NEW HORIZON
COLLEGE OF ENGINEERING
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
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# Employability Enhancement Initiative

## Frequently Asked Questions

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# Frequently Asked Questions in Data Structures

1. Why do we use stacks?

   Stacks follows LIFO method and for addition and retrieval of a data item it takes only O(n) time. Stacks are used whenever we need to access data in the reverse order on their arrival. Stacks are used commonly in recursive function calls, expression parsing, depth first traversal of graphs etc.

2. What is data-structure?

   Data structure is a way of defining, storing & retrieving of data in a structural & systematic way. A data structure may contain different type of data items.

3. How insertion sort and selection sorts are different?

   Both sorting techniques maintains two sub-lists, sorted and unsorted. Both the methods take one element at a time and place it into sorted sub-list. Insertion sort works on the current element in hand and places it in the sorted array at appropriate location by maintaining the properties of insertion sort. Whereas, selection sort searches the minimum from the unsorted sub-list and replaces it with the current element in hand.

4. What is divide and conquer method?

   The basic idea is to divide the problem into several sub problems beyond which cannot be further subdivided. Then solve the sub problems efficiently and join them together to get the solution for the main problem.

5. What are the values for balance factor for an AVL tree? and Explain the types of rotations in AVL tree.

   Balance factors: 0, 1 or –1

   AVL trees have Left (L), Left Right (LR), Right (R), Right Left (RL) rotations to balance the tree to maintain the balance factor.

6. How is an Array different from Linked List?

   The size of the arrays is fixed; Linked Lists are Dynamic in size.

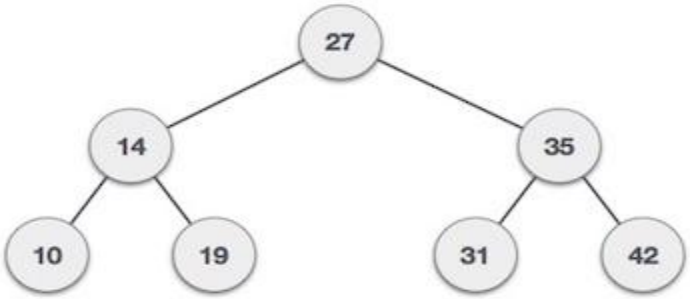
   Inserting and deleting a new element in an array of elements is expensive, whereas both insertion and deletion can easily be done in Linked Lists.

   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.

7. For the given binary search tree, traverse it using all the available methods




In-order traversal − 10 14 19 27 31 35 42

Pre-order traversal − 27 14 10 19 35 31 42

Post-order traversal − 10 19 14 31 42 35 27

8. What are threaded binary trees?

If a node in a binary tree is not having left or right child or if it is a leaf node then that absence of child node is represented by the null pointers.

The space occupied by these null entries can be utilized to store some kind of valuable information. One possible way to utilize this space is to have special pointer

that point to nodes higher in the tree that is ancestors. These special pointers are called threads and the binary tree having such pointers is called threaded binary tree.

There are many ways to thread a binary tree each of these ways either correspond in-order or pre-order traversals.

9. Explain doubly linked list.

It is a collection of data elements called nodes, where each node is divided into three parts

i) An info field that contains the information stored in the node
ii) Left field that contain pointer to node on left side
iii) Right field that contain pointer to node on right side

10. What do you mean by overflow and underflow?

When new data is to be inserted into the data structure but there is no available space i.e. free storage list is empty this situation is called overflow. When we want to delete data from a data structure that is empty this situation is called underflow.

11. What is d-queue?

D-queue stands for double ended queue. It is a abstract data structure that implements a queue for which elements can be added to front or rear and the elements can be removed from the rear or front. It is also called head-tail linked list.

12. What are the limitations of arrays?

i) Arrays are of fixed size.
ii) Data elements are stored in continuous memory locations which may not be available always.
iii) Adding and removing of elements is problematic because of shifting the locations.

13. Convert the expression ((A + B) * C - (D - E) ^ (F + G)) to equivalent Prefix and Postfix notations.

Prefix Notation: - * +ABC ^ - DE + FG
Postfix Notation: AB + C * DE - FG + ^ -

14. What are the major data structures used in the following areas: RDBMS, Network data model and Hierarchical data model.
RDBMS = Array (i.e. Array of structures)
Network data model = Graph
Hierarchical data model = Trees

15. Differentiate linear from non linear data structure.
Linear data structure is a structure wherein data elements are adjacent to each other. Examples of linear data structure include arrays, linked lists, stacks and queues. On the other hand, non-linear data structure is a structure wherein each data element can connect to more than two adjacent data elements. Examples of non linear data structure include trees and graphs.

16. 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.

17. What is a linear search?

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

18. 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.

19. 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.

20. What is hashing?
Hashing is a technique to convert a range of key values into a range of indexes of an array. By using hash tables, we can create associative data storage where data index can be found by providing its key values.

21. Arrays are best data structures
    a. for the size of the structure and the data in the structure are constantly changing
    b. for relatively permanent collections of data
    c. for both of above situation
    d. for none of above situation

Answer: b

22. Consider the following operations performed on a stack of size 5

```
Push(1);
Pop();
Push(2);
Push(3);
Pop();
Push(4);
Pop();
Pop();
Push(5);
```

After the completion of all operation, the number of elements present on stack is
    a. 1
    b. 2
    c. 3
    d. 4

Answer: a

23. The prefix form of A-B/ (C * D ^ E) is
    a. -/*^ACBDE
    b. -ABCD*^DE
    c. -A/B*C^DE
    d. -A/BC*^DE

Answer: c

24. What is the result of the following operation
Top (Push (S, X))

a. X

b. Null

c. S

d. None

Answer: a

25. The result of evaluating the postfix expression 5, 4, 6, +, *, 4, 9, 3, /, +, * is

a. 600
b. 350
c. 650
d. 588

Answer: b

26. In linked list implementation of a queue, where does a new element be inserted?
At the head of link list
At the tail of the link list
At the middle position in the link list
None

Answer: b

27. Which of the following is a collection of items into which items can be inserted arbitrarily and from which only the smallest item can be removed?

Ascending priority queue

Descending priority queue

FIFO queue

None of these

Answer: a

28. In Binary trees nodes with no successor are called.....
    a. End nodes
    b. Terminal nodes
    c. Final nodes
    d. Last nodes

    Answer: b

29. The post order traversal of binary tree is DEBFCA. Find out the pre-order traversal
    ABFCDE
    ADBFEC
    ABDECF
    ABDCEF

    Answer: c

30. In a binary tree, certain null entries are replaced by special pointers which point to nodes higher in the tree for efficiency. These special pointers are called.....

    Leaf
    Branch
    Path
    Thread

    Answer: d

31. A complete binary tree with the property that the value at each node is at least as large as the values at its children is called

    Binary search tree
    Binary tree
    Completely balanced tree
    Heap

    Answer: d

32. A Sorting algorithm is stable if
    a. its time complexity is constant irrespective of the nature of input.
    b. preserves the original order of records with equal keys.
    c. its space complexity is constant irrespective of the nature of input.
    d. it sorts any volume of data in a constant time.

    Answer: b

33. A Red Black tree is

Binary tree with the nodes as red or black colors

Binary tree with root as either red or black

Binary search tree with an additional attribute for its nodes

All the above

Answer: c

34. A binary search tree is generated by inserting the integers in the following order: 50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24. The number of nodes in the left sub-tree and right sub-tree of the root, respectively is

a. (4, 7)
b. (7, 4)
c. (8, 3)
d. (3, 8)

Answer: b

35. In a max heap
Only maximum values are stored
child nodes have maximum value than parent node
c. parent nodes have maximum value than child nodes
d. root has minimum value

Answer: c

36. A variant of linked list in which last node of the list points to the first node of the list is
a. Singly linked list
b. Doubly linked list
c. Circular linked list
d. Multiply linked list

Answer: c

37. In circular linked list, insertion of node requires modification of?

a. One pointer
b. Two pointers
c. Three pointers
d. None

Answer: b

38. Which Data Structure is used to perform Recursion?

a. Queue
b. Tree
c. Linked List
d. Stack

Answer: d

39. Minimum number of moves required to solve a *Tower of Hanoi* puzzle is

a. $2^n - 1$
b. $2^{n-1}$
c. $2n^2$
d. $2n - 1$

Answer: a

40. Which of the following algorithm design technique is used in the quick sort algorithm?

a. Dynamic programming
b. Backtracking
c. Divide-and-conquer
d. Greedy method

Answer: c

41. Quick sort is also known as .....

a. merge sort
b. tree sort
c. shell sort
d. partition and exchange sort

Answer: d

42. In which searching you have less number of comparisons?.

a. Linear search
b. Interpolation search
c. Binary search
d. None of the above

Answer: b

43. Worst case occurs in Linear search when

a. Item is found at middle
b. Item is the last element
c. Item is not in the array
d. both C & B

Answer: d

44. Which of the following searching technique require the data to be in sorted form

a. binary search
b. interpolation search
c. both a and b
d. linear search

Answer: c

45. A tree in which, for every node, the difference between the height of its left subtree and right subtree is not more than one is

a. AVL Tree.
b. Complete Binary Tree.
c. B – Tree.
d. +B Tree.

Answer: a

46. Which indicates pre-order traversal?

a. Left sub-tree, Right sub-tree and root
b. Right sub-tree, Left sub-tree and root
c. Root, Left sub-tree, Right sub-tree
d. Right sub-tree, root, Left sub-tree

Answer: c

47. Which of the following is/are properties of Red-black tree?
Every node is either red or black
The root is red
If a node is red then both its children are black
Every leaf is black

i, ii and iii only
i, iii and iv only
i, ii and iv only
All i, ii, iii and iv

Answer: b

48. The in-order traversal of tree will yield a sorted listing of elements of tree in .....
a. binary trees
b. binary search trees
c. heaps
d. binary heaps

Answer: b

49. Level of any node of a tree is
a. Its distance from the root
b. Height of its right subtree minus height of its left subtree
c. Height of its left subtree minus height of its right subtree
d. None of these

Answer: a

50. A mathematical-model with a collection of operations defined on that model is called
Data Structure
Algorithm
Primitive Data Type
Abstract Data Type
Answer: d

# Frequently Asked Questions in C Programming Language

1. **Comment on the output of this C code?**

```
#include <stdio.h>
   int main()
   {
      float f1 = 0.1;
      if (f1 == 0.1)
         printf("equal\n");
      else
         printf("not equal\n");
   }
```

A) equal

B) not equal

C) output depends on compiler

D) none of the mentioned

Answer: B

2. **Comment on the output of this C code?**

```
#include <stdio.h>
   int main()
   {
      float f1 = 0.1;
      if (f1 == 0.1f)
         printf("equal\n");
      else
         printf("not equal\n");
   }
```

a) equal

b) not equal

c) output depends on compiler

d) none of the mentioned

Answer: a

3. **What is the output of this C code (on a 32-bit machine)?**

```
#include <stdio.h>
```

```
int main()
{
   int x = 10000;
   double y = 56;
   int *p = &x;
   double *q = &y;
   printf("p and q are %d and %d", sizeof(p), sizeof(q));
   return 0;
}
```

a) p and q are 4 and 4

b) p and q are 4 and 8

c) Compiler error

d) p and q are 2 and 8

Answer: a

**4. Which is correct with respect to size of the datatypes?**

a) char > int > float

b) int > char > float

c) char < int < double

d) double > char > int

Answer: c

**5. What is the output of this C code?**

```
#include <stdio.h>
   int main()
   {
      float x = 'a';
      printf("%f", x);
      return 0;
   }
```

a) a

b) run time error

c) a.0000000

d) 97.000000

Answer: d

Explanation: Since the ASCII value of a is 97, the same is assigned to the float variable and printed.

6. **Which of the datatypes have size that is variable?**

a) int

b) struct

c) float

d) double

Answer: b

Explanation: Since the size of the structure depends on its fields, it has a variable size.

