Collection Of Technical Interview Questions

TCS Technical Interview Questions and Answers

1. **What is your strongest programming language (Java, ASP, C, C++, VB, HTML, C#, etc.)?**

Point to remember: Before interview You should decide your Favorite programming language and be prepared based on that question.

2.Differences between C and Java?

1.JAVA is Object-Oriented while C is procedural.

2.Java is an Interpreted language while C is a compiled language.

3.C is a low-level language while JAVA is a high-level language.

4.C uses the top-down approach while JAVA uses the bottom-up approach.

5.Pointer go backstage in JAVA while C requires explicit handling of pointers.

6.The Behind-the-scenes Memory Management with JAVA & The User-Based Memory Management in C.

7.JAVA supports Method Overloading while C does not support overloading at all.

8.Unlike C, JAVA does not support Preprocessors, & does not really them.

9.The standard Input & Output Functions--C uses the printf&scanf functions as its standard input & output while JAVA uses the System.out.print&System.in.read functions.

10.Exception Handling in JAVA And the errors & crashes in C.

3.In header files whether functions are declared or defined?

Functions are declared within header file. That is function prototypes exist in a header file,not function bodies. They are defined in library (lib).

4.What are the different storage classes in C ?

There are four types of storage classes in C. They are extern, register, auto and static

5.What does static variable mean?

Static is an access qualifier. If a variable is declared as static inside a function, the scope is limited to the function,but it will exists for the life time of the program. Values will be persisted between successive calls to a function

6.How do you print an address ?

Use %p in printf to print the address.

7.What are macros? what are its advantages and disadvantages?

Macros are processor directive which will be replaced at compile time.
The disadvantage with macros is that they just replace the code they are not function calls. similarly the advantage is they can reduce time for replacing the same values.

8.**Difference between pass by reference and pass by value?**

Pass by value just passes the value from caller to calling function so the called function cannot modify the values in caller function. But Pass by reference will pass the address to the caller function instead of value if called function requires to modify any value it can directly modify.

9.**What is an object?**

Object is a software bundle of variables and related methods. Objects have state and behavior

10.What is a class?

Class is a user-defined data type in C++. It can be created to solve a particular kind of problem. After creation the user need not know the specifics of the working of a class.

11.What is the difference between class and structure?

Structure: Initially (in C) a structure was used to bundle different type of data types together to perform a particular functionality. But C++ extended the structure to contain functions also.
The major difference is that all declarations inside a structure are by default public.
Class: Class is a successor of Structure. By default all the members inside the class are private.

12. What is ponter?

Pointer is a variable in a program is something with a name, the value of which can vary. The way the compiler and linker handles this is that it assigns
a specific block of memory within the computer to hold the value of that variable.

13.What is the difference between null and void pointer?

A Null pointer has the value 0. void pointer is a generic pointer introduced by ANSI. Generic pointer can hold the address of any data type.

14.what is function overloading

Function overloading is a feature of C++ that allows us to create multiple functions with the same name, so long as they have different parameters.Consider the following function:

```
int Add(intnX, intnY)
 {
   return nX + nY;
 }
```


15.What is function overloading and operator overloading?

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 of 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.
Operator overloading allows existing C++ operators to be redefined so that they work on objects of user-defined classes. Overloaded operators are syntactic sugar for equivalent function calls. They form a

pleasant facade that doesn't add anything fundamental to the language (but they can improve understandability and reduce maintenance costs).

16.what is friend function?

A friend function for a class is used in object-oriented programming to allow access to public, private, or protected data in the class from the outside.
Normally, a function that is not a member of a class cannot access such information; neither can an external class. Occasionally, such access will be advantageous for the programmer. Under these circumstances, the function or external class can be declared as a friend of the class using the friend keyword.

17.What do you mean by inline function?
The idea behind inline functions is to insert the code of a called function at the point where the function is called. If done carefully, this can improve the application's performance in exchange for increased compile time and possibly (but not always) an increase in the size of the generated binary executables.

18. **Tell me something about abstract classes?**

An abstract class is a class which does not fully represent an object. Instead, it represents a broad range of different classes of objects. However, this representation extends only to the features that those classes of objects have in common. Thus, an abstract class provides only a partial description of its objects.

19.What is the difference between realloc() and free()?

The free subroutine frees a block of memory previously allocated by the malloc subroutine. Undefined results occur if the Pointer parameter is not a valid pointer. If the Pointer parameter is a null value, no action will occur. The realloc subroutine changes the size of the block of memory pointed to by the Pointer parameter to the number of bytes specified by the Size parameter and returns a new pointer to the block. The pointer specified by the Pointer parameter must have been created with the malloc, calloc, or realloc subroutines and not been deallocated with the free or realloc subroutines. Undefined results occur if the Pointer parameter is not a valid pointer.

20.What is the difference between an array and a list?

Array is collection of homogeneous elements. List is collection of heterogeneous elements.
For Array memory allocated is static and continuous. For List memory allocated is dynamic and Random.
Array: User need not have to keep in track of next memory allocation.

List: User has to keep in Track of next location where memory is allocated.
Array uses direct access of stored members, list uses sequential access for members.

21.What are the differences between structures and arrays?

Arrays is a group of similar data types but Structures can be group of different data types

22.**What is data structure?**

A data structure is a way of organizing data that considers not only the items stored, but also their relationship to each other. Advance knowledge about the relationship between data items allows designing of efficient algorithms for the manipulation of data.

23. Can you list out the areas in which data structures are applied extensively?

Compiler Design,

Operating System,

Database Management System,

Statistical analysis package,

Numerical Analysis,

Graphics,

Artificial Intelligence,

Simulation

24.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.

25. what are the two integrity rules used in DBMS?

The two types of integrity rules are referential integrity rules and entity integrity rules. Referential integrity rules dictate that a database does not contain orphan foreign key values. This means that
A primary key value cannot be modified if the value is used as a foreign key in a child table. Entity integrity dictates that the primary key value cannot be Null.

26. Tell something about deadlock and how can we prevent dead lock?

In an operating system, a deadlock is a situation which occurs when a process enters a waiting state because a resource requested by it is being held by another waiting process, which in turn is waiting for

another resource. If a process is unable to change its state indefinitely because the resources requested by it are being used by other waiting process, then the system is said to be in a deadlock.

Mutual Exclusion: At least one resource must be non-shareable.[1] Only one process can use the resource at any given instant of time.
Hold and Wait or Resource Holding: A process is currently holding at least one resource and requesting additional resources which are being held by other processes.
No Preemption: The operating system must not de-allocate resources once they have been allocated; they must be released by the holding process voluntarily.
Circular Wait: A process must be waiting for a resource which is being held by another process, which in turn is waiting for the first process to release the resource. In general, there is a set of waiting processes, P = {P1, P2, ..., PN}, such that P1 is waiting for a resource held by P2, P2 is waiting for a resource held by P3 and so on till PN is waiting for a resource held by P1.[1][7]

Thus prevention of deadlock is possible by ensuring that at least one of the four conditions cannot hold.

27. What is Insertion sort, selection sort, bubble sort(basic differences among the functionality of the three sorts and not the exact algorithms)

28. What is Doubly link list?

A doubly linked list is a linked data structure that consists of a set of sequentially linked records called nodes. Each node contains two fields, called links, that are references to the previous and to the next node in the sequence of nodes. The beginning and ending nodes' previous and next links, respectively, point to some kind of terminator, typically a sentinel node or null, to facilitate traversal of the list. If there is only one sentinel node, then the list is circularly linked via the sentinel node. It can be conceptualized as two singly linked lists formed from the same data items, but in opposite sequential orders.

29.What is data abstraction? what are the three levels of data abstraction with Example?

Abstraction is the process of recognizing and focusing on important characteristics of a situation or object and leaving/filtering out the un-wanted characteristics of that situation or object.

Lets take a person as example and see how that person is abstracted in various situations

A doctor sees (abstracts) the person as patient. The doctor is interested in name, height, weight, age, blood group, previous or existing diseases etc of a person
An employer sees (abstracts) a person as Employee. The employer is interested in name, age, health, degree of study, work experience etc of a person.

Abstraction is the basis for software development. Its through abstraction we define the essential aspects of a system. The process of identifying the abstractions for a given system is called as Modeling (or object modeling).

Three levels of data abstraction are:
1. Physical level : how the data is stored physically and where it is stored in database.
2. Logical level : what information or data is stored in the database. eg: Database administrator
3.View level : end users work on view level. if any amendment is made it can be saved by other name.

30.What is command line argument?

Getting the arguments from command prompt in c is known as command line arguments. In c main function has three arguments.They are:

Argument counter
Argument vector
Environment vector

31.**Advantages of a macro over a function?**

Macro gets to see the Compilation environment, so it can expand #defines. It is expanded by the preprocessor.

32.**What are the different storage classes in C?**

Auto,register,static,extern

33.Which header file should you include if you are to develop a function which can accept variable number of arguments?

stdarg.h

34.What is cache memory ?

Cache Memory is used by the central processing unit of a computer to reduce the average time to access memory. The cache is a smaller, faster memory

which stores copies of the data from the most frequently used main memory locations. As long as most memory accesses are cached memory locations, the average
latency of memory accesses will be closer to the cache latency than to the latency of main memory.

35.What is debugger?
A debugger or debugging tool is a computer program that is used to test and debug other programs

36. Const char *p , char const *p What is the difference between the above two?

1) const char *p - Pointer to a Constant char ('p' isn't modifiable but the pointer is)
2) char const *p - Also pointer to a constant Char

However if you had something like:
char * const p - This declares 'p' to be a constant pointer to an char. (Char p is modifiable but the pointer isn't)

37. What is Memory Alignment?

Data structure alignment is the way data is arranged and accessed in computer memory. It consists of two separate but related issues: data alignment and data structure padding.

38.Explain the difference between 'operator new' and the 'new' operator?

The difference between the two is that operator new just allocates raw memory, nothing else. The new operator starts by using operator new to allocate memory, but then it invokes the constructor for the right type of object, so the result is a real live object created in that memory. If that object contains any other objects (either embedded or as base classes) those constructors as invoked as well.

39. Difference between delete and delete[]?

The keyword delete is used to destroy the single variable memory created dynamically which is pointed by single pointer variable.

Eg: int *r=new(int)
the memory pointed by r can be deleted by delete r.
delete [] is used to destroy array of memory pointed by single pointer variable.
Eg:int *r=new(int a[10])
The memory pointed by r can be deleted by delete []r.

40. What is conversion constructor?

A conversion constructor is a single-parameter constructor that is declared without the function specifier 'explicit'. The compiler uses conversion constructors to convert objects from the type of the first parameter to the type of the conversion constructor's class.To define implicit conversions, C++ uses conversion constructors, constructors that accept a single parameter and initialize an object to be a copy of that parameter.

41.What is a spanning Tree?

A spanning tree is a tree associated with a network. All the nodes of the graph appear on the tree once. A minimum spanning tree is a spanning tree organized so that the total edge weight between nodes is minimized.

42. Why should we use data ware housing and how can you extract data for analysis with example?

If you want to get information on all the techniques of designing, maintaining, building and retrieving data, Data warehousing is the ideal method. A data warehouse is premeditated and generated for supporting the decision making process within an organization.

