APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

STUDY MATERIALS

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CONTENTS

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.

2. What are the different operating systems?

1. Batched operating systems
2. Multi-programmed operating systems
3. timesharing operating systems
4. Distributed operating systems
5. Real-time operating systems

3. What are the basic functions of an operating system?

Operating system controls and coordinates the use of the hardware among the various applications programs for various uses. Operating system acts as resource allocator and manager. Also operating system is control program which controls the user programs to prevent errors and improper use of the computer. It is especially concerned with the operation and control of I/O devices.

4. What is kernel?

Kernel is the core and essential part of computer operating system that provides basic services for all parts of OS.

5. What is difference between micro kernel and macro kernel?

Micro kernel is a kernel which run services those are minimal for operating system performance. In this kernel all other operations are performed by processor.

Macro Kernel is a combination of micro and monolithic kernel. In monolithic kernel all operating system code is in single executable image.

6. What is dead lock?

Deadlock is a situation or condition where the two processes are waiting for each other to complete so that they can start. This result both the processes to hang.

7. What is a process?

A program in execution is called a process.

Processes are of two types:
1. Operating system processes
2. User processes

8. What are the states of a process?

1. New
2. Running
3. Waiting
4. Ready
5. Terminated

9. What is starvation and aging?

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

Aging is a technique to avoid starvation in a scheduling system.

10. What is semaphore?

Semaphore is a variable, whose status reports common resource, Semaphore is of two types one is Binary semaphore and other is Counting semaphore.

11. 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

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context switching.

12. What is a thread?

A thread is a program line under execution. Thread sometimes called a light-weight process, is a basic unit of CPU utilization; it comprises a thread id, a program counter, a register set, and a stack

13. 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.

14. 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.

15. What is thrashing?

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

16. What is fragmentation? Tell about different types of fragmentation?

When many of free blocks are too small to satisfy any request then fragmentation occurs. External fragmentation and internal fragmentation are two types of fragmentation. External Fragmentation happens when a dynamic memory allocation algorithm allocates some memory and a small piece is left over that cannot be effectively used. Internal fragmentation is the space wasted inside of allocated memory blocks because of restriction on the allowed sizes of allocated blocks.

17. What are necessary conditions for dead lock?

1. Mutual exclusion (where at least one resource is non-sharable)

2. Hold and wait (where a process holds one resource and waits for other resource)

3. No preemption (where the resources can't be preempted)

4. Circular wait (where p[i] is waiting for p[j] to release a resource. i= 1,2,…n

j=if (i!=n) then i+1

else 1)

18. 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 from larger memory.

19. What is logical and physical addresses space?

Logical address space is generated from CPU; it bound to a separate physical address space is central to proper memory management. Physical address space is seen by the memory unit. Logical address space is virtual address space. Both these address space will be same at compile time but differ at execution time.

20. Differentiate 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

21. 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)

22. What is Memory-Management Unit (MMU)?

Hardware device that maps virtual to physical address. In MMU scheme, the value in the relocation register is added to every address generated by a user process at the time it is sent to memory.

->The user program deals with logical addresses; it never sees the real physical addresses

23. 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

24. 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.

25. When is a system in safe state?

The set of dispatchable processes is in a safe state if there exists at least one temporal order in which all processes can be run to completion without resulting in a deadlock.

26. Explain the concept of the Distributed systems?

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

27. 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.

28. 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 from the ready queue and allocate the CPU to one of them.

29. Explain the meaning of mutex.

Mutex is the short form for 'Mutual Exclusion object'. A mutex allows multiple threads for sharing the same resource. The resource can be file. A mutex with a unique name is created at the time of starting a program. A mutex must be locked from other threads, when any thread that needs the resource. When the data is no longer used / needed, the mutex is set to unlock.

32. What is a daemon?

Daemon is a program that runs in the background without user's interaction. A daemon runs in a multitasking operating system like UNIX. A daemon is initiated and controlled by special programs known as 'processes'.

33. What is pre-emptive and non-preemptive scheduling?

Preemptive scheduling: The preemptive scheduling is prioritized. The highest priority process should always be the process that is currently utilized.

Non-Preemptive scheduling: When a process enters the state of running, the state of that process is not deleted from the scheduler until it finishes its service time.

34. What is busy waiting?

The repeated execution of a loop of code while waiting for an event to occur is called busy-waiting. The CPU is not engaged in any real productive activity during this period, and the process does not progress toward completion.

35. What is page cannibalizing?

Page swapping or page replacements are called page cannibalizing.

37. What is process migration?

It is the transfer of sufficient amount of the state of process from one machine to the target machine.

38. Difference between Primary storage and secondary storage?

Primary memory is the main memory (Hard disk, RAM) where the operating system resides.

Secondary memory can be external devices like CD, floppy magnetic discs etc. secondary storage cannot be directly accessed by the CPU and is also external memory storage.

39. Define compactions.

Compaction is a process in which the free space is collected in a large memory chunk to make some space available for processes.

40. What are residence monitors?

Early operating systems were called residence monitors.

41. 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.

43. 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.

44. What is relative path and absolute path?

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

45. 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.

46. 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.

47. What is DRAM?

Dynamic Ram stores the data in the form of Capacitance, and Static RAM stores the data in Voltages.

48. 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.

49. 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.

50. 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).

54. What is FtDisk?

It is a fault tolerance disk driver for Windows NT.

55.What is Dispatcher?

Dispatcher module gives control of the CPU to the process selected by the short-term scheduler; this involves: Switching context, Switching to user mode, Jumping to the proper location in the user program to restart that program, dispatch latency — time it takes for the dispatcher to stop one process and start another running.

57. What is process spawning?

When the OS at the explicit request of another process creates a process, this action is called process spawning

58. Consider three CPU-intensive processes, which require 10, 20 and 30 time units and arrive at times 0, 2 and 6, respectively. How many context switches are needed if

the operating system implements a shortest remaining time first scheduling algorithm? Do not count the context switches at time zero and at the end.

59. Fork()

60. A system contains three programs and each requires three tape units for its operation. The minimum number of tape units which the system must have such that deadlocks never arise is

61. If there are 100 units of resource R in the system and each process in the system requires 2 units of resource R, then how many processes can be present at maximum so that no deadlock will occur?

62. The following program consists of 3 concurrent processes and 3 binary semaphores. The semaphores are initialized as S0 = 1, S1 = 0 and S2 = 0.

Process P0	Process P1	Process P2

while (true)
 	
{
 	
wait (S0);
 	
print '0'
 	
release (S1);
 	
release (S2);
 	
}
	wait (S1);
	release (S0);
		wait (S2);
		release (S0);

63. Suppose we want to synchronize two concurrent processes P and Q using binary semaphores S and T. The code for the processes P and Q is shown below-

Process P:
```
1. while(1)
2. {
3. W:
```

4. print '0';
5. print '0';
6. X:
7. }

Process Q:
1. **while**(1)
2. {
3. Y:
4. print '1';
5. print '1';
6. Z:
7. }

Synchronization statements can be inserted only at points W, X, Y and Z. Which of the following will always lead to an output string with '001100110011'?

1.   Ans P(S) at W, V(T) at X, P(T) at Y, V(S) at Z, S initially 1 and T initially 0

64 .A counting semaphore S is initialized to 10. Then, 6 P operations and 4 V operations are performed on S. What is the final value of S?

Consider the methods used by processes P1 and P2 for accessing their critical sections whenever needed, as given below. The initial values of shared boolean variables S1 and S2 are randomly assigned.

Method Used by P1	Method Used by P2
while (S1 == S2) ;	while (S1 != S2) ;
Critica1 Section	Critica1 Section
S1 = S2;	S2 = not (S1);

Which one of the following statements describes the properties achieved?
(a) Mutual exclusion but not progress
(b) Progress but not mutual exclusion
(c) Neither mutual exclusion nor progress
(d) Both mutual exclusion and progress

DATA STRUCTURES

1. **What is a Data Structure?**

A data structure is a way of organizing the data so that the data can be used efficiently. Different kinds of data structures are suited to different kinds of applications, and some are highly specialized to specific tasks. For example, B-trees are particularly well-suited for implementation of databases, while compiler implementations usually use hash tables to look up identifiers.