7. **What is the output of this C code?**

```
#include <stdio.h>
   int main()
   {
      enum {ORANGE = 5, MANGO, BANANA = 4, PEACH};
      printf("PEACH = %d\n", PEACH);
   }
```

a) PEACH = 3

b) PEACH = 4

c) PEACH = 5

d) PEACH = 6

Answer: c

Explanation: In enum, the value of constant is defined to the recent assignment from left.

8. **What is the output of this C code?**

```
#include <stdio.h>
   int main()
   {
      printf("C programming %s", "Class by\n%s MCA", "WOW");
   }
```

a) C programming Class by WOW MCA

b) C programming Class by\n%s MCA

c) C programming Class by %s MCA

d) Compilation error

Answer: c

9. **For the following code snippet:**
   **char *str = “Sanfoundry.com\0” “training classes”;**
   **The character pointer str holds reference to string**

a) Sanfoundry.com

b) Sanfoundry.com\0training classes

c) Sanfoundry.comtraining classes

d) Invalid declaration

Answer: b

10. **What is the output of this C code?**

```
#include <stdio.h>
  #define a 10
  int main()
  {
     const int a = 5;
     printf("a = %d\n", a);
  }
```

a) a = 5

b) a = 10

c) Compilation error

d) Runtime error

a) a = 5

Answer: c

11. **What is the output of this C code?**

```
#include <stdio.h>
  int main()
  {
     int var = 010;
     printf("%d", var);
  }
```

a) 2

b) 8

c) 9

d) 10

Answer: b

**12. What is the output of this C code?**

```
#include <stdio.h>
   enum birds {SPARROW, PEACOCK, PARROT};
   enum animals {TIGER = 8, LION, RABBIT, ZEBRA};
   int main()
   {
      enum birds m = TIGER;
      int k;
      k = m;
      printf("%d\n", k);
      return 0;
   }
```

a) 0

b) Compile time error

c) 1

d) 8

Answer: d

**13. What is the output of this C code?**

```
#include <stdio.h>
   void main()
   {
      m();
      m();
   }
   void m()
   {
      static int x = 5;
      x++;
      printf("%d", x);
   }
```

a) 6 7

b) 6 6

c) 5 5

d) 5 6

Answer: a

**14. What is the output of this C code?**

```
#include <stdio.h>
   void main()
   {
      static int x;
      printf("x is %d", x);
   }
```

a) 0

b) 1

c) Junk value

d) Run time error

Answer: a

**15. What is the output of this C code?**

```
#include <stdio.h>
   void main()
   {
      static double x;
      int x;
      printf("x is %d", x);
   }
```

a) Nothing

b) 0

c) Compile time error

d) Junkvalue

Answer: c

**16. What is the output of this C code?**

```
 #include <stdio.h>
   void main()
   {
      static int x;
      if (x++ < 2)
      main();
   }
```

a) Infinite calls to main

b) Run time error

c) Varies

d) main is called twice

Answer: d

**17. Which of following is not accepted in C?**

a) static a = 10; //static as

b) static int func (int); //parameter as static

c) static static int a; //a static variable prefixed with static

d) all of the mentioned

Answer: d

**18. Which of the following are C preprocessors?**

a) #ifdef

b) #define

c) #endif

d) all of the mentioned

Answer: d

**19. #include statement must be written**

a) Before main()

b) Before any scanf/printf

c) After main()

d) It can be written anywhere

Answer: b

**20. What is the output of this C code?**

```
#include <stdio.h>
   int main()
   {
      int one = 1, two = 2;
      #ifdef next
      one = 2;
```

```
    two = 1;
    #endif
    printf("%d, %d", one, two);
  }
```

a) 1

b) 1

c) 2

d) 2

Answer: b

**21.** What is meant by void function?

The functions that return no value are declared as void. The data type of a function is treated as int, if no data type is explicitly mentioned.

**22.** What are header file?

A header file comprises of all standard declarations and definitions for pre defined functions.

One can include the header file in the program by using a preprocessor directive.

The other header files are iomanip.h, stdio.h, ctype.h, fstream.h etc.

A processor directive starts with #, which instructs the compiler to do the required job.

**23.** What are variables?

Variables are user defined named entities of memory locations that can store data.

**24.** What is a file scope?

A variable declared all blocks and functions (precisely main()) has the scope of a file. The scope of a file scope variable is the entire program. The life time of a file scope variable is the life time of a program.

**25.** What is break statement?

A loop's execution is terminated when the test condition evaluates to false. Under certain situations one desires to terminate the loop, irrespective of the test expression.

**26.** What data types can be used in two dimensional arrays?

The dimensions of an array can be indicated.

Using integer constants.

Using char constants.

Using enum identifiers.

Using const identifier of integer or ordinal.

**27.** What is the use of parameters passing in functions?

The call statement communicates with the function through arguments or parameters.
Parameters are the channels through which data flows from call statement to function and vice versa.

**28.** What are pointer variables?

Pointer variables can store the address of other variables but the addresses stored in pointer variable should be of the same data type a pointer variable is point int to.

**29.** Explain the memory representation of 2-D arrays?

A 2-D array is stored in sequential memory blocks. The elements are stored either, Row wise manner (this method is called as row-major order). Column wise manner (this method is called as column-major order).

**30.** What is meant by Identifiers?

Identifiers are also called as variables.

Variables are memory boxes that hold values or constants.

A variable name must begin with an alphabet or underscore followed by alphabets or numbers.

**31.** What is built in data type?

Built in Data Type is also called as Fundamental or Basic data type. They are predefined in the compiler.

# Frequently Asked Questions in Object Oriented Programming Concepts using C++

1. What is C++?

   C++ is created by Bjarne Stroustrup of AT&T Bell Labs as an extension of C, C++ is an object-oriented computer language used in the development of enterprise and commercial applications. Microsoft's Visual C++ became the premier language of choice among developers and programmers.

2. What are the basic concepts of object oriented programming?

   It is necessary to understand some of the concepts used extensively in object oriented programming. These include

   Objects

   Classes

   Data abstraction and encapsulation

   Inheritance

   Polymorphism

   Dynamic Binding

   Message passing

3. What are the advantages of Object Oriented Programming?

   Class data type allows programs to organize as objects that contain both data and functions.

   Polymorphism promotes, reduces software complexity, as multiple definitions are permitted to an operator or function.

   Inheritance allows a class to be derived, from an existing class, thus promoting reusability of code.

   Data hiding or Abstraction of data types provides security to data, as unrelated member functions cannot access its data.

4. What is a class and an object?

   A class is a new way of creating and implementing a user defined data type. Classes provide a method for packing together data of different types.

   A group of data and operations are termed as object. The operations represent the behaviour of the object.

5. What is Polymorphism?

   Polymorphism means that some code or operations or objects behave differently in different contexts. Operator and Function Overloading are the two variants.

   Operator overloading : The mechanism overloading, refers to giving additional functionality to the normal C++ operators like +, ++, -, --, +=, -=, <,>.

   In C++, following features support polymorphism.

   Function overloading:

   C++ enables several functions of the same name to be defined, as long as these functions have different sets of parameters (at least as far as their types are concerned). This capability is called function overloading. When an overloaded function is called, the C++ compiler selects the proper function by examining the number, types and order to the arguments in the call. Function overloading is commonly used to create several functions of the same name that perform similar tasks but on different data types.

   Compile Time Polymorphism: means compiler knows which function should be called when a polymorphic call is made. C++ supports compiler time polymorphism by supporting features like templates, function overloading and default arguments.

   Run Time Polymorphism: is supported by virtual functions. The idea is virtual functions are called according to the type of object pointed or referred, not according to the type of pointer or reference. In other words, virtual functions are resolved late, at runtime.

6. Define inheritance.

   The mechanism of deriving a new class (derived) from an old class (base class) is called inheritance. It allows the extension and reuse of existing code without having to rewrite the code from scratch. Inheritance is the process by which objects of one class acquire properties of objects of another class.

7. What is encapsulation and abstraction?

   The wrapping up of data and functions into a single unit (called class) is known as encapsulation. Encapsulation containing and hiding information about an object, such

as internal data structures and code. Abstraction is of the process of hiding unwanted details from the user.

8. What is public, private and protected?

Public, Protected and Private are three access specifier in C++.

Public data members and member functions are accessible outside the class.

Protected data members and member functions are only available to derived classes.

Private data members and member functions can't be accessed outside the class.

9. What are the four storage specifiers in C++?

There are four storage specifiers in C++:

Auto

Static

Register and

Extern

10. Define Constructor?

A constructor is a member function with the same name as its class. The constructor is invoked whenever an object of its associated class is created. It is called constructor because it constructs the values of data members of the class.

11. Define destructor.

A destructor is called for a class object when that object passes out of scope or is explicitly deleted. A destructor as the name implies is used to destroy the objects that have been created by a constructor. Like a constructor, the destructor is a member function whose name is the same as the class name but is preceded by a tilde symbol.

12. What is the difference between C & C++?

- C++ is an object oriented programming but C is a procedure oriented programming.
- C is super set of C++.
- C can’t support inheritance, function overloading, method overloading etc. but C++ can do this.
- In c program the main function could not return a value but in the C++ the main

function should return a value.

13. What is data abstraction?

Instruments allowing only selected access of components to objects and to members of other classes is called data abstraction.

14. What are data members and member functions of a class?

Data members are the data variables that represent the features or properties of a class.

Member functions are the functions that perform specific tasks in a class. Member functions are called as methods, and data members are also called as attributes.

15. Write the rules relating to a constructor?

The rules for defining a constructor ate the following:

The name of the constructor must be same as that of the class.

A constructor can have parameter list.

The constructor function can be overloaded.

The compiler generates a constructor, in the absence of a user defined constructor.

The constructor is executed automatically.

16. What is a destructor?

A destructor is a function that removes the memory of an object which was allocated by the constructor at the time of creating a object.

17. What is copy constructor?

A copy constructor is executed:

When an object is passed as a parameter to any of the member function.

When a member function returns an object.

When an object is passed by reference to constructor.

18. What is the use of default constructor?

A constructor that accepts no parameters is called the default constructor. If no user-defined constructor exists for a class A and one is needed, the compiler implicitly declares a default parameter less constructor A::A(). This constructor is an inline public member of its class. The compiler will implicitly define A::A() when the compiler uses

this constructor to create an object of type A. The constructor will have no constructor initializer and a null body.

19. What is the difference between implicit and explicit conversion?

When data types are mixed in an expression, the conversion is performed automatically. This process of automatic conversion is called implicit conversion. Explicit Expressions are user defined expressions. C++ provides type casting facility. The expression can be converted into a specific type.

20. What are the two methods used in functions?

In C++, functions that have arguments can be invoked by

Call by value and Call by reference.

21. What is an inline function?

An inline looks like a normal function in the source file but inserts the function's code directly into the calling program. Inline functions execute faster but require more memory space.

22. What are virtual functions?

Virtual functions are used with inheritance, they are called according to the type of object pointed or referred, not according to the type of pointer or reference.

In other words, virtual functions are resolved late, at runtime. Virtual keyword is used to make a function virtual.

C++ program with runtime polymorphism (use of virtual functions).

A base class and a derived class.

A function with same name in base class and derived class.

A pointer or reference of base class type pointing or referring to an object of derived class.

23. Differentiate between a template class and class template?

Template class:

A generic definition or a parameterized class not instantiated until the client provides the needed information. It's jargon for plain templates.

Class template:

A class template specifies how individual classes can be constructed much like the way a class specifies how individual objects can be constructed. It's jargon for plain

classes.

24. What is the difference between method overloading and method overriding?

Overloading a method (or function) in C++ is the ability for functions of the same name to be defined as long as these methods have different signatures (different set of parameters).

Method overriding is the ability of the inherited class rewriting the virtual method of the base class.

25. What is a friend function?

As the name suggests, the function acts as a friend to a class. As a friend of a class, it can access its private and protected members. A friend function is not a member of the class. But it must be listed in the class definition.

26. What are the advantages of inheritance?

It permits code reusability.

Reusability saves time in program development.

It encourages the reuse of proven and debugged high quality software, thus reducing problem after a system becomes functional.