Here are some of the benefits of a data warehouse:

o With data warehousing, you can provide a common data model for different interest areas regardless of data's source. In this way, it becomes easier to report and analyze information.

o Many inconsistencies are identified and resolved before loading of information in data warehousing. This makes the reporting and analyzing process simpler.

o The best part of data warehousing is that the information is under the control of users, so that in case the system gets purged over time, information can be easily and safely stored for longer time period.

o Because of being different from operational systems, a data warehouse helps in retrieving data without slowing down the operational system.

o Data warehousing enhances the value of operational business applications and customer relationship management systems.

o Data warehousing also leads to proper functioning of support system applications like trend reports, exception reports and the actual performance analyzing reports.

Data mining is a powerful new technology to extract data for analysis.

43.Explain recursive function & what is the data structures used to perform recursion?

a) A recursive function is a function which calls itself.

b) The speed of a recursive program is slower because of stack overheads. (This attribute is evident if you run above C program.)
c) A recursive function must have recursive conditions, terminating conditions, and recursive expressions.

Stack data structure . Because of its LIFO (Last In First Out) property it remembers its caller so knows whom to return when the function has to return. Recursion makes use of system stack for storing the return addresses of the function calls. Every recursive function has its equivalent iterative (non-recursive) function. Even when such equivalent iterative procedures are written, explicit stack is to be used.

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

45.What is scope of a variable?

Scope refers to the visibility of variables. It is very useful to be able to limit a variable's scope to a single function. In other words, the variable wil have a limited scope

46.What is an interrupt?

Interrupt is an asynchronous signal informing a program that an event has occurred. When a program receives an interrupt signal, it takes a specified action.

47.What is user defined exception in Java?

The keywords used in java application are try, catch and finally are used in implementing used-defined exceptions. This Exception class inherits all the method from Throwable class.

48.What is java Applet?

Applet is java program that can be embedded into HTML pages. Java applets runs on the java enables web browsers such as mozila and internet explorer. Applet is designed to run remotely on the client browser, so there are some restrictions on it. Applet can't access system resources on the local computer. Applets are used to make the web site more dynamic and entertaining.

49.What do you know about the garbage collector?

Garbage collection is the systematic recovery of pooled computer storage that is being used by a program when that program no longer needs the storage. This frees the storage for use by other programs (or processes within a program). It also ensures that a program using increasing amounts of pooled storage does not reach its quota (in which case it may no longer be able to function).

Garbage collection is an automatic memory management feature in many modern programming languages, such as Java and languages in the .NET framework. Languages that use garbage collection are often interpreted or run within a virtual machine like the JVM. In each case, the environment that runs the code is also responsible for garbage collection.

50.Write a Binary Search program

```
intbinarySearch(intarr[],int size, int item)
{
int left, right, middle;
left = 0;
right = size-1;
```

```
while(left <= right)
{
middle = ((left + right)/2);

if(item == arr[middle])
{
return(middle);
}

if(item >arr[middle])
{
left = middle+1;
}
else
{
right = middle-1;
}
}

return(-1);
}
```

51.What are enumerations?

An enumeration is a data type, used to declare variable that store list of names. It is act like a database, which will store list of items in the variable. example: enumshapes{triangle, rectangle,...

52.What is static identifier?

The static identifier is used for initializing only once, and the value retains during the life time of the program / application. A separate memory is allocated for ‘static’ variables. This value can be used between function calls. The default value of an uninitialized static variable is zero. A function can also be defined as a static function, which has the same scope of the static variable.

53.What is Cryptography?

Cryptography is the science of enabling secure communications between a sender and one or more recipients. This is achieved by the sender scrambling a message (with a computer program and a secret key) and leaving the recipient to unscramble the message (with the same computer program and a key, which may or may not be the same as the sender's key).

There are two types of cryptography: Secret/Symmetric Key Cryptography and Public Key Cryptography

54.What is encryption?

Encryption is the transformation of information from readable form into some unreadable form.

55.What is decryption?

Decryption is the reverse of encryption; it's the transformation of encrypted data back into some intelligible form.

56.What exactly is a digital signature?

Just as a handwritten signature is affixed to a printed letter for verification that the letter originated from its purported sender, digital signature performs the same task for an electronic message. A digital signature is an encrypted version of a message digest, attached together with a message.

Infosys Technical Interview Questions and Answers

1.Difference between C and C++?

a) C follows the procedural programming paradigm while C++ is a multi-paradigm language (procedural as well as object oriented)
In case of C, importance is given to the steps or procedure of the program while C++ focuses on the data rather than the process.
Also, it is easier to implement/edit the code in case of C++ for the same reason.
b) In case of C, the data is not secured while the data is secured (hidden) in C++
This difference is due to specific OOP features like Data Hiding which are not present in C.
c) C is a low-level language while C++ is a middle-level language
C is regarded as a low-level language (difficult interpretation & less user friendly) while C++ has features of both low-level (concentration on what's going on in the machine hardware) & high-level languages (concentration on the program itself) & hence is regarded as a middle-level language.
d) C uses the top-down approach while C++ uses the bottom-up approach
In case of C, the program is formulated step by step, each step is processed into detail while in C++, the base elements are first formulated which then are linked together to give rise to larger systems.
e) C is function-driven while C++ is object-driven
Functions are the building blocks of a C program while objects are building blocks of a C++ program.
f) C++ supports function overloading while C does not
Overloading means two functions having the same name in the same program. This can be done only in C++ with the help of Polymorphism (an OOP feature)
g) We can use functions inside structures in C++ but not in C.
In case of C++, functions can be used inside a structure while structures cannot contain functions in C.

h) The NAMESPACE feature in C++ is absent in case of C
C++ uses NAMESPACE which avoid name collisions. For instance, two students enrolled in the same university cannot have the same roll number while two students in different universities might have the same roll number. The universities are two different namespace & hence contain the same roll number (identifier) but the same university (one namespace) cannot have two students with the same roll number (identifier)
i) The standard input & output functions differ in the two languages
C uses scanf&printf while C++ uses cin>>&cout<< as their respective input & output functions
j) C++ allows the use of reference variables while C does not
Reference variables allow two variable names to point to the same memory location. We cannot use these variables in C programming.
k) C++ supports Exception Handling while C does not.
C does not support it "formally" but it can always be implemented by other methods. Though you don't have the framework to throw & catch exceptions as in C++.

2.What is null pointer?

When referring to computer memory, a null pointer is a command used to direct a software program or operating system to an empty location in the computer memory. Commonly, the null pointer is used to denote the end of a memory search or processing event. In computer programming, a null pointer is a pointer that does not point to any object or function.
A nil pointer is a false value. For example, 1 > 2 is a nil statement.
In the programming language C, NULL is an available command that can be used, where nil is an available command used in the Pascal programming language.

3.What are the 4 basics of OOP?
Abstraction, Inheritance, Encapsulation, and Polymorphism.

4.What you mean by Object Relational DBMS?

An object-relational database (ORD), or object-relational database management system (ORDBMS), is a database management system (DBMS) similar to a relational database, but with an object-oriented database model: objects, classes and inheritance are directly supported in database schemas and in the query language. In addition, just as with proper relational systems, it supports extension of the data model with custom data-types and methods.

5.Structural difference between bitmap and b-tree index ?

Btree
It is made of branch nodes and leaf nodes. Branch nodes holds prefix key value along with the link to the leaf node. The leaf node in turn contains the indexed value and rowed.
Bitmap

It simply consists of bits for every single distinct value. It uses a string of bits to quickly locate rows in a table. Used to index low cardinality columns.

6.what is database Schema?

The formal definition of database schema is a set of formulas (sentences) called integrity constraints imposed on a database.

7.what are the different levels of database schema?

Conceptual schema- a map of concepts and their relationships.
Logical schema- a map of entities and their attributes and relations
Physical schema- a particular implementation of a logical schema
Schema object- Oracle database object

8.what is difference between foreign key and reference key ?

Reference Key is the primary key that is referenced in the other table (linked via the other tables Foreign Key). Foreign Key is how you link the second table to the primary tables Primary Key (or Reference Key).

9.Tell me about DSN?

A Data Source Name (DSN) is the logical name that is used by Open Database Connectivity (ODBC) to refer to the drive and other information that is required to access data. The name is used by Internet Information Services (IIS) for a connection to an ODBC data source, such as a Microsoft SQL Server database.

10.ifference between Clustered index and non clusteredindex ?

Clustered Index
Only one per table
Faster to read than non clustered as data is physically stored in index order
Non Clustered Index
Can be used many times per table
Quicker for insert and update operations than a clustered index

11.What is WPF and WCF?

WPF/WCF application, need in .NET 3.0 Framework. This application will cover the following concepts:
WCF(Windows Communication Foundation)
The new service orientated attributes
The use of interfaces
The use of callbacks

Asynchronous delegates
Creating the proxy
WPF(Windows Presentation Foundation)
Styles
Templates
Animations
Databinding
Multithreading a WPF application

12.What is the difference between an EXE and a DLL?

The term EXE is a shortened version of the word executable as it identifies the file as a program. On the other hand, DLL stands for Dynamic Link Library, which commonly contains functions and procedures that can be used by other programs.
10.Scenarios in which web application should be used and desktop application should be used?

13.Tell how to check whether a linked list is circular.

Create two pointers, each set to the start of the list. Update each as follows:

```
while (pointer1) {
pointer1 = pointer1->next;
pointer2 = pointer2->next; if (pointer2) pointer2=pointer2->next;
if (pointer1 == pointer2) {
print ("circular\n");
}
}
```

14.How can u increase the heap size in the memory?

If heap size set too low then you will get "out of memory" errors. If you set it too high then your system will hang or you will suffer poor performance because parts of the jvm will be swapped in and out of memory. A rule of thumb is that you should not set this parameter larger than about 80% of your free physical memory. On Windows XP machines you can determine your free physical memory from the Performance tab of the Task Manager application.

Boosting the heap size parameter will allow you to read in larger file-based projects. It will also improve the performance of the database back-end since more memory is available for caching.In Java Set the maximum heap size, using the -Xmx command-line option, to a value that allows the application to run with 70% occupancy of the Java heap.The Java heap occupancy often varies over time as the load applied to the application varies. For applications where occupancy varies, set the maximum Java heap size so that there is 70% occupancy at the highest point, and set the minimum heap size, using the -Xms command line option, so that the Java heap is 40% occupied at its lowest memory usage. If these values are set, the Java

memory management algortihms can modify the heap size over time according to the application load, while maintaining usage in the optimal area of between 40% and 70% occupancy.

15.Why is it difficult to store linked list in an array?

Both Arrays and Linked List can be used to store linear data of similar types.

Linked list provide dynamic size while the size of array is fixed, So we must know the upper limit on the number of elements in advance.
Linked lists have following drawbacks:
1) Random access is not allowed. We have to access elements sequentially starting from the first node. So we cannot do binary search with linked lists.
2) Extra memory space for a pointer is required with each element of the list.
3) Arrays have better cache locality that can make a pretty big difference in performance.

16.Different types of keys in SQL?

The different types of Keys in sql server are,

A **candidate key** acts as a unique key. A unique key can be a Primary key. A candidate key can be a single column or combination of columns. Multiple candidate keys are allowed in a table.

Primary Key

To uniquely identify a row, Primary key is used.
A table allows only one Primary key
A **Primary key** can be a single column or combination of columns.

Foreign Key

A foreign key in a table is a key which refer another table's primary key . A primary key can be referred by multiple foreign keys from other tables. It is not required for a primary key to be the reference of any foreign keys. The interesting part is that a foreign key can refer back to the same table but to a different column. This kind of foreign key is known as "self-referencing foreign key".

17.Explain about Joins, Views, Normalization, Triggers?