2. **What are linear and non linear data Structures?**

   - **Linear:** A data structure is said to be linear if its elements form a sequence or a linear list. Examples: Array. Linked List, Stacks and Queues
   - **Non-Linear:** A data structure is said to be non-linear if traversal of nodes is nonlinear in nature. Example: Graph and Trees.

3. **What are the various operations that can be performed on different Data Structures?**

   - **Insertion** ? Add a new data item in the given collection of data items.
   - **Deletion** ? Delete an existing data item from the given collection of data items.
   - **Traversal** ? Access each data item exactly once so that it can be processed.
   - **Searching** ? Find out the location of the data item if it exists in the given collection of data items.
   - **Sorting** ? Arranging the data items in some order i.e. in ascending or descending order in case of numerical data and in dictionary order in case of alphanumeric data.

4. **How is an Array different from Linked List?**

- The size of the arrays is fixed, Linked Lists are Dynamic in size.
- Inserting and deleting a new element in an array of elements is expensive, Whereas both insertion and deletion can easily be done in Linked Lists.
- Random access is not allowed in Linked Listed.
- Extra memory space for a pointer is required with each element of the Linked list.
- Arrays have better cache locality that can make a pretty big difference in performance.

5. **What is Stack and where it can be used?**

Stack is a linear data structure which the order LIFO(Last In First Out) or FILO(First In Last Out) for accessing elements. Basic operations of stack are : **Push, Pop , Peek**
Applications of Stack:

1. Infix to Postfix Conversion using Stack
2. Evaluation of Postfix Expression
3. Reverse a String using Stack
4. Implement two stacks in an array
5. Check for balanced parentheses in an expression

6. **What is a Queue, how it is different from stack and how is it implemented?**

Queue is a linear structure which follows the order is **F**irst **I**n **F**irst **O**ut (FIFO) to access elements. Mainly the following are basic operations on queue: **Enqueue, Dequeue**, **Front, Rear**
The difference between stacks and queues is in removing. In a stack we remove the item the most recently added; in a queue, we remove the item the least recently added. Both Queues and Stacks can be implemented using Arrays and Linked Lists.

7. What are Infix, prefix, Postfix notations?

Infix notation: X + Y – Operators are written in-between their operands. This is the usual way we write expressions. An expression such as

A * (B + C) / D

Postfix notation (also known as "Reverse Polish notation"): X Y + Operators are written after their operands. The infix expression given above is equivalent to

A B C + * D/

Prefix notation (also known as "Polish notation"): + X Y Operators are written before their operands. The expressions given above are equivalent to

/ * A + B C D

8. What is a Linked List and What are its types?

A linked list is a linear data structure (like arrays) where each element is a separate object. Each element (that is node) of a list is comprising of two items – the data and a reference to the next node.Types of Linked List :

- **Singly Linked List :** In this type of linked list, every node stores address or reference of   next node in list and the last node has next address or reference as NULL. For example 1-   >2->3->4->NULL

- **Doubly Linked List :** Here, here are two references associated with each node, One of the reference points to the next node and one to the previous node. Eg. NULL<-1<->2<- 3->NULL

- **Circular Linked List :** Circular linked list is a linked list where all nodes are connected   to form a circle. There is no NULL at the end. A circular linked list can be a singly   circular linked list or doubly circular linked list. Eg. 1->2->3->1 [The next pointer of last node is pointing to the first]

9. Which data structures are used for BFS and DFS of a graph?

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- Queue is used for BFS
- Stack is used for DFS. DFS can also be implemented using recursion (Note that recursion also uses function call stack).

10. **Can doubly linked be implemented using a single pointer variable in every node?**

Doubly linked list can be implemented using a single pointer.

11. **How to implement a stack using queue?**

A stack can be implemented using two queues. Let stack to be implemented be 's' and queues used to implement be 'q1' and 'q2'. Stack 's' can be implemented in two ways:

- Method 1 (By making push operation costly)
- Method 2 (By making pop operation costly)

12. **How to implement a queue using stack?**

A queue can be implemented using two stacks. Let queue to be implemented be q and stacks used to implement q be stack1 and stack2. q can be implemented in two ways:

- Method 1 (By making enQueue operation costly)
- Method 2 (By making deQueue operation costly)

13. **Which Data Structure Should be used for implementiong LRU cache**

We use two data structures to implement an LRU Cache.

Queue which is implemented using a doubly linked list. The maximum size of the queue will be equal to the total number of frames available (cache size).The most recently used pages will be near rear end and least recently pages will be near front end.

A Hash with page number as key and address of the corresponding queue node as value.

14. **How to check if a given Binary Tree is BST or not?**

If inorder traversal of a binary tree is sorted, then the binary tree is BST. The idea is to simply do inorder traversal and while traversing keep track of previous key value. If current key value is greater, then continue, else return false.

15. **Differentiate between file and structure storage structure.**

The key difference between both the data structure is the memory area that is being accessed. When dealing with the structure that resides the main memory of the computer system, this is referred to as storage structure. When dealing with an auxiliary structure, we refer to it as file structures.

16. **When is a binary search best applied?**

A binary search is an algorithm that is best applied to search a list when the elements are already in order or sorted. The list is searched starting in the middle, such that if that middle value is not the target search key, it will check to see if it will continue the search on the lower half of the list or the higher half. The split and search will then continue in the same manner.

17. **How do you reference all the elements in a one-dimension array?**

To reference all the elements in a one -dimension array, you need to use an indexed loop, So that, the counter runs from 0 to the array size minus one. In this manner, You can reference all the elements in sequence by using the loop counter as the array subscript.

18. **In what areas do data structures are applied?**

Data structures are essential in almost every aspect where data is involved. In general, algorithms that involve efficient data structure is applied in the following areas: numerical analysis, operating system, A.I., compiler design, database management, graphics, and statistical analysis, to name a few.

19. **What is LIFO?**

LIFO is a short form of Last In First Out. It refers how data is accessed, stored and retrieved. Using this scheme, data that was stored last should be the one to be extracted first. This also means that in order to gain access to the first data, all the other data that was stored before this first data must first be retrieved and extracted.

20. **What is a queue?**

A queue is a data structure that can simulate a list or stream of data. In this structure, new elements are inserted at one end, and existing elements are removed from the other end.

21. **What are binary trees?**

A binary tree is one type of data structure that has two nodes, a left node, and a right node. In programming, binary trees are an extension of the linked list structures.

22. **Which data structures are applied when dealing with a recursive function?**

Recursion, is a function that calls itself based on a terminating condition, makes use of the stack. Using LIFO, a call to a recursive function saves the return address so that it knows how to return to the calling function after the call terminates.

23. **What is a stack?**

A stack is a data structure in which only the top element can be accessed. As data is stored in the stack, each data is pushed downward, leaving the most recently added data on top.

24. **Explain Binary Search Tree**

A binary search tree stores data in such a way that they can be retrieved very efficiently. The left subtree contains nodes whose keys are less than the node's key value, while the right subtree contains nodes whose keys are greater than or equal to the node's key value. Moreover, both subtrees are also binary search trees.

25. **What are multidimensional arrays?**

Multidimensional arrays make use of multiple indexes to store data. It is useful when storing data that cannot be represented using single dimensional indexing, such as data representation in a board game, tables with data stored in more than one column.

26. **Are linked lists considered linear or non-linear data structures?**

It depends on where you intend to apply linked lists. If you based it on storage, a linked list is considered non-linear. On the other hand, if you based it on access strategies, then a linked list is considered linear.

27. **How does dynamic memory allocation help in managing data?**

Apart from being able to store simple structured data types, dynamic memory allocation can combine separately allocated structured blocks to form composite structures that expand and contract as needed.

28. **What is FIFO?**

FIFO stands for First-in, First-out, and is used to represent how data is accessed in a queue. Data has been inserted into the queue list the longest is the one that is removed first.