27. Explain virtual class and friend class?

Virtual Base Class:

It is used in context of multiple inheritance in C++. If you want to derive two classes from a class, and further derive one class from the two classes in the second level, you need to declare the uppermost base class as "virtual" in the inherited classes. These prevent multiple copies of the uppermost base class data members when an object of the class at the third level of hierarchy is created.

Friend Class:

When a class declares another class as its friend, it is giving complete access to all its data and methods including private and protected data and methods to the friend class member methods.

28. Explain deep copy and a shallow copy?

Deep copy:

It involves using the contents of one object to create another instance of the same class. Here, the two objects may contain the same information but the target

object will have its own buffers and resources. The destructor of either object will not affect the remaining object.

Shallow copy:

It involves the contents of one object into another instance of the same class. This creates a mirror image. The two objects share the same externally contained contents of the other object to be unpredictable. This happens because of the straight copying of references and pointers.

29. What is virtual class and friend class?

Friend class are used when two or more classes are designed to work together and need access to each other's implementation in ways that the rest of the world shouldn't be allowed to have. In other words, they help keep private things private.

For instance, it may be desirable for class. Database Cursor to have more privilege to the internal of class Database than main() has.

30. What is a scope resolution operator?

A scope resolution operator (::), can be used to define the member functions of a class outside the class.

31. What do you mean by pure virtual functions?

A pure virtual member function is a member function that the base class forces derived classes to provide. Normally these member functions have no implementation. Pure virtual functions are equated to zero.

class Shape { public: virtual void draw() = 0; };

32. Explain Stack and Heap Objects?

The memory a program uses is divided into four areas:

The code area: this is where the compiled program sites in memory.

The global area: the place where global variables are stored.

The heap: the place where dynamically allocated variables are allocated from.

The stack: the place where parameters and local variables are allocated from.

33. What is a modifier?

A modifier, also called a modifying function is a member function that changes the value of at least one data member.

In other words, an operation that modifies the state of an object. Modifiers are

also known as 'mutators'.

34. Explain storage qualifiers in C++?

Const: This variable means that if the memory is initialized once, it should not be altered by a program.

Volatile: This variable means that the value in the memory location can be altered even though nothing in the program code modifies the contents.

Mutable: This variable means that a particular member of a structure or class can be altered even if a particular structure variable, class, or class member function is constant.

35. What is the type of 'this' pointer?

It is a constant pointer type.

It gets created when a non static member function of a class is called this pointer.

36. What is the difference between late binding and early binding?

Late binding refers to functions calls that are not resolved until run time while early binding refers to the events that occur at compile time.

Late binding occurs through virtual functions while early binding takes place when all the information needed to call a function is known at the time of compiling.

Early binding increases the efficiency. Some of the examples of early binding are normal function calls, overloaded function calls, and overloaded operators etc.

37. What are the few advantages of Inline function?

It offers an improved macro facility.

By using the inline functions, the user can split a large function with many nested modules of statement blocks into many small inline functions.

38. What is an abstract base class?

An abstract class is a class that is designed to be specifically used as a base class. An abstract class contains at least one pure virtual function.

39. What is file scope?

A variable declared all blocks and functions (precisely main ()) has the scope of a

file.

The scope of a file scope variable is the entire program. The life time of a file scope variable is the life time of a program.

40. What is the use of parameters passing in function?

The call statement communicates with the function through arguments or parameters.

Parameters are the channels through which data flows from call statement to function and vice versa.

41. What are the possible integral promotions while invoking overloaded functions?

Char data type can be converted to integer/float/double.

Int data type can be converted to char/double/float.

Float data type to integer/double/char.

Double data type to float or integer.

42. What are the differences between references and pointers?

Both references and pointers can be used to change local variables of one function inside another function. Both of them can also to save copying of big objects when passed as arguments to functions or returned from functions, to get efficiency again.

References are less powerful than pointers

Once a reference is created, it cannot be later made to reference another object; it cannot be resetted. This is often done with pointers.

References cannot be NULL. Pointers are often made NULL to indicate that they are not pointing to any valid thing.

A reference must be initialized when declared. There is no such restriction with pointers.

References are safer and easier to use.

Safer: Since references must be initialized, wild references like wild pointers are unlikely to exist. It is still possible to have references that don't refer to a valid location.

Easier to use: References don't need referencing operator to access the value. They can be used like normal variables. '&' operator is needed only at the time of declaration. Also, members of an object reference can be accessed with dot operator

('.'), unlike pointers where arrow operator (->) is needed to access members.

43. What is the main purpose of using function prototype?

The main purpose of function prototype is to help the compiler to check the data requirement of the function. With function prototyping, a template is always used when declaring and defining a function.

When a function is called, the compiler uses the template to ensure that proper arguments are passed, and the return value is treated correctly.

Any violation in matching of the arguments or the return types will be treated as errors by compiler, and flagged at the time of compilation.

44. What is message passing?

An object oriented program consists of a set of objects that communicate with each other. Message passing involves specifying the name of the object, the name of the function and the information to be sent.

45. What is the difference between macro and inline?

Inline follows strict parameter type checking, macros do not. Macros are always expanded by preprocessor, whereas compiler may or may not replace the inline definitions.

46. What's the best way to declare and define global variables?

The best way to declare global variables is to declare them after including all the files so that it can be used in all the functions.

47. What is a container class? What are the types of container classes?

A container class is a class that is used to hold objects in memory or external storage.

A container class acts as a generic holder.

A container class has a predefined behaviour and a well known interface.

A container class is a supporting class whose purpose is to hide the topology used for maintaining the list of objects in memory.

When a container class contains a group of mixed objects, the container is called a heterogeneous container; when the container is holding a group of objects that are all the same, the container is called a homogeneous container.

48. What is Associative container?

Associative containers are designed to support direct access to elements using keys. They are not sequential. There are four types of associative containers :

Set

Multiset

Map

Multimap

49. What is an iterator?

Iterators are like pointers. They are used to access the elements of containers thus providing a link between algorithms and containers. Iterators are defined for specific containers and used as arguments to algorithms.

50. What is stack unwinding?

Stack unwinding is a process in which a destructor is invoked in a particular program for destroying all the local objects in the stack between throwing and catching of an exception.

# Frequently Asked Questions in Operating Systems

1 The Banker's algorithm is used
   a. to rectify deadlock
   b. to detect deadlock
   c. to prevent deadlock
   d. to slove deadlock
   Ans : c

2 The primary purpose of an operating system is:
   a. To make the most efficient use of the computer hardware
   b. To allow people to use the computer,
   c. To keep systems programmers employed
   d. To make computers easier to use
   Ans : a

3 A page fault occurs when
   a. the Deadlock happens
   b. the Segmentation starts
   c. the page is found in the memory
   d. the page is not found in the memory
   Ans : d

4 Running multiple programs at the same time is called:
   a. Multitasking
   b. Foreground tasking
   c. Single tasking
   d. Symmetric
   Ans : a

5 Which of the following is not process state?
   a. New
   b. Running
   c. Ready
   d. Finished
   Ans : d

6 A spooler is a
   a. Location in memory that maintains the contents of documents until it prints out
   b. Queue of print job that are waiting to print
   c. Program that coordinates the print job that are waiting to process
   d. Message sent from the printer to the operating system when a

print job is completed

Ans : c

7 Operating system is a ....

a. System software
b. Application software
c. Presentation software
d. Database software

Ans : a

8 The chunks of a memory are known as

a. Sector
b. Offset
c. Page
d. Frame

Ans : d

9 The necessary conditions needed before deadlock can occur?

a. No Mutual Exclusion, Hold and wait, Preemption, Circular Wait
b. Mutual Exclusion, No Hold and wait, Preemption, Circular Wait
c. Mutual Exclusion, Hold and wait, No Preemption, Circular Wait
d. Mutual Exclusion, Hold and wait, Preemption, No Circular Wait

Ans : c

10 The ability of an operating system to control the activities of multiple program at the same time is called

a. Multitasking
b. Multiprocessing
c. Multioperating
d. Multipaging

Ans : a

11 An operating system is a program or a group of programs that

a. Helps in checking the spelling of Word
b. Maintain the relationship in Database
c. Manages the resources of the Computer
d. Performs the calculations of cells in Excel

Ans : c

12 What hole will allocates in "Worst-Fit" algorithm of memory management?

a. It allocates the smaller hole than required memory hole
b. It allocates the smallest hole from the available memory holes
c. It allocates the largest hole from the available memory holes
d. It allocates the exact same size memory hole

Ans : c

13 Which of the following is the allocation method of a disk space?

a. Contiguous allocation
b. Linked allocation

c. Indexed allocation
d. All of the Above

Ans : d

14 Which of the following concept is best to preventing page faults?
a. Paging
b. The working set
c. Hit ratios
d. Address location resolution

Ans : b

15 What is contained in the page table?
a. Base address of each frame and corresponding page number
b. Memory address and corresponding page number
c. File name and corresponding page number
d. None of Above

Ans : a

16 First-in-First-Out (FIFO) scheduling is
a. Non Preemptive Scheduling
b. Preemptive Scheduling
c. Fair Share Scheduling
d. Deadline Scheduling

Ans : a

17 Multiprogramming systems ...
a. Are easier to develop than single programming system
b. Execute each job faster
c. Execute more jobs in the same time period
d. Are used only by large mainframe computer

Ans : c

18 Bringing a page into memory only when it is needed, this mechanism is called
a. Deadlock
b. Page Fault
c. Dormant Paging
d. Demand Paging

Ans : d

19 What do you mean by Memory Compaction?
a. Combine multiple equal memory holes into one big hole
b. Combine multiple small memory holes into one big hole
c. Divide big memory hole into small holes
d. Divide memory hole by 2

Ans : b

20 Copying a process from memory to disk to allow space for other processes is Called
   a. Swapping
   b. Deadlock
   c. Demand Paging
   d. Page Fault
   Ans : a

21 What does Belady's Anomaly related to?
   a. Page Replacement Algorithm
   b. Memory Management Algorithm
   c. Deadlock Prevention Algorithm
   d. Disk Scheduling Algorithm
   Ans : a

22 What are the two types of Semaphore?
   a. Digital Semaphores and Binary Semaphores
   b. Analog Semaphores and Octal Semaphores
   c. Counting Semaphores and Binary Semaphores
   d. Critical Semaphores and System Semaphores
   Ans : c

23 What are the requirements for the solution to critical section problem?
   a. Mutual Exclusion
   b. Progress
   c. Bounded Waiting
   d. All of Above
   Ans : d

24 The virtual memory is
   a. An extremely large main memory
   b. An extremely large secondary memory
   c. An illusion of extremely large main memory
   d. A type of memory used in super computer
   Ans : c

25 A program in execution is called
   a. A Paging
   b. A Process
   c. A virtual memory
   d. A Demand Page
   Ans : b

26 What is Thrashing?
   a. A high paging activity is called thrashing.
   b. A high executing activity is called thrashing
   c. A extremely long process is called thrashing

d. A extremely long virtual memory is called thrashing
Ans : a

27 Which of the following memory unit that processor can access more rapidly
a. Main Memory
b. Virtual Memory
c. Cache memory
d. Read Only Memory
Ans : c

28 Interval between the time of submission and completion of the job is called
a Waiting time b. Turnaround time c. Throughput d. Response time
Ans: b

29 First-in-First-Out (FIFO) scheduling is
a. Non Preemptive Scheduling b. Preemptive Scheduling
c. Fair Share Scheduling d. Deadline Scheduling
Ans: a

30 The scheduling in which CPU is allocated to the process with least CPU-burst time is called
a. Priority Scheduling b. Shortest job first Scheduling
c. Round Robin Scheduling d. Multilevel Queue Scheduling
Ans: b

31 Switching the CPU to another Process requires to save state of the old process and loading new process state is called as _____.
a. Process Blocking
b. Context Switch
c. Time Sharing
d. None of the above
Ans : b

32 Program 'preemption' is
a. forced allocation of the CPU from a program which is executing on the CPU.
b. release of CPU by the program after completing its task.
c. forced allotment of CPU by a program to itself.
d. a program terminating itself due to detection of an error.
Ans: a