The **JOIN** keyword is used in an SQL statement to query data from two or more tables, based on a relationship between certain columns in these tables.
Tables in a database are often related to each other with keys.

A **view** is a virtual table.A view contains rows and columns, just like a real table. The fields in a view are fields from one or more real tables in the database.
You can add SQL functions, WHERE, and JOIN statements to a view and present the data as if the data were coming from one single table.

Normalization is the process of efficiently organizing data in a database. There are two goals of the normalization process: eliminating redundant data (for example, storing the same data in more than one table) and ensuring data dependencies make sense (only storing related data in a table). Both of these are worthy goals as they reduce the amount of space a database consumes and ensure that data is logically stored.

First Normal Form (1NF)

sets the very basic rules for an organized database:
Eliminate duplicative columns from the same table.
Create separate tables for each group of related data and identify each row with a unique column or set of columns (the primary key).

Second Normal Form (2NF)

further addresses the concept of removing duplicative data:
Meet all the requirements of the first normal form.
Remove subsets of data that apply to multiple rows of a table and place them in separate tables.
Create relationships between these new tables and their predecessors through the use of foreign keys.

Third Normal Form (3NF)

Meet all the requirements of the second normal form.
Remove columns that are not dependent upon the primary key.

Boyce-Codd Normal Form (BCNF or 3.5NF)

It also referred to as the "third and half (3.5) normal form", adds one more requirement:
Meet all the requirements of the third normal form.
Every determinant must be a candidate key.

Fourth Normal Form (4NF)

Meet all the requirements of the third normal form.
A relation is in 4NF if it has no multi-valued dependencies.
Remember, these normalization guidelines are cumulative. For a database to be in 2NF, it must first fulfill all the criteria of a 1NF database.
In a DBMS, a **trigger** is a SQL procedure that initiates an action (i.e., fires an action) when an event

(INSERT, DELETE or UPDATE) occurs. Since triggers are event-driven specialized procedures, they are stored in and managed by the DBMS. A trigger cannot be called or executed; the DBMS automatically fires the trigger as a result of a data modification to the associated table. Triggers are used to maintain the referential integrity of data by changing the data in a systematic fashion. Each trigger is attached to a single, specified table in the database.

18.what is the difference between socket and session?

The Socket is a Combination of Ip address and Port Number (in pairs)
Session is a Logical Connectivity between the source and destination

19.What is a default gateway?

In organizational systems a gateway is a node that routes the traffic from a workstation to another network segment. The default gateway commonly connects the internal networks and the outside network (Internet). In such a situation, the gateway node could also act as a proxy server and a firewall. The gateway is also associated with both a router, which uses headers and forwarding tables to determine where packets are sent, and a switch, which provides the actual path for the packet in and out of the gateway.

20.Given an array of 1s and 0s arrange the 1s together and 0s together in a single scan of the array. Optimize the boundary conditions.

```
void main()
{
int A[10]={'0','1','0','1','0','0','0','1','0','1','0','0'};
int x=0,y=A.length-1;
while(x<y){
 if(!A[x])
x++;
else if(A[y])
y--;
if(A[x] && !A[y])//here we are checking that stating index is having 1 and last index having 0 than swap values</y){
A[x]=0,A[y]=1;
}
getch()
}
```

21.Define Data Abstraction. What is its importance?

Abstraction is the process of recognizing and focusing on important characteristics of a situation or object and leaving/filtering out the un-wanted characteristics of that situation or object.
Abstraction is the basis for software development. Its through abstraction we define the essential aspects of

a system. The process of identifying the abstractions for a given system is called as Modeling (or object modeling).
Three levels of data abstraction are:
1. Physical level : how the data is stored physically and where it is stored in database.
2. Logical level : what information or data is stored in the database. eg: Database administrator
3.View level : end users work on view level. if any amendment is made it can be saved by other name.

22.Write a program to swap two numbers without using a temporary variable.

```
void swap(int&i, int&j)
{
i=i+j;
j=i-j;
i=i-j;
}
```

23.Memory Allocation in C/C++

calloc() allocates a memory area, the length will be the product of its parameters(it has two parameters). calloc fills the memory with ZERO's and returns a pointer to first byte. If it fails to locate enough space it returns a NULL pointer.
malloc() allocates a memory area, length will be value entered as parameter.(it has one parameter). It does not initializes memory area
free() used to free the allocated memory(allocated through calloc and malloc), in other words, this used release the allocated memory
new also used to allocate memory on heap and initialize the memory using constructor
delete also used release memory allocated by new operator

24.Write output of the program?

```
inti=10;
printf("%d%d%d",i,++i,i++);
```
Answer = 10 12 12

25.what is virtual function and pure virtual function?

Virtual function:-To achieve polymorphism, function in base class is declared as virtual , By declare virtual we make base class pointer to execute function of any derived class depends on content of pointer (any derived class address).
Pure Virtual Function :-This is function used in base class, and its defination has to be provide in derived class, In other pure virtual function has not defination in base it defined as :
virtual void fun()=0;

This means that this function not going to do anything, In case of pure virtual funtion derived function has to implement pure virtual function or redeclare it as pure virtual function

WIPRO Technical Interview Questions and Answers

Memory management in C

The C programming language manages memory statically, automatically, or dynamically.

Static-duration variables are allocated in main memory, usually along with the executable code of the program, and persist for the lifetime of the program

Automatic-duration variables are allocated on the stack and come and go as functions are called and return.

For static-duration and automatic-duration variables, the size of the allocation is required to be compile-time constant.

Dynamic memory allocation in which memory is more explicitly (but more flexibly) managed, typically, by allocating it from the heap, an area of memory structured for this purpose.

In C, the library function malloc is used to allocate a block of memory on the heap. The program accesses this block of memory via a pointer that malloc returns. When the memory is no longer needed, the pointer is passed to free which deallocates the memory so that it can be used for other purposes.

Functionality of Operating System?

An operating system (OS) is a set of software that manages computer hardware resources and provides common services for computer programs.

To act as interface between hardware and users, an operating system must be able perform the following functions:

1. Enabling startup application programs. Thus, the operating system must have:

- A text editor

- A translator

- An editor of links

2. The allocation of resources needed to execute programs is done by identifying: the programs that are running, the need for memory, peripheral devices and data protection requirements.

3. Facilities for data compression, sorting, mixing, cataloging and maintenance of libraries, through utility programs available.

4. Plan implementation works according to certain criteria, for efficient use of central processing unit.

5. Assisting implementation of programs through computer-user communication system, at both hardware and software level.

Examples of operating systems:BS2000,BS3000,DOS,PC-DOS,MS-DOS,LINUX,SOLARIS,MAC OS,UNIX,WINDOWS

What the use of IP address

An Internet Protocol address (IP address) is a numerical label assigned to each device (e.g., computer, printer) participating in a computer network that uses the Internet Protocol for communication.An IP address serves two principal functions: host or network interface identification and location addressing

What is difference between UNIQUE and PRIMARY KEY constraints?

A UNIQUE constraint is similar to PRIMARY key, but you can have more than one UNIQUE constraint per table. Contrary to PRIMARY key UNIQUE constraints can accept NULL but just once. If the constraint is defined in a combination of fields, then every field can accept NULL and can have some values on them, as long as the combination values is unique.

What are the steps involved in designing?

Project plan, Requirements, Design, Coding, Testing, Re-coding and design, Development, Maintenance.

what is the difference between interface and multiple interface?

Both an abstract class and an interface are specific types of computer objects that allow a programmer to loosely define one type of object as if it were another type, while retaining all of the object's original properties. While multiple different computer languages use one or both of these concepts, Java is the most well-known. Abstract classes and interfaces have a variety of similarities, but also incorporate significant differences in structure, syntax, and usage.

How can we delete Duplicate row in table?

SQL> delete from table_name where rowid not in (select max(rowid) from table group by duplicate_values_field_name);

When do you use SQL Profiler?

SQL Profiler utility allows us to basically track connections to the SQL Server and also determine activities such as which SQL Scripts are running, failed jobs etc..

What do you meant by active and passive objects?

Active objects are one which instigate an interaction which owns a thread and they are responsible for handling control to other objects. In simple words it can be referred as client.
Passive objects are one, which passively waits for the message to be processed. It waits for another object that requires its services. In simple words it can be referred as server.

What do you meant by static and dynamic modeling?

Static modeling is used to specify structure of the objects that exist in the problem domain. These are expressed using class, object and USECASE diagrams.
But Dynamic modeling refers representing the object interactions during runtime. It is represented by sequence, activity, collaboration and statechart diagrams.

What is Program counter?

Program counter holds the address of either the first byte of the next instruction to be fetched for execution or the address of the next byte of a multi byte instruction, which has not been completely fetched. In both the cases it gets incremented automatically one by one as the instruction bytes get fetched. Also Program register keeps the address of the next instruction.

Can you give an example of Stored Procedure?

CREATE procedure - is a stored procedure, which is a saved collection of Transact-SQL statements that can take and return user-supplied parameters.

Benefits of Stored Procedures?

Reduced client/server traffic
Efficient reuse of code and programming abstraction
Enhanced security controls

Is XML case-sensitive?

XML is case sensitive when uppercase and lowercase characters are treated differently.
Element type names, Attribute names, Attribute values, All general and parameter entity names, and data content (text), are case-sensitive.

What is a Null object?

It is an object of some class whose purpose is to indicate that a real object of that class does not exist. One common use for a null object is a return value from a member function that is supposed to return an object with some specified properties but cannot find such an object.

What is the property of class?

A property is a member that provides access to an attribute of an object or a class. Examples of properties

include the length of a string, the size of a font, the caption of a window, the name of a customer, and so on.

Does a class inherit the constructors of its super class?

A class does not inherit constructors from any of its super classes.

If a class is declared without any access modifiers, where may the class be accessed?

A class that is declared without any access modifiers is said to have package access. This means that the class can only be accessed by other classes andinterfaces that are defined within the same package

What do you mean by Stack unwinding?

It is a process during exception handling when the destructor is called for all local objects between the place where the exception was thrown and where it is caught.

Define precondition and post-condition to a member function.

Precondition: A condition that should return true when a member function is invoked. In order to use a function correctly a precondition should return true. If a precondition fails to hold, an operation will not take responsibility to perform any action of sensibility. For example, the interface invariants of stack class respond nothing about pushing even though the stack is already full. In this scenario, sinful () is a precondition for push operation.

Post-Condition: A condition that should return true before returning from an invoked function. In order to use a function correctly a post condition should return true. Taking a stack as an example, is empty () must necessarily be true after pushing the element into the stack when an element is pushed. The function is empty () is a post condition.

How can you sort the elements of the array in descending order?

Syntax

B = sort(A)
B = sort(A,dim)
B = sort(...,mode)
[B,IX] = sort(A,...)
Description

B = sort(A) sorts the elements along different dimensions of an array, and arranges those elements in ascending order.

If A is a ...	sort(A) ...
Vector	Sorts the elements of A.

Matrix	Sorts each column of A.
Multidimensional array	Sorts A along the first non-singleton dimension, and returns an array of sorted vectors.
Cell array of strings	Sorts the strings in ascending ASCII dictionary order, and returns a vector cell array of strings. The sort is case-sensitive; uppercase letters appear in the output before lowercase. You cannot use the dim or mode options with a cell array.

Sort - Sort array elements in ascending or descending order

Integer, floating-point, logical, and character arrays are permitted. Floating-point arrays can be complex. For elements of A with identical values, the order of these elements is preserved in the sorted list. When A is complex, the elements are sorted by magnitude, i.e., abs(A), and where magnitudes are equal, further sorted by phase angle, i.e., angle(A), on the interval [??, ?]. If A includes any NaN elements, sort places these at the high end.

