait for the resource to be released.

- **Hold and Wait:** A process must be simultaneously holding at least one resource and waiting for at least one resource that is currently being held by some other process.
- **No preemption:** Once a process is holding a resource ( i.e. once its request has been granted ), then that resource cannot be taken away from that process until the process voluntarily releases it.
- **Circular Wait:** A set of processes  $\{ P_0, P_1, P_2, \dots, P_N \}$  must exist such that every  $P[i]$  is waiting for  $P[(i + 1) \% (N + 1)]$ .

Note: This condition implies the hold-and-wait condition, but it is easier to deal with the conditions if the four are considered separately.

## 25) What is Banker's algorithm?

Banker's algorithm is used to avoid deadlock. It is the one of deadlock-avoidance method. It is named as Banker's algorithm on the banking system where bank never allocates available cash in such a manner that it can no longer satisfy the requirements of all of its customers.

## 26) What is the difference between logical address space and physical address space?

Logical address space specifies the address that is generated by CPU. On the other hand physical address space specifies the address that is seen by the memory unit.

## 27) What is fragmentation?

Fragmentation is a phenomenon of memory wastage. It reduces the capacity and performance because space is used inefficiently.



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## 28) How many types of fragmentation occur in Operating System?

There are two types of fragmentation:

- **Internal fragmentation:** It is occurred when we deal with the systems that have fixed size allocation units.
- **External fragmentation:** It is occurred when we deal with systems that have variable-size allocation units.

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## 29) What is spooling?

Spooling is a process in which data is temporarily gathered to be used and executed by a device, program or the system. It is associated with printing. When different applications send output to the printer at the same time, spooling keeps these all jobs into a disk file and queues them accordingly to the printer.

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## 30) What is the difference between internal commands and external commands?

Internal commands are the built-in part of the operating system while external commands are the separate file programs that are stored in a separate folder or directory.

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## 31) What is semaphore?

Semaphore is a protected variable or abstract data type that is used to lock the resource being used. The value of the semaphore indicates the status of a common resource.

There are two types of semaphore:

- Binary semaphores
  - Counting semaphores
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### 32) What is a binary Semaphore?

Binary semaphore takes only 0 and 1 as value and used to implement mutual exclusion and synchronize concurrent processes.

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### 33) What is Belady's Anomaly?

Belady's Anomaly is also called FIFO anomaly. Usually, on increasing the number of frames allocated to a process virtual memory, the process execution is faster, because fewer page faults occur. Sometimes, the reverse happens, i.e., the execution time increases even when more frames are allocated to the process. This is Belady's Anomaly. This is true for certain page reference patterns.

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### 34) What is starvation in Operating System?

Starvation is Resource management problem. In this problem, a waiting process does not get the resources it needs for a long time because the resources are being allocated to other processes.

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### 35) What is aging in Operating System?

Aging is a technique used to avoid the starvation in resource scheduling system.

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### 36) What are the advantages of multithreaded programming?

A list of advantages of multithreaded programming:

- Enhance the responsiveness to the users.
  - Resource sharing within the process.
  - Economical
  - Completely utilize the multiprocessing architecture.
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### 37) What is the difference between logical and physical address space?

Logical address specifies the address which is generated by the CPU whereas physical address specifies to the address which is seen by the memory unit.

After fragmentation

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### 38) What are overlays?

Overlays makes a process to be larger than the amount of memory allocated to it. It ensures that only important instructions and data at any given time are kept in memory.

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### 39) When does trashing occur?

Thrashing specifies an instance of high paging activity. This happens when it is spending more time paging instead of executing.