33 "Throughput" of a system is
a. Number of programs processed by it per unit time
b. Number of times the program is invoked by the system
c. Number of requests made to a program by the system
d. None of the above
Ans: a

34 Which scheduling policy is most suitable for a time-shared operating system
a. Shortest-job First. b. Elevator. c. Round-Robin. d. FCFS.
Ans: c

35 _____ is a technique of improving the priority of process waiting in Queue for CPU allocation
a. Starvation b. Ageing c. Revocation d. Relocation
Ans: b

36 Round robin scheduling is essentially the preemptive version of _____.
a. FIFO
b. Shortest job first
c. Shortes remaining
d. Longest time first
Ans : a

37 The number of processes completed per unit time is known as _____.
a. Output
b. Throughput
c. Efficiency
d. Capacity
Ans : b

38 PCB =
a. Program Control Block
b. Process Control Block
c. Process Communication Block
d. None of the above
Ans : b

39 A critical section is a program segment
a. which should run in a certain specified amount of time.
b. which avoids deadlocks.
c. where shared resources are accessed.
d. which must be enclosed by a pair of semaphore operations, P and V.
Ans: c

40 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 access takes place is called :
a. data consistency
b. race condition
c. aging
d. starvation
Ans : b

41 A critical region

a. is a piece of code which only one process executes at a time
b. is a region prone to deadlock
c. is a piece of code which only a finite number of processes execute
d. is found only in Windows NT operation system
Ans: a

42 Before proceeding with its execution, each process must acquire all the resources it needs is called
a. hold and wait b. No pre-emption c. circular wait d. starvation
Ans: a

43 A system is in the safe state if
a. the system can allocate resources to each process in some order and still avoid a deadlock
b. there exist a safe sequence
c. both (a) and (b)
d. none of the mentioned
Ans : c

44 The circular wait condition can be prevented by
a. defining a linear ordering of resource types
b. using thread
c. using pipes
d. all of the mentioned
Ans : a

45 Which one of the following is a visual ( mathematical ) way to determine the deadlock occurrence?
a. resource allocation graph
b. starvation graph
c. inversion graph
d. none of the mentioned
Ans : a

46 'LRU' page replacement policy is
a. Last Replaced Unit. b. Last Restored Unit.
c. Least Recently Used. d. Least Required Unit.
Ans: c

47 Which one of the following explains the sequential file access method?
a. random access according to the given byte number
b. read bytes one at a time, in order
c. read/write sequentially by record
d. read/write randomly by record
Ans : b

48 In linked allocation

a. each file must occupy a set of contiguous blocks on the disk
b. each file is a linked list of disk blocks
c. all the pointers to scattered blocks are placed together in one location
d. None of these

Ans : b

49 In indexed allocation

a. each file must occupy a set of contiguous blocks on the disk
b. each file is a linked list of disk blocks
c. all the pointers to scattered blocks are placed together in one location
d. None of these

Ans : c

50 In the _____ algorithm, the disk arm starts at one end of the disk and moves toward the other end, servicing requests till the other end of the disk. At the other end, the direction is reversed and servicing continues.

a. LOOK
b. SCAN
c. C-SCAN
d. C-LOOK

Ans : b

# Frequently Asked Questions in Database Management System

1 Why a database is called as relational database model?
A database model represents the relationship between one or more databases. The relationship is known as the relational database model. It is an extension of the normal databases without relations. It provides flexibility and allows one database to be in relation with another database. It can access the data from many databases at one time over the network.

2 What are entities and attributes referring to?
- Table consists of some properties that are known as attributes.
- These consist of the representation of entity in the table.
- They are represented by columns in the table.
- Entity is referred to the store data about any particular thing.
- It is the smallest unit inside the table.

3 What do you understand by relation in relational database model?
Relation in the relational database model is defined as the set of tuples that have the same attributes. Tuple represents an object and also the information that the object contains. Objects are basically instances of classes and used to hold the larger picture. Relation is described as a table and is organized in rows and columns. The data referenced by the relation come in the same domain and have the same constraints as well. Relations in the relational database model can be modified using the commands like insert, delete etc

4 Why domain is of high importance?
- Domain describes possible values grouped together that can be given for an attribute. It is considered the same way as a constraint on the value of attribute.
- A domain can be attached to an attribute but only if the attribute is an element of specified set.

For example: XYZ doesn't fulfill the domain constraint but the integer value as 899 fulfills the criteria of domain constraint. Hence, domain is of high importance.

5 What is the difference between base and derived relation?
- Relational database means the relationship between different databases. In relational database user can store and access all the data through the tables which are related to each other.

- Relationship between the store data is called base relations and implementation of it is called as tables. Whereas, relations which don't store the data, but can be found out by applying relational operations on other relations are called as derived relations. When these are implemented they are termed as views or queries.

- Derived relations are more useful then base relation, as they can have more information from many relations, but they act as a single relation.

6 What are constraints in database?
Constraints are kind of restrictions that are applied to the database or on the domain of an attribute. For example an integer attribute is restricted from 1-10 and not more than that.

They provide the way to implement the business logic and the rules in database. In database it can be implemented in the form of check constraints that checks for the rules that haven't been followed by the programmer. Constraint also used to restrict the data that can be stored in the relations. Domain constraint can be applied to check the domain functionality and keep it safe

7 What are the two principles of relational database model? What is the difference between them?

The two principal rules for the relational model are as follows:

- Entity integrity: this is used to maintain the integrity at entity level
- Referential integrity: it is used to maintain integrity on all the values which have been referenced.

The differences between them are as follows:

- Entity integrity tells that in a database every entity should have a unique key; on the other hand referential integrity tells that in the database every table values for all foreign keys will remain valid.
- Referential integrity is based on entity integrity but it is not the other way around

8 What is the difference between primary and foreign key?

- Primary key uniquely identify a relationship in a database, whereas foreign key is the key that is in other relation and it has been referenced from the primary key from other table.
- Primary key remains one only for the table, whereas there can be more than one foreign key.
- Primary key is unique and won't be shared between many tables, but foreign key will be shared between more than one table and will be used to tell the relationship between them.

9 Why stored procedures are called as executable code?

Stored procedure stored inside the database. This also includes the executable code that usually collects and customizes the operations like insert, encapsulation, etc. These stored procedures are used as APIs for simplicity and security purposes. The implementation of it allows the developers to have procedural extensions to the standard SQL syntax. Stored procedure doesn't come as a part of relational database model, but can be included in many implementations commercially

10 What is an index represent in relational database model?

- Index is a way to provide quick access to the data and structure. It has indexes maintain and can be created to combine attributes on a relation. Index allows the queries to filter out the searches faster and matching data can be found earlier with simplicity.

- For example: It is same as the book where by using the index you can directly jump to a defined section. In relational database there is a provision to give multiple indexing techniques to optimize the data distribution

11 What are the relational operations that can be performed on the database?

There are many relational operators that are used to perform actions on relational database. These operators are as follows:

1. Union operator that combines the rows of two relations and doesn't include any duplicate. It also removes the duplicates from the result.

2. Intersection operator provides a set of rows that two relations have in common.
3. Difference operator provide the output by taking two relations and producing the difference of rows from first that don't exist in second.
4. Cartesian product is done on two relations. It acts as a cross join operator.

12 What do you understand by database Normalization?

- Normalization is very essential part of relational model.
- Normal forms are the common form of normalization.
- It helps in reducing redundancy to increase the information overall.
- It has some disadvantages as it increases complexity and have some overhead of processing.
- It consists of set of procedures that eliminates the domains that are non-atomic and redundancy of data that prevents data manipulation and loss of data integrity.

13 What are the different types of normalization that exists in the database?

There are 9 normalizations that are used inside the database. These are as follows:

1. First normal form: in this table represents a relation that has no repeating groups.
2. Second normal form: non- prime attributes are not functional dependent on subset of any candidate key.
3. Third normal form: in a table every non- prime attribute is non-transitively dependent on every candidate key
4. Boyce codd normal form: "every non-trivial functional dependency in the table is dependent on superkey".

14 How de-normalization is different from normalization?

- Analytical processing databases are not very normalized. The operations which are used are read most databases.
- It is used to extract the data that are ancient and accumulated over long period of time. For this purpose de-normalization occurs that provide smart business applications.
- Dimensional tables in star schema are good example of de-normalized data.
- The de-normalized form must be controlled while extracting, transforming, loading and processing.
- There should be constraint that user should not be allowed to view the state till it is consistent.
- It is used to increase the performance on many systems without RDBMS platform

15 How view is related to data independence?

- View is a virtual table that doesn't really exist, but it remains present so that user can view their data.
- It is derived from the base table. The view is stored in the data dictionary and represents the file directly.
- The base table updation or reconstruction is not being reflected in views.
- It is related to the logical data independence as it is at the logical level and not at the physical level.

16 Why E-R models are used?

E-R model stands for entity-relationship model and it is used to represent a model with their relationships. This is an object oriented approach and it is based on real world that consists of objects which are called entities and relationship between them. Entities are further used inside the database in the form of attributes

17 What is the purpose of acid properties?

- ACID stands for Atomicity, Consistency, Isolation and durability and it plays an important role in the database.
- These properties allow the database to be more convenient to access and use. This allows data to be shared more safely in between the tables.
- If these properties are not being implemented then the data will become inconsistent and inaccurate.
- It helps in maintaining the accuracy of the data in the database.

18 What do you understand by cardinality and why it is used?

- Cardinality is important and used to arrange the data inside the database.
- It is related to the design part and need to be properly used in database.
- It is used in E-R diagrams and used to show the relationship between entities/tables.
- It has many forms like the basic is one to one, which associate one entity with another.
- Second is one to many: which relates one entity with many entities in a table.
- Third is many to many M: N that allows many entities to be related to many more.
- Last is many to one that allows the many entities to be associated with one entity.

19 What is the difference between DBMS and RDBMS?

- DBMS is persistent and accessible when the data is created or exists, but RDBMS tells about the relation between the table and other tables.
- RDBS supports a tabular structure for data and relationship between them in the system whereas DBMS supports only the tabular structure.
- DBMS provide uniform methods for application that has to be independently accessed, but RDBMS doesn't provide methods like DBMS but provide relationship which link one entity with another.

20 What is Trigger?

- A Trigger is a process of firing an action when some event like Insert, Update or Delete occurs.
- A trigger can't be called or even executed rather they are automatically become active by the DBMS whenever some modification in associated table occur.
- Triggers are event driven and can attached to particular table in a database.
- Triggers are implicitly executed and stored procedures are also executed by triggers.
- Referential integrity is maintained by the trigger and they are managed and stored by DBMS.
- Triggers can be nested also, in which Insert, Update or Delete logic can be fired from the trigger itself.

21 What are Self Join and Cross Join?

- When we want to join a table to itself then SELF JOIN is used.
- We can give one or more aliases to eliminate the confusion.
- A self join can be used as any type, if both the tables are same.
- The simple example where we can use SELF JOIN is if in a company have a hierarchal reporting structure and an employee reports to another.
- A cross join give the number of rows in the first table multiplied by the number of rows in second table.
- The simple example where we can use CROSS JOIJ is if in an organization wants to combine every Employee with family table to see each Employee with each family member.

22 What are the advantages of using Stored Procedures?

- Procedure can reduce network traffic and latency, and can enhance application performance.
- Procedure execution plans can be reused, staying cached in the management tool's memory, reducing its overhead.
- Procedures provide the benefit of code reuse.
- The logic can be encapsulated using procedures and can help to change procedure's code without interacting to application.
- Procedures give more security to our data.

23 What are cursors and when they are useful?

- When we execute any SQL operations, SQL Server opens a work area in memory which is called Cursor.
- When it is required to perform the row by row operations which are not possible with the set-based operations then cursor is used.

There are two of cursors:

1. Implicate Cursor
- SQL Server automatically manages cursors for all data manipulation statements. These cursors are called implicit cursors.

2. Explicit Cursor
- When the programmer wants to perform the row by row operations for the result set containing more than one row, then he explicitly declare a cursor with a name.
- They are managed by OPEN, FETCH and CLOSE.
-%FOUND, %NOFOUND, %ROWCOUNT and %ISOPEN attributes are used in both types of cursors.