B = sort(A,dim) sorts the elements along the dimension of A specified by a scalar dim.
B = sort(...,mode) sorts the elements in the specified direction, depending on the value of mode.
'ascend'
Ascending order (default)
'descend'
Descending order
[B,IX] = sort(A,...) also returns an array of indices IX, where size(IX) == size(A). If A is a vector, B = A(IX). If A is an m-by-n matrix, then each column of IX is a permutation vector of the corresponding column of A, such that
for j = 1:n
B(:,j) = A(IX(:,j),j);
end
If A has repeated elements of equal value, the returned indices preserve the original ordering.

Example:Sort horizontal vector A:

A = [78 23 10 100 45 5 6];

sort(A)
ans =5 6 10 23 45 78 100

What is DOM?

The Document Object Model (DOM) is a cross-platform and language-independent convention for representing and interacting with objects in HTML, XHTML and XML documents.[1] Objects in the DOM tree may be addressed and manipulated by using methods on the objects. The public interface of a DOM is specified in its application programming interface (API).

How macro execution is faster than function ?

Difference between overloading and overriding in programming language is:

a) In overloading, there is a relationship between methods available in the same class whereas in overriding, there is relationship between a superclass method and subclass method.

b) Overloading does not block inheritance from the superclass whereas overriding blocks inheritance from the superclass.

c) In overloading, separate methods share the same name whereas in overriding, subclass method replaces the superclass.

d) Overloading must have different method signatures whereas overriding must have same signature.

19.what do you mean by realization in oops, what is persistent, transient object.

Name the operators that cannot be overloaded.?

There are 5 operators which cannot be overloaded. They are:

.* - class member access operator

:: - scope resolution operator

. - dot operator

?:: - conditional operator

Sizeof() - operator

Note:- This is possible only in C++.

What is polymorphism?

In programming languages, polymorphism means that some code or operations or objects behave differently in different contexts.

For example, the + (plus) operator in C++:

4 + 5 <-- integer addition
3.14 + 2.0 <-- floating point addition
s1 + "bar" <-- string concatenation!

In C++, that type of polymorphism is called overloading.

Typically, when the term polymorphism is used with C++, however, it refers to using virtual methods, which we'll discuss shortly.

What are the differences between a C++ struct and C++ class?

The default member and base class access specifiers are different.

The C++ struct has all the features of the class. The only differences are that a struct defaults to public member access and public base class inheritance, and a class defaults to the private access specifier and private base class inheritance.

Before interview Please Refer this following programming Questions

Write a Program for :

1.palindrome for string and number

2.String Reverse

3.Sum,Average of all the number

4.Prime no

5.Armstrong no

6.fibonacci

7.factorial

8.prime number,

Palindrome for string

#include

#include

main()
{
char a[100], b[100];

```
printf("Enter the string to check if it is a palindrome\n");
gets(a);

strcpy(b,a);
strrev(b);

if( strcmp(a,b) == 0 )
printf("Entered string is a palindrome.\n");
else
printf("Entered string is not a palindrome.\n");

return 0;
}
```

Palindrome number in c

```
#include

main()
{
int n, reverse = 0, temp;

printf("Enter a number to check if it is a palindrome or not\n");
scanf("%d",&n);

temp = n;

while( temp != 0 )
{
reverse = reverse * 10;
reverse = reverse + temp%10;
temp = temp/10;
}

if ( n == reverse )
printf("%d is a palindrome number.\n", n);
else
printf("%d is not a palindrome number.\n", n);

return 0;
}
```

Reverse a string using C programming

```
#include
#include

main()
{
char arr[100];

printf("Enter a string to reverse\n");
gets(arr);

strrev(arr);

printf("Reverse of entered string is \n%s\n",arr);

return 0;
}
```

/* Fibonacci Series c language */

```
#include

main()
{
int n, first = 0, second = 1, next, c;

printf("Enter the number of terms\n");
scanf("%d",&n);

printf("First %d terms of Fibonacci series are :-\n",n);

for ( c = 0 ; c < n ; c++ )
{
if ( c <= 1 )
next = c;
else
{
next = first + second;
first = second;
second = next;
```

```
}
printf("%d\n",next);
}

return 0;
}
```

Fibonacci series program in c using recursion

```
#include

int Fibonacci(int);

main()
{
int n, i = 0, c;

scanf("%d",&n);

printf("Fibonacci series\n");

for ( c = 1 ; c <= n ; c++ )
{
printf("%d\n", Fibonacci(i));
i++;
}

return 0;
}

int Fibonacci(int n)
{
if ( n == 0 )
return 0;
else if ( n == 1 )
return 1;
else
return ( Fibonacci(n-1) + Fibonacci(n-2) );
}
```

Adding numbers in c using function

```
#include

long addition(long, long);

main()
{
long first, second, sum;

scanf("%ld%ld", &first, &second);

sum = addition(first, second);

printf("%ld\n", sum);

return 0;
}

long addition(long a, long b)
{
long result;

result = a + b;

return result;
}
```


C programming Technical Interview Questions & Answers

1. What is C language?

The C programming language is a standardized programming language developed in the early 1970s by Ken Thompson and Dennis Ritchie for use on the UNIX operating system. It has since spread to many other operating systems, and is one of the most widely used programming languages. C is prized for its efficiency, and is the most popular programming language for writing system software, though it is also used for writing applications.

2. What does static variable mean?

There are 3 main uses for the static.

1. If you declare within a function: It retains the value between function calls

2. If it is declared for a function name: By default function is extern..so it will be visible from other files if the function declaration is as static..it is invisible for the outer files

3. Static for global variables: By default we can use the global variables from outside files If it is static global..that variable is limited to with in the file.

```
#include
int t = 10;
main(){
int x = 0;
void funct1();
funct1();
printf("After first call \n");
funct1();
printf("After second call \n");
funct1();
printf("After third call \n");
}
void funct1()
{
   static int y = 0;
   int z = 10;
   printf("value of y %d z %d",y,z);
   y=y+10;
}
```

value of y 0 z 10 After first call
value of y 10 z 10 After second call
value of y 20 z 10 After third call

3. What are the different storage classes in C?

C has three types of storage: automatic, static and allocated. Variable having block scope and without static specifier have automatic storage duration.

Variables with block scope, and with static specifier have static scope. Global variables (i.e, file scope) with or without the the static specifier also have static scope. Memory obtained from calls to malloc(), alloc() or realloc() belongs to allocated storage class.

4. What is hashing?

To hash means to grind up, and that's essentially what hashing is all about. The heart of a hashing algorithm is a hash function that takes your nice, neat data and grinds it into some random-looking integer.

The idea behind hashing is that some data either has no inherent ordering (such as images) or is expensive to compare (such as images). If the data has no inherent ordering, you can't perform comparison searches.

5. Can static variables be declared in a header file?

You can't declare a static variable without defining it as well (this is because the storage class modifiers static and extern are mutually exclusive). A static variable can be defined in

a header file, but this would cause each source file that included the header file to have its own private copy of the variable, which is probably not what was intended.

6. Can a variable be both constant and volatile?

Yes. The const modifier means that this code cannot change the value of the variable, but that does not mean that the value cannot be changed by means outside this code.

The function itself did not change the value of the timer, so it was declared const. However, the value was changed by hardware on the computer, so it was declared volatile. If a variable is both const and volatile, the two modifiers can appear in either order.

7. Can include files be nested?

Yes. Include files can be nested any number of times. As long as you use precautionary measures, you can avoid including the same file twice. In the past, nesting header files was seen as bad programming practice, because it complicates the dependency tracking function of the MAKE program and thus slows down compilation. Many of today's popular compilers make up for this difficulty by implementing a concept called precompiled headers, in which all headers and associated dependencies are stored in a precompiled state.

8. What is a null pointer?

There are times when it's necessary to have a pointer that doesn't point to anything. The macro NULL, defined in , has a value that's guaranteed to be different from any valid pointer. NULL is a literal zero, possibly cast to void* or char*.

Some people, notably C++ programmers, prefer to use 0 rather than NULL.
The null pointer is used in three ways:
1) To stop indirection in a recursive data structure.
2) As an error value.
3) As a sentinel value.

9. What is the output of printf("%d") ?

When we write printf("%d",x); this means compiler will print the value of x. But as here, there is nothing after %d so compiler will show in output window garbage value.

10. What is the difference between calloc() and malloc() ?

calloc(...) allocates a block of memory for an array of elements of a certain size. By default the block is initialized to 0. The total number of memory allocated will be (number_of_elements * size).

malloc(...) takes in only a single argument which is the memory required in bytes.
malloc(...) allocated bytes of memory and not blocks of memory like calloc(...).

malloc(...) allocates memory blocks and returns a void pointer to the allocated space, or NULL if there is insufficient memory available.

calloc(...) allocates an array in memory with elements initialized to 0 and returns a pointer to the allocated space. calloc(...) calls malloc(...) in order to use the C++ _set_new_mode function to set the new handler mode.

11. What is the difference between printf() and sprintf() ?

sprintf() writes data to the character array whereas printf(...) writes data to the standard output device.

12. How to reduce a final size of executable?

Size of the final executable can be reduced using dynamic linking for libraries.

13. Can you tell me how to check whether a linked list is circular?

Create two pointers, and set both to the start of the list. Update each as follows:

```
while (pointer1) {
pointer1 = pointer1->next;
pointer2 = pointer2->next;
if (pointer2) pointer2=pointer2->next;
if (pointer1 == pointer2) {
print ("circular");
}
}
```

If a list is circular, at some point pointer2 will wrap around and be either at the item just before pointer1, or the item before that. Either way, its either 1 or 2 jumps until they meet.

14. Advantages of a macro over a function?

Macro gets to see the Compilation environment, so it can expand __ __TIME__ __FILE__ #defines. It is expanded by the preprocessor.

For example, you can't do this without macros
#define PRINT(EXPR) printf(#EXPR "=%d\n", EXPR)
PRINT(5+6*7) // expands into printf("5+6*7=%d", 5+6*7);
You can define your mini language with macros:
#define strequal(A,B) (!strcmp(A,B))

15. What is the difference between strings and character arrays?

A major difference is: string will have static storage duration, whereas as a character array will not, unless it is explicity specified by using the static keyword.

Actually, a string is a character array with following properties:
* the multibyte character sequence, to which we generally call string, is used to initialize an array of static storage duration. The size of this array is just sufficient to contain these characters plus the terminating NUL character.

* it not specified what happens if this array, i.e., string, is modified.
* Two strings of same value[1] may share same memory area.

16. Write down the equivalent pointer expression for referring the same element a[i][j][k][l] ?

a[i] == *(a+i)
a[i][j] == *(*(a+i)+j)
a[i][j][k] == *(*(*(a+i)+j)+k)
a[i][j][k][l] == *(*(*(*(a+i)+j)+k)+l)

17. Which bit wise operator is suitable for checking whether a particular bit is on or off?

The bitwise AND operator. Here is an example:

```
enum {
KBit0 = 1,
KBit1,
…
KBit31,
};
if ( some_int& KBit24 )
printf ( “Bit number 24 is ON\n” );
else
printf ( “Bit number 24 is OFF\n” );
```

18. Which bit wise operator is suitable for turning off a particular bit in a number?

The bitwise AND operator, again. In the following code snippet, the bit number 24 is reset to zero.

```
some_int = some_int& ~KBit24;
```

19. Which bit wise operator is suitable for putting on a particular bit in a number?

The bitwise OR operator. In the following code snippet, the bit number 24 is turned ON:
some_int = some_int | KBit24;

20. Does there exist any other function which can be used to convert an integer or a float to a string?

Some implementations provide a nonstandard function called itoa(), which converts an integer to string.