29. **What is an ordered list?**

An ordered list is a list in which each node's position in the list is determined by the value of its key component, so that the key values form an increasing sequence, as the list is traversed.

30. **What is merge sort?**

Merge sort, is a divide-and-conquer approach for sorting the data. In a sequence of data, adjacent ones are merged and sorted to create bigger sorted lists. These sorted lists are then merged again to form an even bigger sorted list, which continues until you have one single sorted list.

31. **Differentiate NULL and VOID**

Null is a value, whereas Void is a data type identifier. A variable that is given a Null value indicates an empty value. The void is used to identify pointers as having no initial size.

32. **What is the primary advantage of a linked list?**

A linked list is an ideal data structure because it can be modified easily. This means that editing a linked list works regardless of how many elements are in the list.

33. **What is the difference between a PUSH and a POP?**

Pushing and popping applies to the way data is stored and retrieved in a stack. A push denotes data being added to it, meaning data is being "pushed" into the stack. On the other hand, a pop denotes data retrieval, and in particular, refers to the topmost data being accessed.

34. **What is a linear search?**

A linear search refers to the way a target key is being searched in a sequential data structure. In this method, each element in the list is checked and compared against the target key. The process is repeated until found or if the end of the file has been reached.

35. **How does variable declaration affect memory allocation?**

The amount of memory to be allocated or reserved would depend on the data type of the variable being declared. For example, if a variable is declared to be of integer type, then 32 bits of memory storage will be reserved for that variable.

36. **What is the advantage of the heap over a stack?**

The heap is more flexible than the stack. That's because memory space for the heap can be dynamically allocated and de-allocated as needed. However, the memory of the heap can at times be slower when compared to that stack.

37. **What is a postfix expression?**

A postfix expression is an expression in which each operator follows its operands. The advantage of this form is that there is no need to group sub-expressions in parentheses or to consider operator precedence.

38. **What is Data abstraction?**

Data abstraction is a powerful tool for breaking down complex data problems into manageable chunks. This is applied by initially specifying the data objects involved and the operations to be performed on these data objects without being overly concerned with how the data objects will be represented and stored in memory.

OBJECT ORIENTED PROGRAMMING TECHNIQUES

1. **Define object oriented programming?**

   OOP is an approach that provides a way of modularizing programs by creating partitioned memory areas for both data and functions that can be used as templates for creating copies of such modules on demand.

2. **List some features of OOP?**

   i. Emphasis is on data rather than procedures.
   ii. Programs that are divided into what are known as objects.
   iii. Follows bottom – up approach in program design.
   iv. Functions that operate on the data of an object are tried together in the data structure.

3. **Define objects?**

   An entity that can store data and send and receive messages. It is an instance of a class.

4. **What are the basic concepts of OOPs?**

   i. Objects
   ii. Class
   iii. Data Abstraction
   iv. Encapsulation
   v. Inheritance
   vi. Polymorphism
   vii. Dynamic binding
   viii. Message passing

5. **Define class?**

   A group of objects that share common properties and relationships. It is a new data type that contains member variables and functions that operate on the variables. A class is defined with a keyword class.

6. **Define data encapsulation?**

   A wrapping up of data and functions into a single unit is known as encapsulation.

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7. What is inheritance?

It is the process by which objects of one class acquire the properties of the another class.

8. Define operator overloading?

The process of making an operator to exhibit different behavior in different instances is known as operator overloading.

9. Define dynamic binding?

Dynamic binding means that the code associated with a given procedure is not known until the time of the call at run time.

10. Give some advantages of OOP's?

i. Through inheritance we can eliminate redundant code and extend the use of existing.
ii. Classes.
iii. Easy to partition the work.
iv. Software complexity can easily be managed.

11. What are the object oriented languages used?

- Object based programming languages
- Object oriented programming languages

12. Give some applications of OOPs?

i. Real time systems
ii. Simulation and modeling
iii. Object oriented databases
iv. CIM/CAD systems

13. Why should we pass the argument as references in friend operator function?

Since the friend functions do not have this pointer, the operand is passed by value as a parameter. So the friend functions have no way to modify the operand. By specifying the parameter to friend operator function as a reference parameter, any changes made to the parameter inside the function affect the operand that generated the call.

14. What is a comment?

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Comments start with a double slash symbol and terminate at the end of the line. A comment may start any where in the line and whatever follows till the end of the line is ignored.

16. List some tokens?

Keywords , identifiers, constants, strings and operators.

17. Define structures and classes?

Structures:-
A hierarchical set of names that refer to an aggregate of data items may have different attributes.
Class:-
Include files, Class declaration ,Class function definition, Main function program
A group of objects that share common properties and relationships. A class is defined with a keyword class.

18. Define arrays?

A collection of data elements arranged to be indexed in one or more dimensions. The arrays are stored in contiguous memory.

19. What are the two ways to create symbolic constant?

• Using a qualifier constant
• Defining a set of integer constants using enum keyword.

20. What are the new operators used in C++?

::   Scope resolution operator
::*   Pointer to member declaration
->*   Pointer to member operator
.*   Pointer to member operator
new   Line feed operator
delete   memory release operator
setw   Field width operator

21. What are the two forms of if statement? Give the syntax also?

The two forms of if statement are
i. Simple if statement
ii. If – else statement
Syntax:-
Form 1:-
If(expression is true)

```
{
Action1;
}
Action2;
```
Form 2:-
```
If (expression is true)
{
Action1;
}
Else
{
Action2;
}
Action3;
```

22. What is an expression?

An expression is a combination of operators, constants and variables arranged as per rules of the language. It may include function calls which return values.

23. Define keywords?

Keywords are explicitly reserved identifiers and cannot be used as names for the program variables or other user defined program elements.

24. Define pointers?

A data type that holds the address of a location in memory.

25. What is an enumerated data type?
A data type consisting of a named set of values. The C++ compiler assigns an integer to each member of the set.

26. What is a main function?

All the C++ programs start with the function main(). Function main returns the integer value that indicates whether the program executed successfully or not.
Syntax:-
Main()
{
}

27. What is the purpose for the return statement?

The return statement is used to return the value from a function. The statement return 0; returns the value 0. The return statement supplies a value from the called function to the calling function.

28. Explain function prototype?

It is used to describe the function interface to the compiler by giving details such as type number and type arguments and the type of return values. Function prototype is a declaration statement in the calling program.
Syntex:-
Type function_name (arguments);

29. What is a call by reference?

A function call mechanism that passes arguments to a function by passing the addresses of the arguments.

30. Define call by value?

A function call mechanism that passes arguments to a function by passing a copy of the value of the arguments.

31. Define macro?

A short piece of text or text template that can be expanded into a longer text.

32. What do you inline function?
A function definition such that each call to the function is in effect replaced by the statements that define the function.

33. What are the situations that inline functions may not work?

1. For function returning values, if a loop, a switch, or a goto exists.
2. For function not returning values, if a return statement exists.
3. If function contains static variables.
4. If inline functions are recursive.
34. What are constant arguments?

The qualifier const tells the compiler that the function should not modify the argument. The compiler will generate an error when this condition is violated.

35. Define virtual function?

A function qualified by the virtual keyword. When a virtual function is called via a pointer, the class of the objected pointed to determine which function definition will be

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used. Virtual functions implement polymorphism whereby objects belonging to different classes can respond to the same message in different ways.

36. Define friend function?

A function that has access to the private members of a class but is not itself a member of the class. An entire class can be a friend of another class.

37. What the two specifications of a class?

The two specifications of a class are:
Class declaration
Class function definition

38. What is a class?

A group of objects that share common properties and relationships. A class is defined with the keyword class.

39. How is a member function of a class defined?

Member function of a class is defined in two places:
1. outside the class definition
2. inside the class definition

40. What are the characteristics of a member function?

• Several different classes can use the same function name. The membership label resolves their scope.
• Member functions can access the private data of the class.
• A member function can call another member function directly, without using the dot operator.

41. Define nesting of member function?

A member function can be called by using its name inside another member function of the same class is known as nesting of member functions.