24 What is Similarity and Difference between Truncate and Delete in SQL?

- Similarity

- Both Truncate and Delete command will delete data from given table and they will not delete the table structure from the database.

- Difference

1. TRUNCATE is a DDL (data definition language) command whereas DELETE is a DML (data manipulation language) command.

2. We can’t execute a trigger with TRUNCATE whereas with DELETE command, a trigger can be executed.

3. We can use any condition in WHERE clause using DELETE but it is not possible with TRUNCATE.

4. If table is referenced by any foreign key constraints then TRUNCATE cannot work.

5. TRUNCATE is faster than DELETE, because when you use DELETE to delete the data, at

that time it store the whole data in rollback space from where you can get the data back after deletion, whereas TRUNCATE will not store data in rollback space and will directly delete it. You can't get the deleted data back when you use TRUNCATE.

25 What is difference between Co-related sub query and nested sub query?

- Correlated subquery executes single time for every row which is selected by the outer query.
- It has a reference to a value from the row selected by the outer query.
- Nested subquery executes only once for the entire nesting (outer) query. It does not contain any reference to the outer query row.

- For example,
- Correlated Subquery:

```
select e.EmpFirstName, e.Salary, e.DeptId from Employee e where e.Salary = (select
max(Salary) from Employee ee where ee.DeptId = e.DeptId)
```

- Nested Subquery:

```
select EmpFirstName, Salary, DeptId from Employee where (DeptId, Salary) in (select
DeptId, max(Salary) from Employee group by DeptId)
```

26 Differentiate UNION, MINUS, UNION ALL and INTERSECT?

- INTERSECT - It will give all the distinct rows from both select queries.
- MINUS - It will give distinct rows returned by the first query but not by the second query.
- UNION - It will give all distinct rows selected by either first query or second query.
- UNION ALL - It will give all rows returned by either query with all duplicate records.

27 What is DDL, DML and DCL?

SQL commands can be divided in three large subgroups.

1) DDL: The SQL commands which deals with database schemas and information of how the data will in database are classified as Data Definition Language.
-For example: CREATE TABLE or ALTER TABLE belongs to DDL.

2) DML: The SQL commands which deals with data manipulation are classified as Data Manipulation L
For example: SELECT, INSERT, etc.

3) DCL: The SQL commands which deal with rights and permission over the database are classified as
For example: GRANT, REVOKE

28 Explain Nested Join, Hash Join, and Merge Join in SQL Query Plan.

Nested Loops Joins

- Nested loops join an outer data set to an inner data set.
- For each row in the outer data set that matches the single-table predicates, the database retrieves all rows in the inner data set that satisfy the join predicate.
- If an index is available, then the database can use it to access the inner data set by rowid.

Hash Joins
- The database uses a hash join to join larger data sets.
- The optimizer uses the smaller of two data sets to build a hash table on the join key in memory, using a deterministic hash function to specify the location in the hash table in which to store each row.
- The database then scans the larger data set, probing the hash table to find the rows that meet the join condition.

Sort Merge Joins
- A sort merge join is a variation on a nested loops join.
- The database sorts two data sets (the SORT JOIN operations), if they are not already sorted.
- For each row in the first data set, the database probes the second data set for matching rows and joins them (the MERGE JOIN operation), basing its start position on the match made in the previous iteration.

29 How to write a sql statement to find the first occurrence of a non zero value?
Answer: There is a slight chance the column "a" has a value of 0 which is not null. In that case, you?ll loose the information. There is another way of searching the first not null value of a column:
select column_name from table_name where column_name is not null and rownum<2;

30 What is the main difference between the IN and EXISTS clause in sub queries??
Answer: The main difference between the IN and EXISTS predicate in sub query is the way in which the query gets executed.

IN -- The inner query is executed first and the list of values obtained as its result is used by the outer query. The inner query is executed for only once.

EXISTS -- The first row from the outer query is selected, then the inner query is executed and, the outer query output uses this result for checking. This process of inner query execution repeats as many no .of times as there are outer query rows. That is, if there are ten rows that can result from outer query, the inner query is executed that many no. of times.

# Frequently Asked Questions in Computer Networks

1. Define Routing?

   The process of determining systematically hoe to forward messages toward the destination nodes based on its address is called routing.

2. What is a peer-peer process?

   The processes on each machine that communicate at a given layer are called peer-peer process.

3. When a switch is said to be congested?

   It is possible that a switch receives packets faster than the shared link can accommodate and stores in its memory, for an extended period of time, then the switch will eventually run out of buffer space, and some packets will have to be dropped and in this state is said to congested state.

4. What is semantic gap?

   Defining a useful channel involves both understanding the applications requirements and recognizing the limitations of the underlying technology. The gap between what applications expects and what the underlying technology can provide is called semantic gap.

5. What is Round Trip Time?

   The duration of time it takes to send a message from one end of a network to the other and back, is called RTT.

6. Define the terms Unicasting, Multiccasting and Broadcasting?

   If the message is sent from a source to a single destination node, it is called Unicasting.
   If the message is sent to some subset of other nodes, it is called Multicasting.
   If the message is sent to all the m nodes in the network it is called Broadcasting

7. What is Multiplexing?

   Multiplexing is the set of techniques that allows the simultaneous transmission of multiple signals across a single data link.

8. Define Network?

   A network is a set of devices connected by physical media links. A network is recursively is a connection of two or more nodes by a physical link or two or more networks connected by one or more nodes.

9. What is a Link?

At the lowest level, a network can consist of two or more computers directly connected by some physical medium such as coaxial cable or optical fiber. Such a physical medium is called as Link

10. What is a node?

A network can consist of two or more computers directly connected by some physical medium such as coaxial cable or optical fiber. Such a physical medium is called as Links and the computer it connects is called as Nodes.

11. What is a gateway or Router?

A node that is connected to two or more networks is commonly called as router or Gateway. It generally forwards message from one network to another.

12. What is point-point link?

If the physical links are limited to a pair of nodes it is said to be point-point link.

13. What is Multiple Access?
If the physical links are shared by more than two nodes, it is said to be Multiple Access.

14. What is FDM?

FDM is an analog technique that can be applied when the bandwidth of a link is greater than the combined bandwidths of the signals to be transmitted.

15. What is TDM?
TDM is a digital process that can be applied when the data rate capacity of the transmission medium is greater than the data rate required by the sending and receiving devices.

16. Which OSI Model layer is the fourth layer above the physical layer?
    A. Session
    B. Transport
    C. Application
    D. Physical
    E. None of the above
    Ans : B.

17. Rank the following transmission media (optical fibre, coaxial cable and twistedpair) according to their channel capacity from the highest to the lowest.
    A. Optical Fibre, Coaxial Cable, Twisted Pair.
    B. Optical Fibre, Twisted Pair, Coaxial cable.
    C. Twisted Pair, Coaxial Cable, Optical Fibre.
    D. Coaxial cable, Optic fibre, Twisted Pair.
    E. None of the above
    Ans : B

18 As a user's message moves from the lowest layer to the top layer of the OSI Model, protocol headers are:

A. Added
B. Removed
C. Rearranged
D. Modified
E. None of the above

Ans : A

19. Which of the following transmission impairments adds unwanted signals to a transmitted signal?

A. Attenuation
B. Delay Distortion
C. Crosstalk
D. Attenuation Distortion
E. None of the above

Ans : C

20. A television (TV) transmission is an example of which type of transmission?

A. Simplex
B. Half duplex
C. Full duplex
D. Automatic
E. None of the above

Ans : A

21 ..... is the physical path between the transmitter and receiver.

A. Transmission media
B. Physical media
C. Transmission path
D. Receiving path

Ans : A

22. Combination of two or more networks are called

A. Internetwork
B. WAN
C. MAN
D. LAN

Answer: A

23. Advantages of security, robust and eliminating traffic includes in

A. Mesh
B. Ring
C. Star
D. Bus

Answer: A

24. Multipoint topology is

A. Bus
B. Star
C. Mesh
D. Ring

Answer: A

25. Internet access is provided by the

A. Internetwork
B. WAN
C. LAN
D. MAN

Answer: B

26. Which of the following devices is a PC component that connects the computer to the network?

A. Bridge
B. NIC
C. DNS Server
D. Gateway

Answer: B

27. Which of the following devices modulates digital signals into analog signals that can be sent over traditional telephone lines?

A. Router
B. Gateway
C. Switch
D. Modem

Answer**:** D

28. Which of the following network devices/systems translates data from one format to another?

A. Hub
B. DHCP Server
C. Gateway
D.NIC

Answer: C.

29. Which of the following terms is used to describe a hardware- or software-based device that protects networks from outside threats?

A. NIC
B. Gateway
C. Firewall
D. Hub

Answer: C

30. Which of the following devices translates hostnames into IP addresses?
A. DNS Server
B. Hub
C. DHCP Server
D. Firewall

Answer: A

# Frequently Asked Questions in Cloud Computing /Unix

1 What is cloud computing?

Cloud computing is an internet based new age computer technology. It is the next stage technology that uses the clouds to provide the services whenever and wherever the user needs it. It provides a method to access several servers worldwide.

2 What are the benefits of cloud computing?

The main benefits of cloud computing are:

- Data backup and storage of data.
- Powerful server capabilities.
- Incremented productivity.
- Very cost effective and time saving.
- Software as Service known as SaaS.

3 Which platforms are used for large scale cloud computing?

The following platforms are used for large scale cloud computing:

- Apache Hadoop
- MapReduce

4 What are the different layers in cloud computing? Explain working of them.

There are 3 layers in the hierarchy of cloud computing.

Infrastructure as a service (IaaS):It provides cloud infrastructure in terms of hardware as like memory, processor, speed etc.

Platform as a service (PaaS):It provides cloud application platform for the developer.

Software as a service (SaaS)::It provides the cloud applications to users directly without installing anything on the system. These applications remain on cloud.

5 What do you mean by software as a service?

Software As a Service (SaaS) is an important layer of cloud computing. It provides cloud applications like Google is doing. It facilitates users to save their document on the cloud and create as well.

6 What is the platform as a service?

It is also a layer in cloud architecture. This model is built on the infrastructure

model and provides resources like computers, storage and network. It is responsible to provide complete virtualization of the infrastructure layer, make it look like a single server and invisible for outside world.

7 What are the different models for deployment in cloud computing?

These are the different deployment model in cloud computing:

Private cloud

Public cloud

Hybrid cloud

Community cloud

8 What is private cloud?

Private clouds are used to keep the strategic operations and other reasons secure. It is a complete platform which is fully functional and can be owned, operated and restricted to only an organization or an industry. Now a day, most of the organizations have moved to private clouds due to security concerns. Virtual private cloud is being used that operate by a hosting company.

9 What is public cloud?

The public clouds are open to the people for use and deployment. For example: Google and Amazon etc. The public clouds focus on a few layers like cloud application, infrastructure providing and providing platform markets

10 What are Hybrid clouds?

Hybrid clouds are the combination of public clouds and private clouds. It is preferred over both the clouds because it applies most robust approach to implement cloud architecture. It includes the functionalities and features of both the worlds. It allows organizations to create their own cloud and allow them to give the control over to someone else as well.

11 What is the difference between cloud computing and mobile computing?

Mobile computing and cloud computing are slightly same in concept. Mobile computing uses the concept of cloud computing . Cloud computing provides users the data which they required while in mobile computing, applications run on the remote server and gives user the access for storage and manage.

12 What is the difference between scalability and elasticity?

Scalability is a characteristic of cloud computing which is used to handle the increasing workload by increasing in proportion amount of resource capacity. By the use of scalability, the architecture provides on demand resources if the requirement is being raised by the traffic. Whereas, Elasticity is a characteristic which provides the concept of commissioning and decommissioning of large amount of resource capacity dynamically. It is measured by the speed by which the resources are coming on demand and the usage of the resources.

13 What is Virtualization ?

Virtualization is a technique for creating virtual resources (rather than the actual) such as server, storage device, network and Operating system.

14 What is hypervisor ?

Hypervisor is a peace of a software that is being install on the physical machine , which then further creates and run virtual machines. Virtual machines are known as guest machines and host machine is the hypervisor on which different virtual machines are created.