#include
char *itoa(int value, char *string, int radix);
DESCRIPTION
The itoa() function constructs a string representation of an integer.
PARAMETERS

value: Is the integer to be converted to string representation.
string: Points to the buffer that is to hold resulting string.
The resulting string may be as long as seventeen bytes.
radix: Is the base of the number; must be in the range 2 - 36.
A portable solution exists. One can use sprintf():

```
char s[SOME_CONST];
inti = 10;
float f = 10.20;
sprintf ( s, "%d %f\n", i, f );
```

21. Why does malloc(0) return valid memory address ? What's the use?

malloc(0) does not return a non-NULL under every implementation. An implementation is free to behave in a manner it finds suitable, if the allocation size requested is zero.
The implmentation may choose any of the following actions:

* A null pointer is returned.
* The behavior is same as if a space of non-zero size was requested. In this case, the usage of return value yields to undefined-behavior.

Notice, however, that if the implementation returns a non-NULL value for a request of a zero-length space, a pointer to object of ZERO length is returned! Think, how an object of zero size should be represented

For implementations that return non-NULL values, a typical usage is as follows:

```
void
func ( void )
{
int *p; /* p is a one-dimensional array, whose size will vary during the the lifetime of the program */
size_t c;
p = malloc(0); /* initial allocation */
if (!p)
{
perror ("FAILURE" );
return;
}
/* … */
while (1)
{
c = (size_t) … ; /* Calculate allocation size */
p = realloc( p, c * sizeof *p );
/* use p, or break from the loop */
/* … */
}
return;
}
```

Notice that this program is not portable, since an implementation is free to return NULL for a malloc(0) request, as the C Standard does not support zero-sized objects.

22. Difference between const char* p and char const* p

In const char* p, the character pointed by 'p' is constant, so u cant change the value of character pointed by p but u can make 'p' refer to some other location.

In char const* p, the ptr'p' is constant not the character referenced by it, so u cant make 'p' to reference to any other location but u can change the value of the char pointed by 'p'.

23. What is the result of using Option Explicit?

When writing your C program, you can include files in two ways. The first way is to surround the file you want to include with the angled brackets < and >. This method of inclusion tells the preprocessor to look for the file in the predefined default location. This predefined default location is often an INCLUDE environment variable that denotes the path to your include files.

For instance, given the INCLUDE variable INCLUDE=C:\COMPILER\INCLUDE;S:\SOURCE\HEADERS; using the #include version of file inclusion, the compiler first checks the C:\COMPILER\INCLUDE directory for the specified file. If the file is not found there, the compiler then checks the S:\SOURCE\HEADERS directory. If the file is still not found, the preprocessor checks the current directory.

The second way to include files is to surround the file you want to include with double quotation marks. This method of inclusion tells the preprocessor to look for the file in the current directory first, then look for it in the predefined locations you have set up. Using the #include file version of file inclusion and applying it to the preceding example, the preprocessor first checks the current directory for the specified file. If the file is not found in the current directory, the C:COMPILERINCLUDE directory is searched. If the file is still not found, the preprocessor checks the S:SOURCEHEADERS directory.

The #include method of file inclusion is often used to include standard headers such as stdio.h or stdlib.h.

The #include file include nonstandard header files that you have created for use in your program. This is because these headers are often modified in the current directory, and you will want the preprocessor to use your newly modified version of the header rather than the older, unmodified version.

24. What is the benefit of using an enum rather than a #define constant?

The use of an enumeration constant (enum) has many advantages over using the traditional symbolic constant style of #define. These advantages include a lower maintenance requirement, improved program readability, and better debugging capability.
1) The first advantage is that enumerated constants are generated automatically by the compiler. Conversely, symbolic constants must be manually assigned values by the programmer.
2) Another advantage of using the enumeration constant method is that your programs are more readable and thus can be understood better by others who might have to update your program later.

3) A third advantage to using enumeration constant

C Introduction

C is a general-purpose computer programming language developed between 1969 and 1973 by Dennis Ritchie at the Bell Telephone Laboratories for use with the Unix operating system. Although C was designed for implementing system software,it is also widely used for developing portable application software.C is one of the most widely used programming languages of all time and there are very few computer architectures for which a C compiler does not exist. C has greatly influenced many other popular programming languages, most notably C++, which began as an extension to C.

C History

Developed between 1969 and 1973 along with Unix
Due mostly to Dennis Ritchie
Designed for systems programming
1)Operating systems
2)Utility programs
3)Compilers
4)Filters

Original machine (DEC PDP-11) was very small
1)24K bytes of memory, 12K used for operating system
2)Written when computers were big, capital equipment
3)Group would get one, develop new language, OS

Characteristics of C

1)Small size
2)Extensive use of function calls
3)Loose typing -- unlike PASCAL
4)Structured language
5) Low level (BitWise) programming readily available
6)Pointer implementation - extensive use of pointers for memory, array, structures and functions.

C Program Structure

A C program basically has the following form:
1)Preprocessor Commands
2)Type definitions
3)Function prototypes -- declare function types and variables passed to function.
4) Variables
5)Functions

We must have a main() function.

C- Advanced

1. **Can we have a pointer to a function?**

a. Not possible

b. Possible

c. Depends on the return value

d. Depends on the # of arguments

Answer:b.Possible

```
void func(int a)
{
}
void main()
{
void (*fp)(int);
fp=func;
fp(1);
}
```

2. **Write a function to swaps the values of two integers.**

a. No solution exist.

b. Solution need 2 extra variables

c Solution exist without any extra variables

d. Solution need 1 extra variable

Solution c Solution exist without any extra variables

```
1. void swap(int a, int b)
{
int c;
c=a;
a=b;
b=c;
}
```

```
2. void swap (int a, int b)
{

a=a+b;

b=a-b;
```

```
a=a-b;

}
```

Solution2 is the best solution since no extra variable is required.

3. **Which of the following Bitwise operators can be used efficiently to swap two numbers?**

a. &

b. ^

c. |

d. ||

Solution:b ^

```
a=a^b
b=a^b
a=a^b
```

Now 'a' will have 'b's initial value and wise-versa.

4. **Do you find any issue with the above snippet of code?**

a. No issues

b. P is a bad pointer

c P is a void pointer

d. Both 2& 3

Answer: b. P is a bad pointer

When a pointer is first allocated, it does not have a pointee. The pointer is "uninitialized" or simply "bad". A de-reference operation on a bad pointer is a serious run-time error. If you are lucky, the de-reference operation will crash or halt immediately (Java behaves this way). If you are unlucky, the bad pointer de-reference will corrupt a random area of memory, slightly altering the operation of the program so that it goes wrong some indefinite time later. Each pointer must be assigned a pointee before it can support de-reference operations. Before that, the pointer is bad and must not be used. Bad pointers are very common. In fact, **every pointer starts out with a bad value**. Correct code overwrites the bad value with a correct reference to a pointee, and thereafter the pointer works fine. There is nothing automatic that gives a pointer a valid pointee.

```
void BadPointer()
{

int* p;          // allocate the pointer, but not the pointee

*p = 42;       // this de-reference is a serious runtime error
```

}

5. **void add(int a, int b)**

{

int c;

c = a + b;

add (1,1);

}

What is the result of above funtion?

a. Sum of a,b,1

b. Results in Buffer Overflow

c Results in Compiler Error

d Results in Stack Overflow

Answer: d. Results in Stack Overflow

When a function is called recursively, sometimes infinite recursions occur which results in STACK OVERFLOW. What does it mean? Well when a function is called,

1. First it will evaluate actual parameter expressions.

2. Then, memory is allocated to local variables.

3. Store caller's current address of execution (return address of the current function) and then continue execute the recursive call.

4. Then it executes rest of the function body and reaches end and returns to the caller's address.

Now when a function is infinitely called (recursively) without a proper condition to check its recursive, then only first 3 steps keep executing and function will never reach step 4 to finish execution and return to previous function. In this way, function will keep allocating memory and at some point of time it will go out of memory or reaches stack limit and will never be able to accommodate another function and hence crashes. This is called stack overflow.

6. **Which of the following will initialize the new memory to 0 ?**

a. malloc

b. free

c. new

d delete

Answer: c. new

"new" will initlize the new memory to 0 but "malloc()" gives random value in the new alloted memory location

7. **Which of the following standard C library converts a string to a long integer and reports any .leftover. numbers that could not be converted.**

a. atol

b. atoi

c. stol

d. strtol

Answer: d. strtol

strtol() Converts a string to a long integer and reports any .leftover. numbers that could not be converted.
atoi() Converts a string to an integer.
atol() Converts a string to a long integer.

C Interview Questions and Answers

1) How can we construct an increment statement or decrement statement in C?

Answer: We can do this in two different ways. 1) By using the increment operator ++ and decrement operator. For example, the statement "i++" means to increment the value of x by 1. Likewise, the statement "x –" means to decrement the value of x by 1. 2) The 2nd way of writing increment statements is to use the conventional + plus sign or minus sign. In the case of "i++, another way to write it is "i = i +1.

2) List the different storage class specifiers in C?

Answer: static, auto, extern, register

3) Some Programmers debug their programs by placing comment symbols on some of the codes instead of deleting it. How does this aid in debugging?

Answer: Using comment symbols "/* */ " in a code, also called as commenting out, is a way of segregate some codes that you think maybe causing errors in the code, without deleting the program. The aim is that if the code is in fact correct, we can simply remove the comment symbols and continue on. It also saves you time and effort on having to retype the codes if you have deleted it in the first place.

4) What is call by value and call by reference in C Programming language?

We can pass value to function by two different ways: call by value and call by reference. In case of call by value, a copy of value is passed to the function, so original value is not modified in the call by value. But

in case of call by reference, an address of value is passed to the function, so original value is modified in the call by reference.

5) How can we replace the following statement by using WHILE Loop?

```
for (x=1; x<=100; x++)
printf ("%d ", x *x );
```

Answer:

```
x=1;
while (x<=100)
{
printf ("%d ", x * x);
x++;
}
```

6) Name the different functions are used for dynamic memory allocation in C Program?

Answer:
malloc(), calloc(), realloc(), free()

7) Explain about spaghetti programming?

Answer: Spaghetti programming refers to programs that tend to get tangled and overlapped throughout the codes. This unorganized approach to coding is usually attributed to lack of experience on the part of the programmer. Spaghetti coding makes a program complex and analysing the codes difficult, and so must be avoided as much as possible.

8) Write the programming code to swap two numbers without using third variable?

```
int x=10, y=20;

printf("Before swap x=%d y=%d",x,y);

y=x-y;   &nb

x=x-y;

printf(
```

9) In C program, how we can insert quote characters (‘ and ”) into the output screen?

Answer: This is a common problem for freshers/beginners because quotes are normally part of a “printf” statement in program. If we want to insert the quote character as part of the output, use the format specifiers , and ” (for double quote) , ’ (for single quote).

10) Differentiate between the = symbol and == symbol?

Answer: The = symbol is

11) For what purpose we use a ‘ character?

<

12) What is modular programming?

An

13) Can the curly brackets { } be used to enclose a single line of code?