42. What are the characteristic of a static data member?

1. It is initialized to zero when the first object of its class is created. No other initialization is permitted.
2. Only one copy of the member is created for the entire class and is shared by all the objects of that class no matter how many objects are created.
3. It is visible only within the class, but its lifetime is the entire program.

43. Give the properties of the static member functions?

i. A **static** function can have access to only other static members declared in the same class.
ii. A **static** member function can be called using the class name as class name :: function name

44. How an object as function argument can be done?

This can be done in two ways:
a. A copy of the entire object is passed to the function
b. Only the address of the object is transferred to the function.
The first method is called pass by value and the second method is called pass by reference.

45. What are the characteristics of the friend function?

i. It is not in the scope of the class to which it has been declared as friend.
ii. It can be invoked like a normal function without the help of any object.
iii. It has the objects as the arguments.

46. Define pointer?

A pointer is a data type that holds the address of a location in memory.

47. Explain function overloading?

Function names can be overloaded in C++. We can assign the same name to two or more distinct functions.
(e.g)   Int mul(int a, int b);
      Float mul(float x, float y);

48. Define private base classes?

A base class which allows it's public and protected members to be inherited as private members of the private members of the derived class. Thus the inherited members are accessible to the members and friends of the derived class. But they are not accessible the users of the derived class.

49. Define default argument?

An argument value that is specified in a function declaration and is used if the corresponding actual argument is omitted when the function is called.

50. Give the syntax for calling a member function?

Object name . function name (actual arguments);

51. Define constructor?

A special member function automatically creating an instance of a class. This function has the same name as the class.

52. What are the special characteristics of constructor?

They shoul be declared in the public section. They are invoked automatically when the objects are ceated. They cannot be inherited.

53. What is parameterized constructor?
The constructor that take arguments are called parameterized constructor. When a constructor has been parameterized the object declaration statement such as integer i1 will not work.

53. What are the two ways in which a parameterized constructor can be called?

By calling the constructor explicitly
By calling the constructor implicitly

54. What are the kinds of constructors that we call?

Constructor without arguments
Constructor with arguments

55. What is the advantage of using dynamic initialization?

The advantage of using dynamic initialization is that various initialization formats can be provided using overloaded constructors.

56. What are copy constructors? Explain with example

The constructor that creates a new class object from an existing object of the same class.
Eg:- integer i2(i1) or integer i2 = i1 would define the object i2 at the same time initialize the values of i1.

57. Define destructor?

A function that is called to deallocate the memory of the objects of a class.

58. List the difference between constructor and destructor?

Constructor can have parameters. There can be more than one constructor. Constructors is invoked when from object is declared.

Destructor have no parameters. Only one destructor is used in class. Destructor is invoked up on exit program.

59. Define dynamic constructor?

Allocation of memory to objects at the time of their construction is known as dynamic constructor.

60. What is the advantage of using dynamic initialization?

The advantage of using dynamic initialization is that various initialization formats can be provided using overloaded constructor.

61. Define operator overloading?

A language feature that allows a function or operator to be given more than one definition. For instance C++ permits to add two variables of user defined types with the same syntax that is applied to the basic types. The mechanism of giving such special meaning to an operator is known as operator overloading.

62. Give the operator in C++ which cannot be overloaded?

i.   Sizeof ->size of operator
ii.   :: ->scope resolution opertor
iii.   ?: -> conditional operator
iv.   . ->Membership operator
v.   .* ->pointer to member operator

63. How can we overload a function?

With the help of a special operator called operator function. The general form of an operator function is:
Return type class name :: operator op(arg list)
{
Function body
}

64. Give any four rules for operator overloading?

(i) Only existing operators can be overloaded.
(ii) The overloaded operator must have at least one operand that is of user defined type.
(iii) We cannot used friend functions to overload certain operators.
(iv) Overloaded operators follow the syntax rules of the original operators.

65. What are the steps that involves in the process of overloading?

• Creates a class that defines the data type that is to be used in the overloading operation.
• Declare the operator function operator op() in the public part of a class.
• Define the operator function to implement the required operation.

66. What are the restriction and limitations overloading operators?

Operator function must be member functions are friend functions. The overloading operator must have atleast one operand that is of user defined datatype.

67. Give a function overload a unary minus operator using friend function?

Frinend void operator –(space &s)
{
s.x = -s.x;
s.y = **-s.y;**
s.z = -s.z;
}

68. Define unary and binary operator overloading?

Overloading without explicit arguments t an operator function is known as Unary operator overloading and overloading with a single explicit argument is known as binary operator overloading.

69. Explain overloading of new and delete operators?

The memory allocation operators new and delete can be overloaded to handle memory resource in a customized way. The main reason for overloading these functions is to increase the efficiency of memory management.

70. Define type conversion?

A conversion of value from one data type to another.

71. What are the three types of conversion takes place?

• Conversion from basic type to class type
• Conversion from class type to basic type
• Conversion from one class type to another class type.

72. When and how the conversion function exists?

To convert the data from a basic type to user defined type. The conversion should be defined in user defined object's class in the form of a constructor. The constructor function takes a single argument of basic data type.

73. Give the syntax for overloading with friend functions?

Friend return type operator op(arguments)
{
Body of the function
}

74. Define inheritance?

The mechanism of deriving a new class from an old one is called inheritance. The old class is referred to as the base class and the new one is called the derived class or the subclass.

75. What are the types in inheritance?

i. Single inheritance
ii. Multiple inheritance
iii.Multilevel inheritance
iv. Hierarchical inheritance
v. Hybrid inheritance

76. Explain single inheritance?

A derived class with only one base class is called single inheritance

77. What is multiple inheritance?

A derived class with more than one base class is called multiple inheritance.

78. Define hierarchical inheritance?

One class may be inherited by more than one class. This process is known as hierarchical inheritance.

79. What is hybrid inheritance?

There could be situations where we need to apply two or more type of inheritance to design a program. This is called hybrid inheritance.

80. What is multilevel inheritance?

The mechanism of deriving a class from another derived class is known as multilevel inheritance.

81. What is virtual base class?

The child has two direct base classes parent1 and parent2 which themselves have common base class grand parent. The child inherits the traits of grand parent via two separate paths. It can also inherits directly shown by the broken line. The grand parent is sometimes referred to as indirect base class.

82. What is abstract class?

An abstract class is one that is not used to create objects. An abstract class is designed only to act as a base class. It is a design concept is program development and provides a base upon which other classes may be built.

83. What is nesting of classes?

A class can contain objects of other classes as its members. It is called nesting of classes.
Class A{....};
Class B
{
A a;
};

84. What is polymorphism?

Polymorphism is one of the crucial feature of OOP. It simple means one name multiple forms. It contain run time polymorphism and compile time polymorphism.

85. What are the types of polymorphism?

* Run time polymorphism
* Compile time polymorphism

86. What is compile time polymorphism?

The overloaded member function are selected for invoking by matching arguments both type and number. This information is known to the compiler at the compile time and therefore compiler is able to select the appropriate function for a particular call at the compile time itself. This is called early binding or static binding or static linking. Also known as compile time polymorphism.

88. What the types in compile time polymorphism?
* Function overloading
* Operator overloading

89. What is this pointer?

A unique keyword called this to represent an object has invokes a member function.

90. What is virtual function?

The same function same in both the base and derived classes the function in base class is declared as virtual using the keyword virtual preceding its normal function declaration.

91. What are the rules for virtual function?

1. They cannot be static members
2. They are access by using object pointers
3. A virtual function can be a friend of another class.

92. What is pure virtual function?

A pure virtual function is a function declared in a base class that has no definition relative to the base class.

93. What are the file stream classes in C++?

1. filebuf
2. fstreambase
3. ifstream
4. ofstream
5. fstream

94. What are the file manipulation function in C++?

i. seekg()
ii. seekp()
iii. tellg()
iv. tellp()

95. What are the file open modes?
Ios::app, ios::binary, ios::out, ios::in, ios::ate, ios::nocreate, ios::noreplace,ios::trunk.