15 What is the difference between Xen & KVM ?

For Xen hypervisor first we have to install Xen kernel and have to boot the machine with Xen kernel where as KVM is kernel based Virtualization , we don't need any extra kernel for KVM. KVM is a module in Kernel. Xen hypervisor by default doesn't support full virtualization whereas KVM supports Full virtualization.

16 What are different hypervisors available in Linux ?

Xen & KVM are two hypervisor available in linux.

17 Which of the following is owned by an organization selling cloud services?

a) Public

b) Private

c) Community

d) Hybrid

Answer:a

18 It provides virtual machines, virtual storage, virtual infrastructure, and other hardware assets

a) IaaS

b) SaaS

c) PaaS

d) All of the mentioned

Answer:a

19 Which of the following has infrastructure security managed and owned by vendor?

a) Hybrid

b) Private/Community

c) Public

d) None of the mentioned

Answer:b

20 It is a complete operating environment with applications, management, and the user interface.

a) IaaS

b) SaaS

c) PaaS

d) All of the mentioned

Answer:b

21 Which of the following is classic example of an IaaS service model ?

a) AWS

b) Azure

c) Cloudera

d) All of the mentioned

Answer:a

22 The default shell in UNIX OS is

a) ksh

b) sh

c) csh

d) bsh

Answer:d

23 The kill system call is used to

a) Send shutdown messages to all by superuser

b) Send a signal to a process

c) Kill processes

d) Stop the processes

Answer:b

24 The process which terminates before the parent process exits becomes

a) Zombie

b) Orphan

c) Child

d) None of the above

Answer:a

25 Which command is used to extract intermediate result in a pipeline

a) tee

b) extract

c) exec

d) none of the above

Answer:a

26 Which of the following commands can be used to change default permissions for files and directories at the time of creation

a) Chmod

b) Chown

c) Umask

d) Chgrp

Answer:c

27 Which command is used to display disk consumption of a specific directory

a) du

b) ds

c) dd

d) dds

Answer:a

28 Applications communicate with kernel by using:

a) System Calls

b) C Programs

c) Shell Script

d) Shell

Answer:a

29 Which signal is sent when the Child process terminates?

a) SIGINIT

b) SIGKILL

c) SIGSTOP

d) SIGCHLD

Answer:b

30 Which of the following features of UNIX may be used for inter process communication?

a) Signals

b) Pipes

c) Semaphore

d) All of these

# Frequently Asked Questions in Core Java

1 **Name some OOPS Concepts in Java?**

Java is based on Object Oriented Programming Concepts, following are some of the OOPS concepts implemented in java programming.

- Abstraction
- Encapsulation
- Polymorphism
- Inheritance
- Association
- Aggregation
- Composition

2 **What do you mean by platform independence of Java?**

Platform independence means that you can run the same Java Program in any Operating System. For example, you can write java program in Windows and run it in Mac OS.

3 **What is JVM and is it platform independent?**

Java Virtual Machine (JVM) is the heart of java programming language. JVM is responsible for converting byte code into machine readable code. JVM is not platform independent, thats why you have different JVM for different operating systems. We can customize JVM with Java Options, such as allocating minimum and maximum memory to JVM. It's called virtual because it provides an interface that doesn't depend on the underlying OS.

4 **What is the difference between JDK and JVM?**

Java Development Kit (JDK) is for development purpose and JVM is a part of it to execute the java programs.

JDK provides all the tools, executables and binaries required to compile, debug and execute a Java Program. The execution part is handled by JVM to provide machine independence.

5 **What is the difference between JVM and JRE?**

Java Runtime Environment (JRE) is the implementation of JVM. JRE consists of JVM and java binaries and other classes to execute any program successfully. JRE doesn't contain any development tools like java compiler, debugger etc. If you want to

execute any java program, you should have JRE installed.

6 **Which class is the superclass of all classes?**

java.lang.Object is the root class for all the java classes and we don't need to extend it.

7 **Why Java doesn't support multiple inheritance?**

Java doesn't support multiple inheritance in classes because of "Diamond Problem". To know more about diamond problem with example, read Multiple Inheritance in Java.

However multiple inheritances are supported in interfaces. An interface can extend multiple interfaces because they just declare the methods and implementation will be present in the implementing class. So there is no issue of the diamond problem with interfaces.

8 **Why Java is not pure Object Oriented language?**

Java is not said to be pure object-oriented because it supports primitive types such as int, byte, short, long etc. I believe it brings simplicity to the language while writing our code. Obviously, java could have wrapper objects for the primitive types but just for the representation, they would not have provided any benefit.

As we know, for all the primitive types we have wrapper classes such as Integer, Long etc that provides some additional methods.

9 **What is difference between path and classpath variables?**

PATH is an environment variable used by operating system to locate the executables. That's why when we install Java or want any executable to be found by OS, we need to add the directory location in the PATH variable. If you work on Windows OS, read this post to learn how to setup PATH variable on Windows.

Classpath is specific to java and used by java executables to locate class files. We can provide the classpath location while running java application and it can be a directory, ZIP files, JAR files etc.

10 **What is the importance of main method in Java?**

main() method is the entry point of any standalone java application. The syntax of main method is public static void main(String args[]).

Java main method is public and static so that Java runtime can access it without initializing the class. The input parameter is an array of String through which we can pass runtime arguments to the java program.

11 **What is overloading and overriding in java?**

When we have more than one method with the same name in a single class but the arguments are different, then it is called as method overloading.

Overriding concept comes in picture with inheritance when we have two methods with same signature, one in parent class and another in child class. We can use @Override annotation in the child class overridden method to make sure if parent class method is changed, so as child class.

12 **Can we overload main method?**

Yes, we can have multiple methods with name "main" in a single class. However if we run the class, java runtime environment will look for main method with syntax as public static void main(String args[]).

13 **Can we have multiple public classes in a java source file?**

We can't have more than one public class in a single java source file. A single source file can have multiple classes that are not public.

14 **What is Java Package and which package is imported by default?**

Java package is the mechanism to organize the java classes by grouping them. The grouping logic can be based on functionality or modules based. A java class fully classified name contains package and class name. For example, java.lang.Object is the fully classified name of Object class that is part of java.lang package.

java.lang package is imported by default and we don't need to import any class from this package explicitly.

15 **What are access modifiers?**

Java provides access control through public, private and protected access modifier keywords. When none of these are used, it's called default access modifier. A java class can only have public or default access modifier.

16 **What is final keyword?**

final keyword is used with Class to make sure no other class can extend it, for example String class is final and we can't extend it.

We can use the final keyword with methods to make sure child classes can't override it.

final keyword can be used with variables to make sure that it can be assigned only once. However the state of the variable can be changed, for example, we can assign

a final variable to an object only once but the object variables can change later on.

Java interface variables are by default final and static.

17 **What is static keyword?**

static keyword can be used with class level variables to make it global i.e all the objects will share the same variable.

static keyword can be used with methods also. A static method can access only static variables of class and invoke only static methods of the class.

18 **What is finally and finalize in java?**

finally block is used with try-catch to put the code that you want to get executed always, even if any exception is thrown by the try-catch block. finally block is mostly used to release resources created in the try block.

finalize() is a special method in Object class that we can override in our classes. This method gets called by the garbage collector when the object is getting garbage collected. This method is usually overridden to release system resources when the object is garbage collected.

19 **Can we declare a class as static?**

We can't declare a top-level class as static however an inner class can be declared as static. If inner class is declared as static, it's called static nested class.
The static nested class is same as any other top-level class and is nested for only packaging convenience.

20 **What is static import?**

If we have to use any static variable or method from other class, usually we import the class and then use the method/variable with class name.

```
import java.lang.Math;

//inside class
double test = Math.PI * 5;
```

We can do the same thing by importing the static method or variable only and then use it in the class as if it belongs to it.

```
import static java.lang.Math.PI;

//no need to refer class now
```

```
double test = PI * 5;
```

Use of static import can cause confusion, so it's better to avoid it. Overuse of static import can make your program unreadable and unmaintainable.

21 **What is try-with-resources in java?**

One of the Java 7 features is the try-with-resources statement for automatic resource management. Before Java 7, there was no auto resource management and we should explicitly close the resource. Usually, it was done in the finally block of a try-catch statement. This approach used to cause memory leaks when we forgot to close the resource.

From Java 7, we can create resources inside try block and use it. Java takes care of closing it as soon as try-catch block gets finished.

22 **What is multi-catch block in java?**

Java 7 one of the improvement was multi-catch block where we can catch multiple exceptions in a single catch block. This makes are code shorter and cleaner when every catch block has similar code.

If a catch block handles multiple exceptions, you can separate them using a pipe (|) and in this case, exception parameter (ex) is final, so you can't change it.

23 **What is static block?**

Java static block is the group of statements that gets executed when the class is loaded into memory by Java ClassLoader. It is used to initialize static variables of the class. Mostly it's used to create static resources when class is loaded.

24 **What is an interface?**

Interfaces are core part of java programming language and used a lot not only in JDK but also java design patterns, most of the frameworks and tools. Interfaces provide a way to achieve abstraction in java and used to define the contract for the subclasses to implement.

Interfaces are good for starting point to define Type and create top level hierarchy in our code. Since a java class can implements multiple interfaces, it's better to use interfaces as super class in most of the cases.

25 **What is an abstract class?**

Abstract classes are used in java to create a class with some default method implementation for subclasses. An abstract class can have abstract method without

body and it can have methods with implementation also.

abstract keyword is used to create a abstract class. Abstract classes can't be instantiated and mostly used to provide base for sub-classes to extend and implement the abstract methods and override or use the implemented methods in abstract class.

26 **What is the difference between abstract class and interface?**

abstract keyword is used to create abstract class whereas interface is the keyword for interfaces.

Abstract classes can have method implementations whereas interfaces can't.

A class can extend only one abstract class but it can implement multiple interfaces.

We can run abstract class if it has main() method whereas we can't run an interface.

27 **Can an interface implement or extend another interface?**

Interfaces don't implement another interface, they extend it. Since interfaces can't have method implementations, there is no issue of diamond problem. That's why we have multiple inheritance in interfaces i.e an interface can extend multiple interfaces.

From Java 8 onwards, interfaces can have default method implementations. So to handle diamond problem when a common default method is present in multiple interfaces, it's mandatory to provide implementation of the method in the class implementing them.

28 **What is Marker interface?**

A marker interface is an empty interface without any method but used to force some functionality in implementing classes by Java. Some of the well known marker interfaces are Serializable and Cloneable.

29 **What are Wrapper classes?**

Java wrapper classes are the Object representation of eight primitive types in java. All the wrapper classes in java are immutable and final. Java 5 autoboxing and unboxing allows easy conversion between primitive types and their corresponding wrapper classes.

30 **What is Enum in Java?**

Enum was introduced in Java 1.5 as a new type whose fields consists of fixed set of constants. For example, in Java we can create Direction as enum with fixed fields as

EAST, WEST, NORTH, SOUTH.

enum is the keyword to create an enum type and similar to the class. Enum constants are implicitly static and final. Read more in detail at java enum.

31 **What is Java Annotations?**

Java Annotations provide information about the code and they have no direct effect on the code they annotate. Annotations are introduced in Java 5. Annotation is metadata about the program embedded in the program itself. It can be parsed by the annotation parsing tool or by the compiler. We can also specify annotation availability to either compile time only or till runtime also. Java Built-in annotations are @Override, @Deprecated and @SuppressWarnings.

32 **What is Java Reflection API? Why it's so important to have?**

Java Reflection API provides the ability to inspect and modify the runtime behavior of java application. We can inspect a java class, interface, enum and get their methods and field details. Reflection API is an advanced topic and we should avoid it in normal programming. Reflection API usage can break the design pattern such as Singletonpattern by invoking the private constructor i.e violating the rules of access modifiers.

Even though we don't use Reflection API in normal programming, it's very important to have. We can't have any frameworks such as Spring, Hibernate or servers such as Tomcat, JBoss without Reflection API. They invoke the appropriate methods and instantiate classes through reflection API and use it a lot for other processing.