Answer: While curly brackets are mai

14) Check these operators and find out the incorrect operator and explain why? (>=, <=, <>, ==)

Answer: The incorrect is <>. While this operator is correctly interpreted as “not equal to”” in writing conditional statements, it is not the proper operator to be used in C program. Instead, the operator!= must be used to indicate “not equal to “condition.**15) What is ++X and X++ Operator?**

Answ

16) Can we use “ int”” data type to store the value 32768? Why?

Answer: No. “ int”” data type is capable of storing values from -32768 to 32767. To store 32768, you can use “ “long int”” instead of “int”. You can also use “ “unsigned int”, assuming you

17) Explain about the header files and what are the uses of header files in C program?

Answer: Header files are also called as library files. They contain 2 essential things: the definitions and prototypes of functions being used in a code. Simply put, commands that you use in C programming codes are actually functions that are defined from

18) Can we use two or more operators such as and be combined in a single line of program?

Answer: Yes, it’s perfectly valid to combine operators, especially if the need comes.

For example: you can have a code like “printf (“Good ‘Morning ”) ” to output the text “Good”” on the first line and “Morning”” enclosed in single quotes to appear on the next two lines.

19) Why we are not declaring all the header files in every C p

Answer: The choice of declaring a header file at the top of C pr

20) List out the merits and demerits of array in C program?

Answer:

Merits:

(b) It is not nece

(c) Array elements are stored in continuous memory location.

Demerit:

(a) We cannot change size of array at the run time. So Wastage of memory space.

(b) Array can store only similar type of data.

22) When we will use the “Void” keyword in a function?

23) Write a loop statement that will show the following output:

for (b=1; b<=a; b++

printf("%s","*");

}printf(" ");

24) How can we generate random number

Answer: Random numbers are generated in C using the rand() command. For example: anyNum = rand() will generate any integer number beginning from 0, assuming that anyNum is a variable of type integer.

25) What is wrong in this statement? scanf (%d, whatnumber);

Answer: This format is used f <

Answer: You

29) Is it possible to initializ

Answer: Yes, you don’t have to write a separa

Answer: To get the length of a strin

3

Answer: Reserved words are words that are part of the standard C language library. This

32) What is the different file extensions involved when coding in C?

Answer: Source codes in C are saved with .C file extension. Header files or library files have the .H file extension. Every time a program source code is successfully compiled, it creates an .OBJ object file, and

33) Explain about linked list?

34) Consider the below statement

Answer: FALSE. All reserved words must be written in lowercase; o

35) What are binary trees?

Answer: Binary trees are actually an extension of the concept of linked lists. A binary tree has two pointers, a left one and a right one. Each side can further branch to form additional nodes, which each node having two

36) Is this program statement is valid? INT = 10.

Answer: Assuming that INT is a variable of type float, this statement is valid. One may think that INT is a reserved word and must not be used for other purposes. However, recall that reserved words are express in lowercase, so the C compiler will not inte

37) What is wrong with this program statement? void = 10;

An

38) What is a newline escape sequence?

Answer: A newline escape sequence is representfore the actual output expression or after.

39) Explain about output redirection?

Answer: It is the process of transferring data to an alternative output source other than the display screen. Output redirection allows a program to have its outp

40) Write a simple code fragment that will check if a number i

Answer: If (num>=0)

41) What is the difference between functions abs() and fabs()?<

Answer: These 2 fu

42) What does the function toupper() do?<

43) In C which function can be used to append a

Answer: The strcat function. It takes two parameters, the source string

44) Do these two program statements perform the

Answer:Yes, they both do the exact same thing, which is to accept the next key pressed by t

45) Differentiate between text files and binary files?

48) The % symbol has a special use in a printf statement. How can you place this character as

Answer: We can do this by using %% in the printf statement. For example, you can write pri

49) Explain the advan

Answer: Storing data o

50) What is calloc and malloc?

Answer:

Java Interview Questions

1.What is JVM?

The Java interpreter along with the runtime environment required to run the Java application in called as Java virtual machine(JVM)

2. What is the most important feature of Java?

Java is a platform independent language.

3. What do you mean by platform independence?

Platform independence means that we can write and compile the java code in one platform (eg Windows) and can execute the class in any other supported platform eg (Linux,Solaris,etc).

4. What is the difference between a JDK and a JVM?

JDK is Java Development Kit which is for development purpose and it includes execution environment also. But JVM is purely a run time environment and hence you will not be able to compile your source files using a JVM.

5. What is the base class of all classes?

java.lang.Object

6. What are the access modifiers in Java?

There are 3 access modifiers. Public, protected and private, and the default one if no identifier is specified is called friendly, but programmer cannot specify the friendly identifier explicitly.

7. What is are packages?

A package is a collection of related classes and interfaces providing access protection and namespace management.

8. What is meant by Inheritance and what are its advantages?

Inheritance is the process of inheriting all the features from a class. The advantages of inheritance are reusability of code and accessibility of variables and methods of the super class by subclasses.

9. What is the difference between superclass and subclass?

A super class is a class that is inherited whereas sub class is a class that does the inheriting.

10. What is an abstract class?

An abstract class is a class designed with implementation gaps for subclasses to fill in and is deliberately incomplete.

11. What are the states associated in the thread?

Thread contains ready, running, waiting and dead states.

12. What is synchronization?

Synchronization is the mechanism that ensures that only one thread is accessed the resources at a time.

13. What is deadlock?

When two threads are waiting each other and can't precede the program is said to be deadlock.

14. What is an applet?

Applet is a dynamic and interactive program that runs inside a web page displayed by a java capable browser

15. What is the lifecycle of an applet?

init() method - Can be called when an applet is first loaded
start() method - Can be called each time an applet is started.
paint() method - Can be called when the applet is minimized or maximized.
stop() method - Can be used when the browser moves off the applet's page.
destroy() method - Can be called when the browser is finished with the applet.

16. How do you set security in applets?

using setSecurityManager() method

17. What is a layout manager and what are different types of layout managers available in java AWT?

A layout manager is an object that is used to organize components in a container. The different layouts are available are FlowLayout, BorderLayout, CardLayout, GridLayout and GridBagLayout

18. What is JDBC?

JDBC is a set of Java API for executing SQL statements. This API consists of a set of classes and interfaces to enable programs to write pure Java Database applications.

19. What are drivers available?

-a) JDBC-ODBC Bridge driver b) Native API Partly-Java driver
c) JDBC-Net Pure Java driver d) Native-Protocol Pure Java driver

20. What is stored procedure?

Stored procedure is a group of SQL statements that forms a logical unit and performs a particular task. Stored Procedures are used to encapsulate a set of operations or queries to execute on database. Stored procedures can be compiled and executed with different parameters and results and may have any combination of input/output parameters.

21. What is the Java API?

The Java API is a large collection of ready-made software components that provide many useful capabilities, such as graphical user interface (GUI) widgets.

22. Why there are no global variables in Java?

Global variables are globally accessible. Java does not support globally accessible variables due to following reasons:
1)The global variables breaks the referential transparency
2)Global variables creates collisions in namespace.

23. What are Encapsulation, Inheritance and Polymorphism?

Encapsulation is the mechanism that binds together code and data it manipulates and keeps both safe from outside interference and misuse. Inheritance is the process by which one object acquires the properties of another object. Polymorphism is the feature that allows one interface to be used for general class actions.

24. What is the use of bin and lib in JDK?

Bin contains all tools such as javac, appletviewer, awt tool, etc., whereas lib contains API and all packages.

25. What is method overloading and method overriding?

Method overloading: When a method in a class having the same method name with different arguments is said to be method overloading. Method overriding : When a method in a class having the same method name with same arguments is said to be method overriding.

26. What is the difference between this() and super()?

this() can be used to invoke a constructor of the same class whereas super() can be used to invoke a super class constructor.

27. What is Domain Naming Service(DNS)?

It is very difficult to remember a set of numbers(IP address) to connect to the Internet. The Domain Naming Service(DNS) is used to overcome this problem. It maps one particular IP address to a string of characters. For example, www. mascom. com implies com is the domain name reserved for US commercial sites, moscom is the name of the company and www is the name of the specific computer, which is mascom's server.

28. What is URL?

URL stands for Uniform Resource Locator and it points to resource files on the Internet. URL has four components: http://www. address. com:80/index.html, where http - protocol name, address - IP address or host name, 80 - port number and index.html - file path.

29. What is RMI and steps involved in developing an RMI object?

Remote Method Invocation (RMI) allows java object that executes on one machine and to invoke the method of a Java object to execute on another machine. The steps involved in developing an RMI object are: a) Define the interfaces b) Implementing these interfaces c) Compile the interfaces and their implementations with the java compiler d) Compile the server implementation with RMI compiler e) Run the RMI registry f) Run the application.

30. What is RMI architecture?

RMI architecture consists of four layers and each layer performs specific functions: a) Application layer - contains the actual object definition. b) Proxy layer - consists of stub and skeleton. c) Remote Reference layer - gets the stream of bytes from the transport layer and sends it to the proxy layer. d) Transportation layer - responsible for handling the actual machine-to-machine communication.

31. What is a Java Bean?

A Java Bean is a software component that has been designed to be reusable in a variety of different environments.

32. What are checked exceptions?

Checked exception are those which the Java compiler forces you to catch. e.g. IOException are checked Exceptions.

33. What are runtime exceptions?

Runtime exceptions are those exceptions that are thrown at runtime because of either wrong input data or because of wrong business logic etc. These are not checked by the compiler at compile time.

34. What is the difference between error and an exception?

An error is an irrecoverable condition occurring at runtime. Such as OutOfMemory error. These JVM errors and you can not repair them at runtime. While exceptions are conditions that occur because of bad input etc. e.g. FileNotFoundException will be thrown if the specified file does not exist. Or a NullPointerException will take place if you try using a null reference. In most of the cases it is possible to recover from an exception (probably by giving user a feedback for entering proper values etc.).

35. What is the purpose of finalization?

The purpose of finalization is to give an unreachable object the opportunity to perform any cleanup processing before the object is garbage collected. For example, closing a opened file, closing a opened database Connection.

36. What is the difference between yielding and sleeping?

When a task invokes its yield() method, it returns to the ready state. When a task invokes its sleep() method, it returns to the waiting state.

37. What is the difference between preemptive scheduling and time slicing?

Under preemptive scheduling, the highest priority task executes until it enters the waiting or dead states or a higher priority task comes into existence. Under time slicing, a task executes for a predefined slice of time and then reenters the pool of ready tasks. The scheduler then determines which task should execute next, based on priority and other factors.

38. What is mutable object and immutable object?

If a object value is changeable then we can call it as Mutable object. (Ex., StringBuffer, …) If you are not allowed to change the value of an object, it is immutable object. (Ex., String, Integer, Float, …)

39. What is the purpose of Void class?

The Void class is an uninstantiable placeholder class to hold a reference to the Class object representing the primitive Java type void.

40. What is JIT and its use?

Really, just a very fast compiler… In this incarnation, pretty much a one-pass compiler — no offline computations. So you can't look at the whole method, rank the expressions according to which ones are re-used the most, and then generate code. In theory terms, it's an on-line problem.

41. What is nested class?

If all the methods of a inner class is static then it is a nested class.

42. What is HashMap and Map?

Map is Interface and Hashmap is class that implements that.

43. What are different types of access modifiers?

public: Any thing declared as public can be accessed from anywhere. private: Any thing declared as private can't be seen outside of its class. protected: Any thing declared as protected can be accessed by classes in the same package and subclasses in the other packages. default modifier : Can be accessed only to classes in the same package.