96. What are the error handling function in C++?

1. eof()
2. fail()
3. bad()
4. good()

97. Describe principles of object oriented programming?

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a. Classes

A group of objects that share common properties and relationships. It is a new data type that contains member variables and functions that operate on the variables. A class is defined with a keyword class.

b. Objects

c. Abstraction

d. Encapsulation

A wrapping up of data and functions into a single unit is known as encapsulation.

e. Inheritance

It is the process by which objects of one class acquire the properties of the another class.

f. Polymorphism

g. Dynamic binding

Dynamic binding means that the code associated with a given procedure is not known until the time of the call at run time.

h. Message passing

98. Explain object oriented languages?

a. Object based programming languages

b. Object oriented programming languages

99. What are the applications of OOPs?

Advantages:-

i. Through inheritance we can eliminate redundant code and extend the use of existing.

ii. Classes.

iii. Easy to partition the work.

iv. Software complexity can easily be managed.

Applications:-

Real time systems

ii. Simulation and modeling

iii. Object oriented databases

iv. CIM/CAD systems

100. Explain inheritance concept?

Single inheritance

Multiple inheritance

Multilevel inheritance

Hierarchical inheritance

Hybrid inheritance

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DATABASE MANAGEMENT SYSTEMS

1) What is RDBMS?

Relational Data Base Management system is system software that stores and manages access to data held in relational form, laid down by Dr.E.F.Codd

2) What is meant by integrity constraints?

An integrity constraint is a rule that restricts the values for one or more columns in a table.

3) Explain the difference between Primary key and unique key?

Primary key.

1. It doesn‟t allow NULL and DUPLICATE value

2. Table can have only one primary key

Unique Key.

1.Itdoesn‟t allow DUPLICATE value but you can insert any no. of NULL values

2. Table can have more than one Unique keys.

4) What are responsibilities of a DBA?

• Installing and upgrading the Oracle Server and application tools

• Allocating system storage and planning future storage requirements for the

• database system

• Creating primary database storage structures (tablespaces) after application developers have designed an application

• Creating primary objects (tables, views, indexes) once application developers have

• designed an application.

5) What is SGA?

System Global Area or Shared Global Area is a group of shared memory structures that contain data and control information for one instance. If multiple users are concurrently connected to the same instance, the data in the instance's SGA is "shared" among the users.

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6) What is instance?

The combination of the SGA and the Oracle processes (Background Process) is called an Oracle database instance. Instance will start in NOMOUNT stage.

7) What is DB buffer cache?

The database buffer cache is a portion of the SGA that holds copies of the data blocks read from data files. It will maintain two list Least-Recently-Used list (LRU) and

Most-Recently-Used list (MRU).

8) What is Redo log buffer?

The redo log buffer is a circular buffer in the SGA that holds information about changes made to the database. This information is stored in redo entries.

9) What will be there in Private SQL area?

A private SQL area is a memory area that contains data such as bind information and runtime buffers. A private SQL area has a persistent area and a runtime area.

10) What is data dictionary?

Ans.The data dictionary is a collection of database tables and views containing reference information about the database, its structures, and its users. It will maintain the following information

a). Names of all tables and views in the database

b) Names and data types of columns in database tables

c) Privileges of all Oracle users

11) What is checkpoint?

When a checkpoint occurs, Oracle must update the headers of all datafiles to indicate the checkpoint. If you are not enabled CKPT using CHECKPOINT_PROCESS, this job is performed by LGWR, in oracle 8 CKPT by default enabled.

12) Is checkpoint optional? Then which one will take care of ckpt is not present?

Yes. Checkpoint is optional. If you are not enabled CKPT using CHECKPOINT_PROCESS=TRUE, this job is performed by LGWR

13) What is the logical layout of the database?

Tablespaces (Collection of Segments called Tablespace.)

Segments (Collection of may or may not contiguous Extents called Segments.)

Extents (Collection of contiguous Blocks called Extents.)

Blocks (Collection of one or more row pieces called Blocks.)

14) What is PGA?

Program Global Area (PGA) is a memory buffer that contains data and control information for a server process. A PGA is created by Oracle when a server process is started.

15) What is rollback and rolling forward?

Rollback :Undo the uncommitted transactions.

Rolling forward:While performing Instance recovery rolling forward will take place for making rollback segments with committed and uncommitted transactions.

16) What are the different kinds of locks?

General types are exclusive locks and share locks. But further classifications are row level and table level.

17) What is dead lock?

A deadlock is a situation that can occur in multi-user systems that prevents some transactions from continuing work. A deadlock can occur when two or more users are waiting for data locked by each other.

18) What are the types of privileges?

Object privileges and System privileges.

19) What is role and how to create a role

A role is a set of privileges that can be granted to users or to other roles.

Syntax.

SVRMGR> CREATE ROLE <R.NAME> IDENTIFIED BY <P.WORD>;

20) What is auditing?

Auditing keeps track of operations performed by database users. Audit record containing this information like user performing the operation, type of operation, object involved in the operation, date and time of the operation.

21) What is the importance of backup?

Backups of the database's data files and control files are absolutely necessary as part of the strategy to safeguard data against potential media failures that can damage these files.

22) What are the kinds of backups?

Physical backup – Online backup (Hot) and Offline (Cold) backup

Logical backup - Complete, cumulative and incremental backup using export utility.

23) What is recovery?

If hardware, software, network, process, or system failure affects the operation of a database system, you must usually recover the databases and return to normal operations as quickly as possible.

24) What is Normalization?

Normalization is basic to designing a high-performance system. It is the process of breaking down all items to their lowest level, making sure that each piece of data can be uniquely identified and is not duplicated. Process of refining the database.

25) What are database triggers?

A database trigger is a stored PL/SQL block that is associated with a table. Oracle automatically executes a trigger when a specified SQL statement is issued against the table.

26) What is DDBMS?

Distributed Database Management Systems:

A distributed database system appears to a user as a single server but is, in fact, a set of two or more servers. The data on each server can be simultaneously accessed and modified via a network. Each server in the distributed system is controlled by its local database administrator (DBA), and each server cooperates to maintain the consistency of the global database.

27) What is SQL?

Structured Query Language (SQL), pronounced "sequel," is the set of commands

that all programs and users must use to access data within the Oracle database.

28) What are DDL, DML, TCL and DCL?

DDL – Data Definition Language; Create, Alter, Drop and Truncate.

DML – Data Manipulation Language; Insert, Update and Delete.

TCL - Transaction Control Language; Commit, Rollback and Savepoint

DCL - Data Control Language; Grant and Revoke.

29) What is Savepoint?

To identify a point in a transaction to which you can later roll back.

30) What is truncate command?

To remove all rows from a table or cluster and reset the STORAGE parameters to

the values when the table or cluster was created.

31) What is PL/SQL?

PL/SQL (Procedural Language/SQL) is set of procedural capabilities that extend the power of traditional SQL. PL/sql statements can be combined with traditional SQL in variety of SQL products to increase the ease of application programming, and considerably overall system performance.

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Block Structure:

Declare

<Local declaration>

Begin

<Statements>

Exception

<Error handler>

End;

32) What is ODBC?

Open Database Connectivity.

A standard protocol for accessing Relational Database around sql.

33) What is referential integrity constraint?

A referential integrity constraint designates a column or combination of columns as a foreign key and establishes a relationship between that foreign key and a specified primary or unique key, called the referenced key. In this relationship, the table containing the foreign key is called the child table and the table containing the referenced key is called the parent table.

34) Who proposed the relational model? Edgar F. Codd proposed the relational model in 1970.

35) Enlist the types of cursor. They types of cursor are: • Implicit cursor: Declared automatically as soon as the execution of SQL takes place without the awareness of the user. • Explicit cursor: Defined by PL/ SQL which handles query in more than one row.

36) Define database model. A data model determining fundamentally how data can be stored, manipulated and organised and the structure of the database logically is called database model.

37) Define sub-query. A query contained by a query is called Sub-query.

38) Why is group-clause used?

Group-clause uses aggregate values to be derived by collecting similar data.