33 **What is composition in java?**

Composition is the design technique to implement has-a relationship in classes. We can use Object composition for code reuse.

Java composition is achieved by using instance variables that refer to other objects. The benefit of using composition is that we can control the visibility of other objects to client classes and reuse only what we need.

34 **What is the benefit of Composition over Inheritance?**

One of the best practices of Java programming is to "favor composition over inheritance". Some of the possible reasons are:

- Any change in the superclass might affect subclass even though we might not be using the superclass methods. For example, if we have a method test() in the subclass and suddenly somebody introduces a method test() in the superclass, we will get compilation errors in the subclass. Composition will never face this issue because we are using only what methods we need.

- Inheritance exposes all the superclass methods and variables to the client and if we have no control in designing superclass, it can lead to security holes. Composition allows us to provide restricted access to the methods and hence more secure.
- We can get runtime binding in composition where inheritance binds the classes at compile time. So composition provides flexibility in the invocation of methods.

35 **How to sort a collection of custom Objects in Java?**

We need to implement Comparable interface to support sorting of custom objects in a collection. Comparable interface has compareTo(T obj) method which is used by sorting methods and by providing this method implementation, we can provide default way to sort custom objects collection.

However, if you want to sort based on different criteria, such as sorting an Employees collection based on salary or age, then we can create Comparator instances and pass it as sorting methodology.

36 **What is inner class in java?**

We can define a class inside a class and they are called nested classes. Any non-static nested class is known as inner class. Inner classes are associated with the object of the class and they can access all the variables and methods of the outer class. Since inner classes are associated with the instance, we can't have any static variables in them.

We can have local inner class or anonymous inner class inside a class.

37 **What is anonymous inner class?**

A local inner class without name is known as anonymous inner class. An anonymous class is defined and instantiated in a single statement. Anonymous inner class always extend a class or implement an interface.

Since an anonymous class has no name, it is not possible to define a constructor for an anonymous class. Anonymous inner classes are accessible only at the point where it is defined.

38 **What is Classloader in Java?**

Java Classloader is the program that loads byte code program into memory when we want to access any class. We can create our own classloader by extending ClassLoader class and overridingloadClass(String name) method.

39 **What are different types of classloaders?**

There are three types of built-in Class Loaders in Java:

1. Bootstrap Class Loader – It loads JDK internal classes, typically loads rt.jar and other core classes.
2. Extensions Class Loader – It loads classes from the JDK extensions directory, usually $JAVA_HOME/lib/ext directory.
3. System Class Loader – It loads classes from the current classpath that can be set while invoking a program using -cp or -classpath command line options.

40 **What is ternary operator in java?**

Java ternary operator is the only conditional operator that takes three operands. It's a one liner replacement for if-then-else statement and used a lot in java programming. We can use ternary operator if-else conditions or even switch conditions using nested ternary operators.

41 **What does super keyword do?**

super keyword can be used to access super class method when you have overridden the method in the child class.

We can use super keyword to invoke superclass constructor in child class constructor but in this case, it should be the first statement in the constructor method.

```
package com.journaldev.access;

public class SuperClass {

	public SuperClass(){
	}

	public SuperClass(inti){}

	public void test(){
		System.out.println("super class test method");
	}
}
```

Use of super keyword can be seen in below child class implementation.

```
package com.journaldev.access;

public class ChildClass extends SuperClass {

	public ChildClass(String str){
		//access super class constructor with super keyword
		super();
```

```
                //access child class method
                test();

                //use super to access super class method
                super.test();
        }

        @Override
        public void test(){
                System.out.println("child class test method");
        }
}
```

42 **What is break and continue statement?**

We can use break statement to terminate for, while, or do-while loop. We can use break statement in switch statement to exit the switch case. You can see the example of break statement at java break. We can use break with label to terminate the nested loops.

The continue statement skips the current iteration of a for, while or do-while loop. We can use continue statement with the label to skip the current iteration of the outermost loop.

43 **What is this keyword?**

this keyword provides the reference to the current object and it's mostly used to make sure that object variables are used, not the local variables having the same name.

```
//constructor
public Point(int x, int y) {
this.x = x;
this.y = y;
}
```

We can also use this keyword to invoke other constructors from a constructor.

```
public Rectangle() {
   this(0, 0, 0, 0);
}
public Rectangle(int width, int height) {
   this(0, 0, width, height);
}
public Rectangle(int x, int y, int width, int height) {
this.x = x;
```

```
this.y = y;
this.width = width;
this.height = height;
}
```

44 **What is default constructor?**

No argument constructor of a class is known as default constructor. When we don't define any constructor for the class, java compiler automatically creates the default no-args constructor for the class. If there are other constructors defined, then compiler won't create default constructor for us.

45 **Can we have try without catch block?**

Yes, we can have try-finally statement and hence avoiding catch block.

46 **What is Garbage Collection?**

Garbage Collection is the process of looking at heap memory, identifying which objects are in use and which are not, and deleting the unused objects. In Java, process of deallocating memory is handled automatically by the garbage collector.

We can run the garbage collector with code Runtime.getRuntime().gc() or use utility method System.gc(). For a detailed analysis of Heap Memory and Garbage Collection, please read Java Garbage Collection.

47 **What is Serialization and Deserialization?**

We can convert a Java object to an Stream that is called Serialization. Once an object is converted to Stream, it can be saved to file or send over the network or used in socket connections.

The object should implement Serializable interface and we can use java.io.ObjectOutputStream to write object to file or to any OutputStream object. The process of converting stream data created through serialization to Object is called deserialization. Read more at Java Deserialization.

48 **How to run a JAR file through command prompt?**

We can run a jar file using java command but it requires Main-Class entry in jar manifest file. Main-Class is the entry point of the jar and used by java command to execute the class.

49 **What is the use of System class?**

Java System Class is one of the core classes. One of the easiest way to log

information for debugging is System.out.print() method.

System class is final so that we can't subclass and override its behavior through inheritance. System class doesn't provide any public constructors, so we can't instantiate this class and that's why all of its methods are static.

Some of the utility methods of System class are for array copy, get the current time, reading environment variables.

50 **What is instanceof keyword?**

We can use instanceof keyword to check if an object belongs to a class or not. We should avoid it's usage as much as possible. Sample usage is:

```
public static void main(String args[]){
    Object str = new String("abc");

    if(strinstanceof String){
            System.out.println("String value:"+str);
    }

    if(strinstanceof Integer){
            System.out.println("Integer value:"+str);
    }
}
```

Since str is of type String at runtime, first if statement evaluates to true and second one to false.

51 **Can we use String with switch case?**

One of the Java 7 feature was improvement of switch case of allow Strings. So if you are using Java 7 or higher version, you can use String in switch-case statements.

52 **What is difference between Heap and Stack Memory?**

Major difference between Heap and Stack memory are as follows:

- Heap memory is used by all the parts of the application whereas stack memory is used only by one thread of execution.
- Whenever an object is created, it's always stored in the Heap space and stack memory contains the reference to it. Stack memory only contains local primitive variables and reference variables to objects in heap space.

Memory management in the stack is done in LIFO manner whereas it's more complex in Heap memory because it's used globally.

# Frequently Asked Questions in Advanced Java

1. **Which class can handle any type of request so it is protocol-independent?**
   A) GenericServlet
   B) HttpServlet

   C) Both A & B

   D) None of the above

   **ANSWER: A) GenericServlet**

2. **Which packages represent interfaces and classes for servlet API?**

   A) javax.servlet

   B) javax.servlet.http

   C) Both A & B

   D) None of the above

   ANSWER: C) Both A & B

3. **In RequestDispacher which method is used to sends the same request and response objects to another servlet?**

   A) forward()

   B) sendRedirect()

   C) Both A & B

   D) None of the above

   ANSWER: A) forward()

4. **An attribute in servlet is an object that can be set, get or removed frm one of the following scopes?**

   A) session scope

   B) request scope

   C) application scope

D) All mentioned above

ANSWER: D) All mentioned above

5. **Which class provides stream to read binary data such as image etc. from the request object?**

A) ServltInputStream

B) ServletOutputStream

C) Both A & B

D) None of the above

ANSWER: A) ServltInputStream

6. **Which type of ServletEngine is a server that includes built-in support for servlets?**

A) Add-on ServletEngine

B) Embedded ServletEngine

C) Standalone ServletEngine

D) None of the above

ANSWER: C) Standalone ServletEngine

7. **JavaServer Pages often serve the same purpose as programs implemented using the Common Gateway Interface (CGI)?**

A) True

B) False

ANSWER: A) True

8. **In which technology, we mix our business logic with the presentation logic?**

A) Servlet

B) JSP

C) Both A & B

D) None of the above

ANSWER: A) Servlet

**9. In the following which packages does a JSP API consists of?**

A) javax.servlet.jsp

B) java.servlet

C) javax.servlet.jsp.tagext

D) Both A & C

ANSWER: D) Both A & C

**10. The javax.servlet.jsp package has two interfaces find in the following?**

A) JspPage

B) HttpJspPage

C) JspWriter

D) Both A & B

ANSWER: D) Both A & B

**11. Which tag is used to execute java source code in JSP?**

A) Declaration Tag

B) Scriptlet tag

C) Expression tag

D) None of the above

ANSWER: B) Scriptlet tag

**12. How many JSP implicit objects are there and these objects are created by the web container that are available to all the jsp pages?**

A) 8

B) 9

C) 10

D) 7

ANSWER: B) 9

**13. In JSP page directive which attribute defines the MIME(Multipurpose Internet Mail Extension) type of the HTTP response?**

A) import

B) Content Type

C) Extends

D) Info

ANSWER: B) Content Type

**14. The JSP include directive is used to include the contents of any resource it may be?**

A) jsp file

B) html file

C) text file

D) All mentioned above

ANSWER: D) All mentioned above

**15. In JSP Action tags which tags are used for bean development?**

A) jsp:useBean

B) jsp:setPoperty

C) jsp:getProperty

D) All mentioned above

ANSWER: D) All mentioned above

16. **In JSP Action tags which is used to include the content of another resource it may be JSP, html or servlet**?

    A) jsp:include

    B) jsp:forward

    C) jsp:plugin

    D) jsp:papam

    ANSWER: A) jsp:include

17. **A bean encapsulates many objects into one object, so we can access this object from multiple places?**

    A) True

    B) False

    ANSWER: A) True

18. **In JSP action tags Which are used for developing web application with Java Bean?**

    A) jsp:useBean

    B) jsp:setProperty

    C) jsp:getProperty

    D) Both B & C

    ANSWER: D) Both B & C

19. **Model View Controller in JSP which represents the state of the application i.e. data. It can also have business logic?**

    A) Model

    B) View

    C) Controller

    D) None of the above

    ANSWER: A) Model

**20. In which Architecture of a JSP Application JSP plays a key role and it is responsible for processing the request made by client?**

A) Model1 Architecture

B) Model2 Architecture

C) Both A & B

D) None of the above

ANSWER: A) Model1 Architecture

**21. In JSP which is an exception that is typically a user error or a problem that cannot be foreseen by the programmer?**

A) Checked exceptions

B) Runtime exceptions

C) Errors

D) None of the above

ANSWER: A) Checked exceptions

**22. The authentication mechanism in the servlet specification uses a technique called?**

A) Role Based Authentication

B) Form Based Authentication

C) Both A & B

D) None of the above

ANSWER: A) Role Based Authentication

**23. JSP's provide better facilities for separation of page code and template data by mean of Java beans, EJBs and custom tag libraries?**

A) True

B) False

ANSWER: A) True

**24. A JSP page consists of which tags?**

A) HTML tags

B) JSP tags

C) Both A & B

D) None of the above

ANSWER: C) Both A & B

**25. Which is the Microsoft solution for providing dynamic Web content?**

A) ASP

B) JSP

C) Both A & B

D) None of the above

ANSWER: A) ASP

**26. In which attribute specifies a JSP page that should process any exceptions thrown but not caught in the current page?**

A) The ErrorPage Attribute

B) The IsErrorPage Attribute

C) Both A & B

D) None of the above

ANSWER: A) The ErrorPage Attribute

**27. Which middleware services are provided by EJB?**

A) Security

B) Transaction Management

C) Both A & B

D) None of the above

ANSWER: C) Both A&B

**28. EJB is like COM provided by Microsoft but, it is different from?**

A) Java Bean

B) RMI

C) Web Services

D) All mentioned above

ANSWER: D) All mentioned above

**29. EJB is like COM, Abbreviate the term COM?**

A) Component Object Model

B) Component Oriented Model

C) Common Object Model

D) Common Oriented Model

ANSWER: A) Component Object Model

**30. Which is a server-side component, it is required to be deployed on the server?**

A) EJB

B) RMI

C) Both A & B

D) None of the above

ANSWER: A) EJB

**31. EJB technology is built on the top of Socket Programming?**

A) True

B) False

ANSWER: B) False

**32. What are the Collection types in Hibernate ?**

Ans:Set, List, Array, Map, Bag

**33. What is EAR file?**

Answer) An EAR file is a JAR file with an .ear extension. A J2EE application with all of its Modules is delivered in EAR file.