44. What is the difference between Reader/Writer and InputStream/Output Stream?

The Reader/Writer class is character-oriented and the InputStream/OutputStream class is byte-oriented.

45. What is servlet?

Servlets are modules that extend request/response-oriented servers, such as java-enabled web servers. For example, a servlet might be responsible for taking data in an HTML order-entry form and applying

the business logic used to update a company's order database.

46. What is Constructor?

A constructor is a special method whose task is to initialize the object of its class.
It is special because its name is the same as the class name.
They do not have return types, not even void and therefore they cannot return values.
They cannot be inherited, though a derived class can call the base class constructor.
Constructor is invoked whenever an object of its associated class is created.

47. What is an Iterator ?

The Iterator interface is used to step through the elements of a Collection.
Iterators let you process each element of a Collection.
Iterators are a generic way to go through all the elements of a Collection no matter how it is organized.
Iterator is an Interface implemented a different way for every Collection.

48. What is the List interface?

The List interface provides support for ordered collections of objects.
Lists may contain duplicate elements.

49. What is memory leak?

A memory leak is where an unreferenced object that will never be used again still hangs around in memory and doesnt get garbage collected.

50. What is the difference between the prefix and postfix forms of the ++ operator?

The prefix form performs the increment operation and returns the value of the increment operation.
The postfix form returns the current value all of the expression and then performs the increment operation on that value.

51. What is the difference between a constructor and a method?

A constructor is a member function of a class that is used to create objects of that class. It has the same name as the class itself, has no return type, and is invoked using the new operator.
A method is an ordinary member function of a class. It has its own name, a return type (which may be void), and is invoked using the dot operator.

52. What will happen to the Exception object after exception handling?

Exception object will be garbage collected.

53. Difference between static and dynamic class loading.

Static class loading: The process of loading a class using new operator is called static class loading.
Dynamic class loading: The process of loading a class at runtime is called dynamic class loading.
Dynamic class loading can be done by using Class.forName(….).newInstance().

54. Explain the Common use of EJB

The EJBs can be used to incorporate business logic in a web-centric application.
The EJBs can be used to integrate business processes in Business-to-business (B2B) e-commerce applications.In Enterprise Application Integration applications, EJBs can be used to house processing and mapping between different applications.

55. What is JSP?

JSP is a technology that returns dynamic content to the Web client using HTML, XML and JAVA elements. JSP page looks like a HTML page but is a servlet. It contains Presentation logic and business logic of a web application.

56. What is the purpose of apache tomcat?

Apache server is a standalone server that is used to test servlets and create JSP pages. It is free and open source that is integrated in the Apache web server. It is fast, reliable server to configure the applications but it is hard to install. It is a servlet container that includes tools to configure and manage the server to run the applications. It can also be configured by editing XML configuration files.

57. Where pragma is used?

Pragma is used inside the servlets in the header with a certain value. The value is of no-cache that tells that a servlets is acting as a proxy and it has to forward request. Pragma directives allow the compiler to

use machine and operating system features while keeping the overall functionality with the Java language. These are different for different compilers.

58. Briefly explain daemon thread.

Daemon thread is a low priority thread which runs in the background performs garbage collection operation for the java runtime system.

59. What is a native method?

A native method is a method that is implemented in a language other than Java.

60. Explain different way of using thread?

A Java thread could be implemented by using Runnable interface or by extending the Thread class. The Runnable is more advantageous, when you are going for multiple inheritance.

61. What are the two major components of JDBC?

One implementation interface for database manufacturers, the other implementation interface for application and applet writers.

62. What kind of thread is the Garbage collector thread?

It is a daemon thread.

63. What are the different ways to handle exceptions?

There are two ways to handle exceptions,
1. By wrapping the desired code in a try block followed by a catch block to catch the exceptions. and
2. List the desired exceptions in the throws clause of the method and let the caller of the method handle those exceptions.

64. How many objects are created in the following piece of code?

MyClass c1, c2, c3;
c1 = new MyClass ();
c3 = new MyClass ();
Answer: Only 2 objects are created, c1 and c3. The reference c2 is only declared and not initialized.

65.What is UNICODE?

Unicode is used for internal representation of characters and strings and it uses 16 bits to represent each other.

C++ Basics updated on Sep 2018

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C++ Interview Questions

C++ Introduction

The C++ programming language provides a model of memory and computation that closely matches that of most computers. In addition, it provides powerful and flexible mechanisms for abstraction; that is, language constructs that allow the programmer to introduce and use new types of objects that match the concepts of an application. Thus, C++ supports styles of programming that rely on fairly direct manipulation of hardware resources to deliver a high degree of efficiency plus higher-level styles of programming that rely on user-defined types to provide a model of data and computation that is closer to a human's view of the task being performed by a computer. These higher-level styles of programming are often called data abstraction, object-oriented programming, and generic programming.

C++ History

In the early 1980's, also at Bell Laboratories, another programming language was created which was based upon the C language.This new language was developed by Bjarne Stroustrup and was called C++. According to Stroustrup, the purpose of C++ is to make writing good programs easier and more pleasant for the individual programmer.When he designed C++, he added OOP (Object Oriented Programming) features to C without significantly changing the C component. Thus C++ is a "relative" of C, meaning that any valid C program is also a valid C++ program.

C++ Features

1)Class
User-defined types

2)Operator overloading
Attach different meaning to expressions such as a + b
3)References
Pass-by-reference function arguments
4)Virtual Functions
Dispatched depending on type at run time
5)Templates
Macro-like polymorphism for containers (e.g., arrays)
6)Exceptions

C++ Structure

1)Introduction
2)Memory alignment
3)Bit Fields
4)Using structure in Assembly

C++ Advanced

1. **If you want many different iterators to be active simultaneously then which of the followings can be used?**

a. Internal Iterators

b. External Iterators

c. Both

d. None

Answer:b External Iterators

An internal iterator is implemented with member functions of the class that has items to step through. .An external iterator is implemented as a separate class that can be "attach" to the object that has items to step through. .An external iterator has the advantage that many different iterators can be active simultaneously on the same object.

2. **Write a function which gets the n bits from an unsigned integer x, starting from position p .(the right most digit is at position 0)**

a.mask = FFFF;

mask = mask << p;

output = mask & x;

b.mask = FFFF;

```
  mask   = mask << p;
  output   = mask ^ x;
c.mask  = FFFF;
  mask   = mask >> p;
  output   = mask & x
d.mask  = FFFF;
  mask   = mask >> p;
  output   = mask ^ x;;
```

Answer:d

3. Are method overloading and method overriding (w.r.t C++) same?

a. Both are same

b Method overriding is available only in JAVA.

c. Method overloading is not available in C++.

d. Both are different

Answer:d. Both are different

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.

C++ Interview Questions

1. What is C++?

Released in 1985, C++ is an object-oriented programming language created by Bjarne Stroustrup. C++ maintains almost all aspects of the C language, while simplifying memory management and adding several features - including a new datatype known as a class (you will learn more about these later) - to allow object-oriented programming. C++ maintains the features of C which allowed for low-level memory access but also gives the programmer new tools to simplify memory management.
C++ used for:
C++ is a powerful general-purpose programming language. It can be used to create small programs or

large applications. It can be used to make CGI scripts or console-only DOS programs. C++ allows you to create programs to do almost anything you need to do. The creator of C++, Bjarne Stroustrup, has put together a partial list of applications written in C++.

2. How do you find out if a linked-list has an end? (i.e. the list is not a cycle)
You can find out by using 2 pointers. One of them goes 2 nodes each time. The second one goes at 1 nodes each time. If there is a cycle, the one that goes 2 nodes each time will eventually meet the one that goes slower. If that is the case, then you will know the linked-list is a cycle.

3. What is the difference between realloc() and free()?
The free subroutine frees a block of memory previously allocated by the malloc subroutine. Undefined results occur if the Pointer parameter is not a valid pointer. If the Pointer parameter is a null value, no action will occur. The realloc subroutine changes the size of the block of memory pointed to by the Pointer parameter to the number of bytes specified by the Size parameter and returns a new pointer to the block. The pointer specified by the Pointer parameter must have been created with the malloc, calloc, or realloc subroutines and not been deallocated with the free or realloc subroutines. Undefined results occur if the Pointer parameter is not a valid pointer.

4. Base class has some virtual method and derived class has a method with the same name. If we initialize the base class pointer with derived object, calling of that virtual method will result in which method being called?

a. Base method
b. Derived method
Ans. B

5. What is function overloading and operator overloading?
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 of 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.

Operator overloading allows existing C++ operators to be redefined so that they work on objects of user-defined classes. Overloaded operators are syntactic sugar for equivalent function calls. They form a pleasant facade that doesn't add anything fundamental to the language (but they can improve understandability and reduce maintenance costs).

6. 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.

DBMS Interview Questions

1. What is database?

A database is a collection of information that is organized. So that it can easily be accessed, managed, and updated.

2. What is DBMS?

DBMS stands for Database Management System. It is a collection of programs that enables user to create and maintain a database.

3. What is a Database system?

The database and DBMS software together is called as Database system.

4. What are the advantages of DBMS?

I. Redundancy is controlled.

II. Providing multiple user interfaces.

III. Providing backup and recovery

IV. Unauthorized access is restricted.

V. Enforcing integrity constraints.

5. What is normalization?

It is a process of analysing the given relation schemas based on their Functional Dependencies (FDs) and primary key to achieve the properties
(1).Minimizing redundancy, (2). Minimizing insertion, deletion and update anomalies.

6. What is Data Model?

A collection of conceptual tools for describing data, data relationships data semantics and constraints.

7. What is E-R model?

This data model is based on real world that consists of basic objects called entities and of relationship among these objects. Entities are described in a database by a set of attributes.

8. What is Object Oriented model?

This model is based on collection of objects. An object contains values stored in instance variables with in the object. An object also contains bodies of code that operate on the object. These bodies of code are called methods. Objects that contain same types of values and the same methods are grouped together into classes.

9. What is an Entity?

An entity is a thing or object of importance about which data must be captured.

10. What is DDL (Data Definition Language)?

A data base schema is specifies by a set of definitions expressed by a special language called DDL.

11. What is DML (Data Manipulation Language)?

This language that enable user to access or manipulate data as organised by appropriate data model. Procedural DML or Low level: DML requires a user to specify what data are needed and how to get those data. Non-Procedural DML or High level: DML requires a user to specify what data are needed without specifying how to get those data

12. What is DML Compiler?

It translates DML statements in a query language into low-level instruction that the query evaluation engine can understand.

13. What is Query evaluation engine?

It executes low-level instruction generated by compiler.

14. What is Functional Dependency?

Functional Dependency is the starting point of normalization. Functional Dependency exists when a relation between two attributes allows you to uniquely determine the corresponding attribute’s value.

15. What is 1 NF (Normal Form)?

The first normal form or 1NF is the first and the simplest type of normalization that can be implemented in a database. The main aims of 1NF are to:

1. Eliminate duplicative columns from the same table.

2. Create separate tables for each group of related data and identify each row with a unique column (the primary key).

16. What is Fully Functional dependency?

A functional dependency X Y is full functional dependency if removal of any attribute A from X means that the dependency does not hold any more.

17. What is 2NF?

A relation schema R is in 2NF if it is in 1NF and every non-prime attribute A in R is fully functionally dependent on primary key.

18. What is 3NF?

A relation is in third normal form if it is in Second Normal Form and there are no functional (transitive) dependencies between two (or more) non-primary key attributes.