39) Compare Non-clustered and clustered index Both having B-tree structure, non-clustered index has data pointers enabling one table many non-clustered indexes while clustered index is distinct for every table.

40) Define Aggregate functions. Functions which operate against a collection of values and returning single value is called aggregate functions

41) Define Scalar functions. Scalar function is depended on the argument given and returns sole value.

42) What restrictions can you apply when you are creating views? Restrictions that are applied are: • Only the current database can have views. • You are not liable to change any computed value in any particular view. • Integrity constants decide the functionality of INSERT and DELETE. • Full-text index definitions cannot be applied. • Temporary views cannot be created. • Temporary tables cannot contain views. • No association with DEFAULT definitions.• Triggers such as INSTEAD OF is associated with views.

43) Define "correlated subqueries". A „correlated subquery‟ is a sort of sub query but correlated subquery is reliant on another query for a value that is returned. In case of execution, the sub query is executed first and then the correlated query.

44) Define Data Warehousing. Storage and access of data from the central location in order to take some strategic decision is called Data Warehousing. Enterprise management is used for managing the information whose framework is known as Data Warehousing.

45) Define Join and enlist its types. Joins help in explaining the relation between different tables. They also enable you to select data with relation to data in another table. The various types are: • INNER JOINs: Blank rows are left in the middle while more than equal to two tables are joined. • OUTER JOINs: Divided into Left Outer Join and Right Outer Join. Blank rows are

left at the specified side by joining tables in other side. Other joins are CROSS JOINs, NATURAL JOINs, EQUI JOIN and NON-EQUI JOIN.

46) Define Entity. It can be defined as being a „thing" with an independent existence in the real world.

47) What do you mean by Entity type? A set of entries having similar attributes are entity types.

48) Define Entity Set. Compilation of all entries of any particular type of entry in the database is called Entity Set.

49) What is Denormalization.

DeNormalization is a technique used to access the data from higher to lower normal forms of database. It is also process of introducing redundancy into a table by incorporating data from the related tables.

50) What are all the different normalizations? The normal forms can be divided into 5 forms, and they are explained below -. **First Normal Form (1NF):.**This should remove all the duplicate columns from the table. Creation of tables for the related data and identification of unique columns.**Second Normal Form (2NF):.**Meeting all requirements of the first normal form.Placing the subsets of data in separate tables and Creation of relationships between the tables using primary keys.**Third Normal Form (3NF):.**This should meet all requirements of 2NF. Removing the columns which are not dependent on primary key constraints.**Fourth Normal Form (3NF):.**Meeting all the requirements of third normal form and it should not have multi- valued dependencies.

51) What is a View? A view is a virtual table which consists of a subset of data contained in a table. Views are not virtually present, and it takes less space to store. View can have data of one or more tables combined, and it is depending on the relationship.

52) What is an Index?

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An index is performance tuning method of allowing faster retrieval of records from the table. An index creates an entry for each value and it will be faster to retrieve data.

53) What is a Cursor? A database Cursor is a control which enables traversal over the rows or records in the table. This can be viewed as a pointer to one row in a set of rows. Cursor is very much useful for traversing such as retrieval, addition and removal of database records.

54) What is a relationship and what are they? Database Relationship is defined as the connection between the tables in a database. There are various data basing relationships, and they are as follows:.• One to One Relationship.• One to Many Relationship.• Many to One Relationship.• Self-Referencing Relationship.

55)What is a stored procedure? • Stored Procedure is a function consists of many SQL statement to access the database system. Several SQL statements are consolidated into a stored procedure and execute them whenever and wherever required.

56) What is the difference between DELETE and TRUNCATE commands? • DELETE command is used to remove rows from the table, and WHERE clause can be used for conditional set of parameters. Commit and Rollback can be performed after delete statement. • TRUNCATE removes all rows from the table. Truncate operation cannot be rolled back.

57) What is a constraint?
Constraint can be used to specify the limit on the data type of table. Constraint can be specified while creating or altering the table statement. Sample of constraint are. • NOT NULL. • CHECK.• DEFAULT.• UNIQUE.• PRIMARY KEY.• FOREIGN KEY.

58) What is data Integrity? Data Integrity defines the accuracy and consistency of data stored in a database. It can also define integrity constraints to enforce business rules on the data when it is entered into the application or database.

59) What is Auto Increment? Auto increment keyword allows the user to create a unique number to be generated when a new record is inserted into the table. AUTO INCREMENT

keyword can be used in Oracle and IDENTITY keyword can be used in SQL SERVER.Mostly this keyword can be used whenever PRIMARY KEY is used.

60) Which operator is used in query for pattern matching? LIKE operator is used for pattern matching, and it can be used as -. 1. % – Matches zero or more characters. 2. _(Underscore) – Matching exactly one character.

are product.

COMPUTER NETWORKS

1. **What are layers in OSI model?**
   There are a total of 7 layers
   1. Physical Layer
   2. Data Link Layer
   3. Network Layer
   4. Transport Layer
   5. Session Layer
   6. Presentation Layer
   7. Application Layer

2. **What is Stop-and-Wait Protocol?**
   In Stop and wait protocol, a sender after sending a frame waits for an acknowledgment of the frame and sends the next frame only when acknowledgment of the frame has received.

3. **Differences between Hub, Switch and Router?**

Hub	Switch	Router
Physical Layer Device	Data Link Layer Device	Network Layer Device
Simply repeats signal to all ports	Doesn't simply repeat, but filters content by MAC or LAN address	Routes data based on IP address
Collision domain of all hosts connected through Hub remains one. i.e., if signal sent by any two devices can collide.	Switch divides collision domain, but broadcast domain of connected devices remains same.	It divides both collision and broadcast domains,

4. **What is Piggybacking?**
   Piggybacking is used in bi-directional data transmission in the network layer (OSI model). The idea is to improve efficiency piggyback acknowledgment (of the received data) on the data frame (to be sent) instead of sending a separate frame.

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5. What happens when you type a URL in the web browser?

A URL may contain a request to HTML, image file or any other type.
- If the content of the typed URL is in the cache and fresh, then display the content.
- Else find the IP address for the domain so that a TCP connection can be set up. Browser does a DNS lookup.
- Browser needs to know the IP address for a URL so that it can set up a TCP connection. This is why browser needs DNS service. The browser first looks for URL-IP mapping browser cache, then in OS cache. If all caches are empty, then it makes a recursive query to the local DNS server. The local DNS server provides the IP address.
- Browser sets up a TCP connection using three-way handshake.
- Browser sends a HTTP request.
- Server has a web server like Apache, IIS running that handles incoming HTTP request and sends an HTTP response.
- Browser receives the HTTP response and renders the content.

6. What is DHCP, how does it work?

- The idea of DHCP (Dynamic Host Configuration Protocol) is to enable devices to get IP address without any manual configuration.
- The device sends a broadcast message saying "I am new here"
- The DHCP server sees the message and responds back to the device and typically allocates an IP address. All other devices on network ignore the message of the new device as they are not DHCP server.

In Wi-Fi networks, Access Points generally work as a DHCP server.

7. What is ARP, how does it work?

ARP stands for Address Resolution Protocol. ARP is used to find LAN address from the Network address. A node typically has destination IP to send a packet, the nodes need link layer address to send a frame over a local link. The ARP protocol helps here.
1. The node sends a broadcast message to all nodes saying what is the MAC address of this IP address.
2. Node with the provided IP address replies with the MAC address.
Like DHCP, ARP is a discovery protocol, but unlike DHCP there is not server here

8. What do you mean by Network?

Set of devices connected to each other over the physical medium is known as a computer network. For example the Internet.

9. What do you mean by the TCP/IP Model?

TCP/IP stands for Transmission control protocol and Internet protocol. It describes how the data will get transmitted and routed from end to end communication.

10. What do you mean by TCP and UDP?

TCP stands for Transfer control protocol and UDP stands for User Datagrams protocol and TCP is a connection-oriented protocol and UDP is a Connectionless protocol.