**34. The Struts Framework has no built-in support for the Model layer, Struts supports which of these model components?**

A) JavaBeans

B) EJB

C) CORBA

D) JDO

E) All Mentioned above

ANSWER: E) All Mentioned above

**35. Abbreviate the term POJO?**

A) Plain Old Java Object

B) Performance Old Java Object

C) Performance Optimize Java Object

D) None of the above

ANSWER: A) Plain Old Java Object

**36. In Which technology Struts 2 provides various types of tags such as UI tags, Data tags, control tags etc. to ease the development of struts 2 application?**

A) Various Result support

B) Integration Support

C) Various Tag support

D) Theme and Template support

ANSWER: C) Various Tag support

**37. In MVC which is responsible for managing the data of the application, it responds to the request from the view and it also responds to instructions from the controller**

**to update itself?**

A) View

B) Model

C) Controller

D) None of the above

ANSWER: B) Model

**38. The Model-View-Controller pattern in Struts2 is realized with how many core components?**

A) 4

B) 5

C) 6

D) 3

ANSWER: B) 5

**39. In which configuration file is a link between the View and Model components in the Web Client but you would not have to touch these settings for 99.99% of your projects?**

A) The struts-config.xml file

B) The struts.xml file

C) The web.xml file

D) The struts.properties file

ANSWER: A) The struts-config.xml file

**40. The values configured in struts.properties file will override the default values configured in default.properties which is contained in the struts2-core-x. y.z.jar distribution?**

A) True

B) False

ANSWER: A) True

**41. A value Stack is simply a stack that contains application specific objects such as?**

A) Action objects

B) Model object

C) Both A & B

D) None of the above

ANSWER: C) Both A & B

**42. Abbreviate the term OGNL?**

A) Object-Goal Navigation Language

B) Object- Graph Navigation Language

C) Oriented-Graph Navigation Language

D) None of the above

ANSWER: B) Object- Graph Navigation Language

**43. The Object Graph Navigation Language (OGNL) is not an expression language?**

A) True

B) False

ANSWER: B) False

**44. Explain JSP and tell its uses.**

JSP stands for Java Server Pages. It is a presentation layer technology independent of platform. It comes with SUN's J2EE platforms. They are like HTML pages but with Java code pieces embedded in them. They are saved with a .jsp extension. They are compiled using JSP compiler in the background and generate a Servlet from the page.

**45. What is the requirement of a tag library?**

A collection of custom tags is called a Tag Library. Recurring tasks are handled more easily and reused across multiple applications to increase productivity. They are used by Web Application designers who focus on presentation rather than accessing database or other services. Some popular libraries are String tag library and Apache display tag library.

**46. Explain JSP Technology.**

JSP is a standard extension of Java and is defined on top of Servlet extensions. Its goal is to simplify management and creation of dynamic web pages. It is platformindependent, secure, and it makes use of Java as a server side scripting language.

**47. Explain Implicit objects in JSP.**

Objects created by web container and contain information regarding a particular request, application or page are called Implicit Objects. They are :

1)response

2)exception

3)application

4)reque

**48. How can multiple submits due to refresh button clicks be prevented?**

1. A form filled by the user is submitted to the server using POST or GET method. The state in the database and business model are updated.

2. A redirect response is used to reply by the servlet for a view page.

3. A view is loaded by the browser using the GET command and no user data is sent. This is safe from multiple submits as it is a separate JSP page.

**49. Differentiate between response.sendRedirect(url) and <jsp:forward page = …> .**

<jsp.forward> element forwards the request object from 1 JSP file to another. Target file can be HTML, servlet or another JSP file, but it should be in the same application context as forwarding JSP file.

sendRedirect send HTTP temporary redirect response to the browser. The browser then creates a new request for the redirected page. It kills the session variables.

**50. Can a subsequent request be accessed with one's servlet code, if a request attribute is already sent in his JSP?**

The request goes out of scope, thus, it cannot be accessed. However, if a request attribute is set in one's servlet, then it can be accessed in his JSP. A JSP is a server side component and the page in translated to a Java servlet, and then executed. Only HTML code is given as output

**51. How to include static files in a JSP page?**

Static pages are always included using JSP include directive. This way the inclusion is performed in the translation phase once. Note that a relative URL must be supplied for file attribute. Although static resources may be included, it is not preferred as each request requires inclusion.

**52. How can a thread safe JSP page be implemented?**

It can be done by having them implemented by the SingleThreadModel Interface. Add <%@page isThreadSafe="false" %> directive in the JSP page.

**53. How can the output of JSP or servlet page be prevented from being cached by the browser?**

Using appropriate HTTP header attributes to prevent the dynamic content output by a JSP page from being cached by the browser.

## Frequently Asked Questions in Web Programming

1 Why are the protocols layered?

Layering protocols simplifies the task of communicating over the network and it allows for reuse of layers that are not specific to a particular application.

2 What is meant by Name Resolution?

Name Resolution is the process of mapping a hostname to its corresponding IP Address. One way to translate a hostname to an IP address is to look it up in a simple text file. The second way is the domain name service, which is a distributed database containing all registered hostnames on the Internet and their IP addresses.

3 What are the components of HTTP URL?

The components are host, an optional port, path, filename, section and query string.

4 Define URI, URL, and URN.

1. URI (Uniform Resource Identifier): It identifies an object on the Internet.

2. URL (Uniform Resource Locator): It is a specification for identifying an object such as a file, newsgroup, CGI program or e-mail address by indicating the exact location on the internet.

3. URN (Uniform Resource Name): It is a method for referencing an object without declaring the full path to the object.

5 Define CGI -Common Gateway Interface.

A specification for transferring information between a World Wide Web server and a CGI program. ACGI program is any program designed to accept and return data that conforms to the CGI specification. The program could be written in. any programming language, including C, Perl, Java, or Visual Basic.

6 Do all HTML tags come in pair?

No, not all HTMLS tags come in pair. For e.g. <img>, <br>

7 What are some of the common lists that can be used when designing a page?

Some of the common lists that can be used are:

a) Ordered list

b) Unordered list

c) Definition list

d) Menu list

e) Directory list

8 Is it possible to list elements straight in an html file?

Yes, it is possible with the use of indents.

9 Does a Hyperlink apply only to text?

No. The hyPerlinks can be applied to both text as well as the images.

It means that even the images can become clickable links with a capability to take the visitor to the next page.

This can be done simply by using <a href> tag.

10 What hierarchy is being followed when in style sheets?

Inline style takes priority over embedded style sheets.

Embedded style take priority over external style sheets.

If a single selector includes three different style definitions, the definition that is closest to the actual tag gets the priority.

11 How can I hide my source?

No. you can’t hide your source as it is required by the browser to display your document.

12 How do you refer to the .css file in the web page?

.css file in the web page can be referred with the use of <link> tag.

It should be kept between <head></head> tag.

Example:

<link href="/css/mystyle.css" type="text/css" rel="stylesheet" />

13 How to upload files using HTML to website?

The uploading of files requires some necessary configuration like an HTTP server that acts as a transaction between the user and the server and access to the directory of cgi-bin that consists of the receiving script.

14 What is SVG?

SVG is the abbreviation for Scalable Vector Graphics and is recommended by W3C.

15 Differentiate between Canvas and SVG.

Canvas is resolution dependent while SVG is not.

Canvas does not provide any support for event handlers while SVG does.

Canvas is suitable for graphic-intensive games while SVG is not suitable for gaming.

Canvas is suitable for small rendering areas while SVG is suitable for large rendering areas like Google maps.

16 What is the relationship between SGML, HTML, XML and XHTML?

SGML (Standard generalized markup language) is a standard which tells how to specify document markup. It's only a Meta language which describes how a document markup should be. HTML is a markup language which is described using SGML. XHTML was created from XML which was used in HTML 4.0. So for example in SGML derived HTML "</br>" is not valid but in XHTML it's valid.

17 If I do not put <! DOCTYPE html> will HTML 5 work?

No, browser will not be able to identify that it's a HTML document and HTML 5 tags will not function proPerly.

18 What are the advantages of XML?

The following are the advantages of XML:

1. It is platform-independent.

2. Data structures: records, lists and trees can be represented using XML.

3. Its format describes structure, field names and their specific values too. Its therefore called self-documenting.

4. Its syntax and parsing requirements make the necessary parsing algorithms very simple, efficient, and consistent.

5. It can be used as a document storage and processing format.

19 Differentiate DTD and schema.

A DTD provides a list of the elements, attributes, comments, notes, and entities contained in an XML or HTML document and indicates their relationship with each other. The 'DOCTYPE' tells the browser that it is a Document Type Declaration.

Schema means the organization and the structure of a database.

Example : An XML schema is a description of XML document. It is expressed in terms of constraints on the structure and content of documents.

20 Why JavaScript is called as Script for all browsers?

JavaScript interpreter treats the tag such that it treats all the lines in the comments as script lines. The JavaScript comment starts with // inside the <SCRIPT> tag. The script is contained inside <HTML> tag that contains a comment tag. The browser that is non-compatible with JavaScript ignore the lines and move on, but compatible browsers always treats it as a script and execute it.

21 Explain Data entry validation.

This tells that if the field of the form is filled out then during the processing of the server the client side can interact with it.

22 How to run the interactive PHP shell from the command line interface?

Just use the PHP CLI program with the option -a as follows:

php –a

23 How can we display the output directly to the browser?

To be able to display the output directly to the browser, we have to use the special tags <?= and ?>.

24 What is the main difference between PHP 4 and PHP 5?

PHP 5 presents many additional OOP (Object Oriented Programming) features.

25 What are the features of Perl programming?

Perl takes the best features from other languages, such as C, awk, sed, sh, and BASIC, among others.

Perls database integration interface DBI supports third-party databases including Oracle, Sybase, Postgres, MySQL and others.

Perl works with HTML, XML, and other mark-up languages.

Perl supports Unicode.

Perl is Y2K compliant.

26 What are the benefits of Perl programming in using it in web based applications?

Perl used to be the most popular web programming language due to its text manipulation capabilities and rapid development cycle.

Perl is widely known as " the duct-tape of the Internet”

Perl can handle encrypted Web data, including e-commerce transactions.

27 Which feature of Perl provides code reusability ?

Inheritance feature of Perl provides code reusability.

28 List the data types that Perl can handle?

Scalars ($): It stores a single value.

Arrays (@): It stores a list of scalar values.

Hashes (%): It stores associative arrays which use a key value as index instead of numerical indexes

29 Explain what is Ruby on Rails?

Ruby: It is an object oriented programming language inspired by PERL and PYTHON.

Rails: It is a framework used for building web application

30 Mention what is the naming convention in Rails?

Variables: For declaring Variables, all letters are lowercase, and words are separated by underscores

Class and Module: Modules and Classes uses MixedCase and have no underscore; each word starts with a uppercase letter

Database Table: The database table name should have lowercase letters and underscore between words, and all table names should be in the plural form for example invoice_items

Model: It is represented by unbroken MixedCase and always have singular with the table name

Controller: Controller class names are represented in plural form, such that OrdersController would be the controller for the order table.