11. What do you mean by a Firewall?

Firewall is a concept of a security system that will helps computers to protect it with unauthorized access or any cyber-attack.

12. What do you mean by DNS?

DNS Stands for Domain Name System. It's an internet address mapping process with the local name. We can also can it as an internet phonebook.

13. What do you mean by Proxy server?

Proxy server prevents the external users which are unauthorized to access the network.

14. What is Bandwidth?
Every line has an upper limit and a lower limit on the frequency of signals it can carry. This limited range is called the bandwidth.

15. Explain RIP (Routing Information Protocol)

It is a simple protocol used to exchange information between the routers.

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16. What is subnet?

A generic term for section of a large networks usually separated by a bridge or router.

17. What is MAC address?
The address for a device as it is identified at the Media Access Control (MAC) layer in the network architecture. MAC address is usually stored in ROM on the network adapter card and is unique.

18. What is multiplexing?
Multiplexing is the process of dividing a link, the phycal medium, into logical channels for better efficiency. Here medium is not changed but it has several channels instead of one.

19. What is ICMP?
ICMP is Internet Control Message Protocol, a network layer protocol of the TCP/IP suite used by hosts and gateways to send notification of datagram problems back to the sender. It uses the echo test / reply to test whether a destination is reachable and responding. It also handles both control and error messages.

20. What are the protocols in application layer ?
The protocols defined in application layer are
• TELNET
• FTP
• SMTP
• DNS

21. What are the protocols in transport layer ?
The protocols defined in transport layer are
• TCP
• UDP

22. What is TELNET ?

TELNET is a client –server application that allows a user to log on to a remote machine,giving the user access to the remote system. TELNET is an abbreviation of terminal Network.

23. What is Hypertext Transfer Protocol(HTTP) ?

It is the main protocol used to access data on the World Wide Web .the protol transfers data in the form of plain text,hypertext,audio,video,and so on. It is so called because its efficiency allows its use in a hypertext environment where there are rapid jumps from one document to another.

24. What is Kerberos?

It is an authentication service developed at the Massachusetts Institute of Technology.

Kerberos uses encryption to prevent intruders from discovering passwords and gaining

unauthorized access to files.

SOFTWARE ENGINEERING

1. **.What is computer software?**

   A. Computer software is a complete package, which includes software program, its documentation and user guide on how to use the software.

2. **Can you differentiate computer software and computer program?**

   A. A computer program is piece of programming code which performs a well defined task where as software includes programming code, its documentation and user guide.

3. **What is software engineering?**

   A. Software engineering is an engineering branch associated with software system development.

4. **When you know programming, what is the need to learn software engineering concepts?**

   A. A person who knows how to build a wall may not be good at building an entire house. Likewise, a person who can write programs may not have knowledge of other concepts of Software Engineering. The software engineering concepts guide programmers on how to assess requirements of end user, design the algorithms before actual coding starts, create programs by coding, testing the code and its documentation.

5. **What are the important categories of software?**
   System software

   Application software

   Embedded software

   Web Applications

   Artificial Intelligence software

   Scientific software

6. **What is software process or Software Development Life Cycle (SDLC)?**

A. Software Development Life Cycle, or software process is the systematic development of software by following every stage in the development process namely, Requirement Gathering, System Analysis, Design, Coding, Testing, Maintenance and Documentation in that order.

7. **What are SDLC models available?**

   A. There are several SDLC models available such as Waterfall Model, Iterative Model, Spiral model, Agile Model etc.

8. **What are various phases of SDLC?**

   A. The generic phases of SDLC are: Requirement Gathering, System Analysis and Design, Coding, Testing and implementation. The phases depend upon the model we choose to develop software.

9. **Which SDLC model is the best?**

   A. SDLC Models are adopted as per requirements of development process. It may very software-to-software to ensuring which model is suitable.

   We can select the best SDLC model if following answers are satisfied -

   - Is SDLC suitable for selected technology to implement the software ?
   - Is SDLC appropriate for client's requirements and priorities ?
   - Is SDLC model suitable for size and complexity of the software ?
   - Is the SDLC model suitable for type of projects and engineering we do ?
   - Is the SDLC appropriate for the geographically co-located or dispersed developers ?

10. **What is software project management?**

    A. Software project management is process of managing all activities like time, cost and quality management involved in software development.

11. **Who is software project manager?**

    A. A software project manager is a person who undertakes the responsibility of carrying out the software project.

12. **What does software project manager do?**

    A. Software project manager is engaged with software management activities. He is responsible for project planning, monitoring the progress, communication among stakeholders, managing risks and resources, smooth execution of development and delivering the project within time, cost and quality contraints.

13. **What is software scope?**

    A. Software scope is a well-defined boundary, which encompasses all the activities that are done to develop and deliver the software product.

    The software scope clearly defines all functionalities and artifacts to be delivered as a part of the software. The scope identifies what the product will do and what it will not do, what the end product will contain and what it will not contain.

14. **What is project estimation?**

    A. It is a process to estimate various aspects of software product in order to calculate the cost of development in terms of efforts, time and resources. This estimation can be derived from past experience, by consulting experts or by using pre-defined formulas.

15. **How can we derive the size of software product?**

    A. Size of software product can be calculated using either of two methods -

- Counting the lines of delivered code
- Counting delivered function points

16. **What are function points?**

    A. Function points are the various features provided by the software product. It is considered as a unit of measurement for software size.

17. **What are software project estimation techniques available?**

    A. There are many estimation techniques available.The most widely used are -

- Decomposition technique (Counting Lines of Code and Function Points)

- Empirical technique (Putnam and COCOMO).

18. **What is Software configuration management?**

A. Software Configuration management is a process of tracking and controlling the changes in software in terms of the requirements, design, functions and development of the product.

19. **What is change control?**

A. Change control is function of configuration management, which ensures that all changes made to software system are consistent and made as per organizational rules and regulations.

20. **How can you measure project execution?**

A. We can measure project execution by means of Activity Monitoring, Status Reports and Milestone Checklists.

21. **Mention some project management tools.**

A. There are various project management tools used as per the requirements of software project and organization policies. They include Gantt Chart, PERT Chart, Resource Histogram, Critical Path Analysis, Status Reports, Milestone Checklists etc.

22. **What are software requirements?**

A. Software requirements are functional description of proposed software system. Requirements are assumed to be the description of target system, its functionalities and features. Requirements convey the expectations of users from the system.

There many ways to keep track of requirements.

Two commonly used are:

Make a requirements specifications document to list all of the requirements.

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Create an excel sheet the list down the requirement, type, dependency, priority, etc

23. **What is feasibility study?**

A. It is a measure to assess how practical and beneficial the software project development will be for an organization. The software analyzer conducts a thorough study to understand economic, technical and operational feasibility of the project.

- **Economic** - Resource transportation, cost for training, cost of additional utilities and tools and overall estimation of costs and benefits of the project.

- **Technical** - Is it possible to develop this system ? Assessing suitability of machine(s) and operating system(s) on which software will execute, existing developers' knowledge and skills, training, utilities or tools for project.

- **Operational** - Can the organization adjust smoothly to the changes done as per the demand of project ? Is the problem worth solving ?

24. **How can you gather requirements?**

A. Requirements can be gathered from users via interviews, surveys, task analysis, brainstorming, domain analysis, prototyping, studying existing usable version of software, and by observation.

25. **What is SRS?**

A. SRS or Software Requirement Specification is a document produced at the time of requirement gathering process. It can be also seen as a process of refining requirements and   documenting them.

26. **What are functional requirements?**

A. Functional requirements are functional features and specifications expected by users from the proposed software product.

27. **What are non-functional requirements?**

    A. Non-functional requirements are implicit and are related to security, performance, look and feel of user interface, interoperability, cost etc.

28. **What is modularization?**

    A. Modularization is a technique to divide a software system into multiple discreet modules, which are expected to carry out task(s) independently.

29. **What is concurrency and how it is achieved in software?**

    A. Concurrency is the tendency of events or actions to happen simultaneously. In software, when two or more processes execute simultaneously, they are called concurrent processes.

    Example

    While you initiate print command and printing starts, you can open a new application.

    Concurrency, is implemented by splitting the software into multiple independent units of execution namely processes and threads, and executing them in parallel.

30. **Mentions some software analysis & design tools?**

    A. These can be: DFDs (Data Flow Diagrams), Structured Charts, Structured English, Data Dictionary, HIPO (Hierarchical Input Process Output) diagrams, ER (Entity Relationship) Diagrams and Decision tables.

31. **What is level-0 DFD?**

    A. Highest abstraction level DFD is known as Level 0 DFD also called a context level DFD, which depicts the entire information system as one diagram concealing all the underlying details.

32. **What is the difference between function oriented and object oriented design?**

    A. Function-oriented design is comprised of many smaller sub-systems known as functions. Each function is capable of performing significant task in the system. Object

oriented design works around the real world objects (entities), their classes (categories) and methods operating on objects (functions).

33. **Briefly define top-down and bottom-up design model.**

    A. Top-down model starts with generalized view of system and decomposes it to more specific ones, whereas bottom-up model starts with most specific and basic components first and keeps composing the components to get higher level of abstraction.

34. **Differentiate validation and verification?**

    A. Validation checks if the product is made as per user requirements whereas verification checks if proper steps are followed to develop the product.

    Validation confirms the right product and verification confirms if the product is built in a right way.

35. **What is black-box and white-box testing?**

    A. Black-box testing checks if the desired outputs are produced when valid input values are given. It does not verify the actual implementation of the program.

    White-box testing not only checks for desired and valid output when valid input is provided but also it checks if the code is implemented correctly.

Criteria	Black Box Testing	White Box Testing
Knowledge of software program, design and structure essential	No	Yes
Knowledge of Software Implementation essential	No	Yes
Who conducts this test on software	Software Testing Employee	Software Developer
Baseline reference for tester	Requirements specifications	Design and structure details

36. **Quality assurance vs. Quality Control?**

    A. Quality Assurance monitors to check if proper process is followed while software developing the software.

Quality Control deals with maintaining the quality of software product.

37. **What are various types of software maintenance?**

A. Maintenance types are: corrective, adaptive, perfective and preventive.

- **Corrective**

  Removing errors spotted by users

- **Adaptive**

  tackling the changes in the hardware and software environment where the software works

- **Perfective maintenance**

  implementing changes in existing or new requirements of user

- **Preventive maintenance**

  taking appropriate measures to avoid future problems

38. **What is software re-engineering?**

A. Software re-engineering is process to upgrade the technology on which the software is built without changing the functionality of the software. This is done in order to keep the software tuned with the latest technology.

39. **What are CASE tools?**

A. CASE stands for Computer Aided Software Engineering. CASE tools are set of automated software application programs, which are used to support, accelerate and smoothen the SDLC activities.

40. **What are the messages and the dynamic diagrams?**

Messages are the specifications for any sort of communication. When a message is passed then the estimated action is expected which is basically a statement for the

execution that held prior. Dynamic diagrams are also called the behavioral diagrams. The names of few of the dynamic diagrams are:

Use case diagram

Sequence diagram

Collaboration diagram

Activity diagram

Statechart diagram.

41. What are the elements which are utilized in the state chart diagram?

The elements which are in the state chart diagram are:

Initial state

State

Transition

Event and action

Final state

42. What are the different parts of a deployment diagram?

The deployment program consists of the –

Nodes

Components

Dependencies

Links

43. Name some of the roles that are played by the packages, modules and wrappers?

Modules are known as component diagrams which include the physical computers as a node and display the different packages inside it is a component.

Packages are used to organize the different classes, all at one place.

Wrappers are collectively used to constitute the multiple packages which include the content from it.

44. What do you understand by relationships in UML?

There are basically three different kinds of relationships which are -

Dependencies - They are the relationship between two different entities. If any single entity is changed then the impact would be laid on the other too. It also depicts that one class use another class as an argument in the signature of the operation.

Generalization - In this relationship, the specified class and subclass ratio is evaluated. It also depicts that one entity inherits the properties of the other entity.

Association - Association is a structural relationship between two different objects.

45. Tell us the difference between activity and sequence diagrams?

Sequence diagrams basically show the way of processing or the execution of the process with any of the sequence. Sequence diagrams are entirely focused on the representative interaction among different objects.

On the other hand, activity diagrams actually detect the following phases-

Depicts the operational workflow in a system.

Shows the actions and sequences for a number of objects.

46. What are the elements which are used in activity diagrams?

The significant elements which are used in activity diagrams are:

Activities - it indicates the action which has to be performed or had been performed in the system.

Transitions - they are represented by an arrow and used to indicate the floor that is occurring among the elements in the diagram.

Decision points - in the system the logical branching is highlighted by the decision points.

States - these are indicated in order to mention the milestones for the processing of activity diagrams and is shown by a rounded rectangle.

47. Can you name the different elements with the collaboration diagram?

There are basically three types of elements of a collaborative diagram:

Object - the interaction in a system always takes place between two objects. An object is always depicted by a rectangle with the name of the object. This is preceded by a colon and an underline.

Relation - it is also known as an association which is always among the objects which are linked with the connection in a system. They are depicted by placing the qualifiers on both ends.

Message - An instance of communication from one point to the other significant point or destination is a message. It always depicts the interaction that is offering between the objects in a system. The sequence of this interaction is directly shown by the number.

48. What is known as static diagrams?

Static diagrams are also known as the structural diagrams. They are known by the following names-

- o Class diagram
- o Object diagram
- o Component diagram
- o Deployment diagram.

49. What do you understand by SDLC and name its processes?

SDLC stands for the software development life cycle and it is an amalgamation of the number of processes. This entire life cycle is divided into several phases. The major of them are:

- o Use case driven
- o Architecture-centric
- o Iterative
- o Incremental

50. Can you give us a brief defining the architecture?

Architecture means with the structural and behavioral aspects of the entire software system. It significantly monitors over the software usage and the functionality evolving around it. With architecture, the entire performance is economical and all the technical constants can be well managed.

51. What are the modelling diagrams that are most commonly used?

The most frequently used modeling diagrams are 9 in number. These are as:

- o Use case diagram
- o Class diagram
- o Object diagram
- o Sequence diagram
- o State chart diagram
- o Collaboration diagram
- o Activity diagram
- o Component diagram
- o Deployment diagram

52. Can you tell us a few advantages of creating a model?

There are a number of advantages for creating any model like:

They help to document the entire system.

They help to make templates for the construction in the system.

They help in the visualization of the system.

The structural dimensions of a system can be specified.

Modeling is entirely accepted by the engineering technique.

53. What are the different views that have to be considered before the buildup of an object oriented software system?

Before the actual building up of an object-oriented software system, there are generally 5 views-

Use case view - it exposes the requirements of any system.

Design view - it captures the vocabulary of the system.

Process view - this view models the distribution across the system.

Implementation view - this view addresses the implementation of the system.

Deployment view - this view focuses over the components which are required for the deployment of the system.

54. Can you name the types of modelling?

There are basically three types of modeling used

Architectural modeling

Behavioral modeling

Structural Modeling.

55. What do you understand by UML?

UML stands for the Unified Modelling Language and it is also a graphical language for visualization, construction and documenting for the artifacts of any of the system. You can efficiently create the blueprints for various aspects before the actual physical implementation of the system occurs.

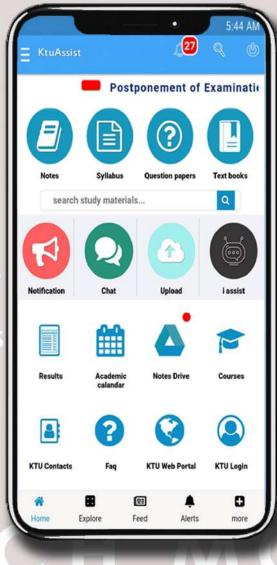### 56. What are the different software architectural styles?

Pipe and Filter

Layered Architecture

Data Centered Architecture

Model View Controller