19. What is BCNF (Boyce-Codd Normal Form)?

A table is in Boyce-Codd normal form (BCNF) if and only if it is in 3NF and every determinant is a candidate key.

20. What is 4NF?

Fourth normal form requires that a table be BCNF and contain no multi-valued dependencies.

21. What is 5NF?

A table is in fifth normal form (5NF) or Project-Join Normal Form (PJNF) if it is in 4NF and it cannot have a lossless decomposition into any number of smaller tables.

22. What is a query?

A query with respect to DBMS relates to user commands that are used to interact with a data base.

23. What is meant by query optimization?

The phase that identifies an efficient execution plan for evaluating a query that has the least estimated cost is referred to as query optimization.

24. What is an attribute?

It is a particular property, which describes the entity.

25. What is RDBMS?

Relational Data Base Management Systems (RDBMS) are database management systems that maintain data records and indices in tables.

26. What's difference between DBMS and RDBMS?

DBMS provides a systematic and organized way of storing, managing and retrieving from collection of logically related information. RDBMS also provides what DBMS provides but above that it provides relationship integrity.

27. What is SQL?

SQL stands for Structured Query Language. SQL is an ANSI (American National Standards Institute) standard computer language for accessing and manipulating database systems. SQL statements are used to retrieve and update data in a database.

28. What is Stored Procedure?

A stored procedure is a named group of SQL statements that have been previously created and stored in the server database.

29. What is a view?

A view may be a subset of the database or it may contain virtual data that is derived from the database files but is not explicitly stored.

30. What is Trigger?

A trigger is a SQL procedure that initiates an action when an event (INSERT, DELETE or UPDATE) occurs.

31. What is Index?

An index is a physical structure containing pointers to the data.

32. What is extension and intension?

Extension -It is the number of tuples present in a table at any instance. This is time dependent.

Intension -It is a constant value that gives the name, structure of table and the constraints laid on it.

33. What do you mean by atomicity and aggregation?

Atomicity-Atomicity states that database modifications must follow an "all or nothing" rule. Each transaction is said to be "atomic." If one part of the transaction fails, the entire transaction fails.

Aggregation - A feature of the entity relationship model that allows a relationship set to participate in another relationship set. This is indicated on an ER diagram by drawing a dashed box around the aggregation.

34. What is RDBMS KERNEL?

Two important pieces of RDBMS architecture are the kernel, which is the software, and the data dictionary, which consists of the system- level data structures used by the kernel to manage the database.

35. Name the sub-systems of a RDBMS?

I/O, Security, Language Processing, Process Control, Storage Management, Logging and Recovery, Distribution Control, Transaction Control, Memory Management, Lock Management.

36. How do you communicate with an RDBMS?

You communicate with an RDBMS using Structured Query Language (SQL)

37. Disadvantage in File Processing System?

· Data redundancy & inconsistency.

- Difficult in accessing data.
- Data isolation.
- Data integrity.
- Concurrent access is not possible.
- Security Problems.

38. What is VDL (View Definition Language)?

It specifies user views and their mappings to the conceptual schema.

39. What is SDL (Storage Definition Language)?

This language is to specify the internal schema. This language may Specify the mapping between two schemas.

40. Describe concurrency control?

Concurrency control is the process managing simultaneous operations against a database so that database integrity is no compromised. There are two approaches to concurrency control.

The pessimistic approach involves locking and the optimistic approach involves versioning.

41. Describe the difference between homogeneous and heterogeneous distributed database?

A homogenous database is one that uses the same DBMS at each node. A heterogeneous database is one that may have a different DBMS at each node.

42. What is a distributed database?

A distributed database is a single logical database that is spread across more than one node or locations that are all connected via some communication link.

43. Explain the difference between two and three-tier architectures?

Three-tier architecture includes a client and two server layers.

The application code is stored on the application server and the database is stored on the database server. A two-tier architecture includes a client and one server layer. The database is stored on the database server.

44. Briefly describe the three types of SQL commands?

Data definition language commands are used to create, alter, and drop tables. Data manipulation commands are used to insert, modify, update, and query data in the database. Data control language commands help the DBA to control the database.

45. List some of the properties of a relation?

Relations in a database have a unique name and no multivalued attributes exist. Each row is unique and each attribute within a relation has a unique name. The sequence of both columns and rows is irrelevant.

46. Explain the differences between an intranet and an extranet?

An Internet database is accessible by everyone who has access to a Web site. An intranet database limits access to only people within a given organization.

47. What is SQL Deadlock?

Deadlock is a unique situation in a multi user system that causes two or more users to wait indefinitely for a locked resource.

48. What is a Catalog?

A catalog is a table that contains the information such as structure of each file, the type and storage format of each data item and various constraints on the data .The information stored in the catalog is called Metadata.

49. What is data ware housing & OLAP?

Data warehousing and OLAP (online analytical processing) systems are the techniques used in many companies to extract and analyze useful information from very large databases for decision making .

50. Describe the three levels of data abstraction?

Physical level: The lowest level of abstraction describes how data are stored.

Logical level: The next higher level of abstraction, describes what data are stored in database and what relationship among those data.

View level: The highest level of abstraction describes only part of entire database.

51. What is Data Independence?

Data independence means that the application is independent of the storage structure and access strategy of data.

52. How many types of relationship exist in database designing?

There are three major relationship models:-

One-to-one

One-to-many

Many-to-many

53. What is order by clause?

ORDER BY clause helps to sort the data in either ascending order to descending

54. What is the use of DBCC commands?

DBCC stands for database consistency checker. We use these commands to check the consistency of the databases, i.e., maintenance, validation task and status checks.

55. What is Collation?

Collation refers to a set of rules that determine how data is sorted and compared.

56. What is difference between DELETE & TRUNCATE commands?

Delete command removes the rows from a table based on the condition that we provide with a WHERE clause. Truncate will actually remove all the rows from a table and there will be no data in the table after we run the truncate command.

57. What is Hashing technique?

This is a primary file organization technique that provides very fast access to records on certain search conditions.

58. What is a transaction?

A transaction is a logical unit of database processing that includes one or more database access operations.

59. What are the different phases of Transaction?

Analysis phase

Redo phase

Undo phase

60. What is “transparent dbms”?

It is one, which keeps its physical structure hidden from user.

61. What are the primitive operations common to all record management System?

Addition, deletion and modification.

62. Explain the differences between structured data and unstructured data.

Structured data are facts concerning objects and events. The most important structured data are numeric, character, and dates.

Structured data are stored in tabular form. Unstructured data are multimedia data such as documents, photographs, maps, images, sound, and video clips. Unstructured data are most commonly found on Web servers and Web-enabled databases.

63. What are the major functions of the database administrator?

Managing database structure, controlling concurrent processing, managing processing rights and responsibilities, developing database security, providing for database recovery, managing the DBMS and maintaining the data repository.

64. What is a dependency graph?

A dependency graph is a diagram that is used to portray the connections between database elements.

65. Explain the difference between an exclusive lock and a shared lock?

An exclusive lock prohibits other users from reading the locked resource; a shared lock allows other users to read the locked resource, but they cannot update it.

66. Explain the "paradigm mismatch" between SQL and application programming languages.

SQL statements return a set of rows, while an application program works on one row at a time. To resolve this mismatch the results of SQL statements are processed as pseudofiles, using a cursor or pointer to specify which row is being processed.

67. Name four applications for triggers.

(1)Providing default values, (2) enforcing data constraints,

(3) Updating views and (4) enforcing referential integrity

68. What are the advantages of using stored procedures?

The advantages of stored procedures are (1) greater security, (2) decreased network traffic, (3) the fact that SQL can be optimized and (4) code sharing which leads to less work, standardized processing, and specialization among developers.

69. Explain the difference between attributes and identifiers.

Entities have attributes. Attributes are properties that describe the entity's characteristics. Entity instances have identifiers. Identifiers are attributes that name, or identify, entity instances.

70. What is Enterprise Resource Planning (ERP), and what kind of a database is used in an ERP application?

Enterprise Resource Planning (ERP) is an information system used in manufacturing companies and includes sales, inventory, production planning, purchasing and other business functions. An ERP system typically uses a multiuser database.

71. Describe the difference between embedded and dynamic SQL?

Embedded SQL is the process of including hard coded SQL statements. These statements do not change unless the source code is modified. Dynamic SQL is the process of generating SQL on the fly.The statements generated do not have to be the same each time.

72. Explain a join between tables

A join allows tables to be linked to other tables when a relationship between the tables exists. The relationships are established by using a common column in the tables and often uses the primary/foreign key relationship.

73. Describe a subquery.

A subquery is a query that is composed of two queries. The first query (inner query) is within the WHERE clause of the other query (outer query).

74. Compare a hierarchical and network database model?

The hierarchical model is a top-down structure where each parent may have many children but each child can have only one parent. This model supports one-to-one and one-to-many relationships.

The network model can be much more flexible than the hierarchical model since each parent can have multiple children but each child can also have multiple parents. This model supports one-to-one, one-to-many, and many-to-many relationships.

75. Explain the difference between a dynamic and materialized view.

A dynamic view may be created every time that a specific view is requested by a user. A materialized view is created and or updated infrequently and it must be synchronized with its associated base table(s).

76. Explain what needs to happen to convert a relation to third normal form.

First you must verify that a relation is in both first normal form and second normal form. If the relation is not, you must convert into second normal form. After a relation is in second normal form, you must remove all transitive dependencies.

77. Describe the four types of indexes?

A unique primary index is unique and is used to find and store a row. A nonunique primary index is not unique and is used to find a row but also where to store a row (based on its unique primary index). A unique secondary index is unique for each row and used to find table rows. A nonunique secondary index is not unique and used to find table rows.

78. Explain minimum and maximum cardinality?

Minimum cardinality is the minimum number of instances of an entity that can be associated with each instance of another entity. Maximum cardinality is the maximum number of instances of an entity that can be associated with each instance of another entity.

79. What is deadlock? How can it be avoided? How can it be resolved once it occurs?

Deadlock occurs when two transactions are each waiting on a resource that the other transaction holds. Deadlock can be prevented by requiring transactions to acquire all locks at the same time; once it occurs, the only way to cure it is to abort one of the transactions and back out of partially completed work.

80. Explain what we mean by an ACID transaction.

An ACID transaction is one that is atomic, consistent, isolated, and durable. Durable means that database changes are permanent. Consistency can mean either statement level or transaction level consistency. With transaction level consistency, a transaction may not see its own changes.Atomic means it is performed as a unit.

81. Under what conditions should indexes be used?

Indexes can be created to enforce uniqueness, to facilitate sorting, and to enable fast retrieval by column values. A good candidate for an index is a column that is frequently used with equal conditions in WHERE clauses.

82. What is difference between SQL and SQL SERVER?

SQL is a language that provides an interface to RDBMS, developed by IBM. SQL SERVER is a RDBMS just like Oracle, DB2.

83. What is Specialization?

It is the process of defining a set of subclasses of an entity type where each subclass contain all the attributes and relationships of the parent entity and may have additional attributes and relationships which are specific to itself.

84. What is generalization?

It is the process of finding common attributes and relations of a number of entities and defining a common super class for them.

85. What is meant by Proactive, Retroactive and Simultaneous Update?

Proactive Update: The updates that are applied to database before it becomes effective in real world.

Retroactive Update: The updates that are applied to database after it becomes effective in real world.

Simultaneous Update: The updates that are applied to database at the same time when it becomes effective in real world.

86. What is RAID Technology?

Redundant array of inexpensive (or independent) disks. The main goal of raid technology is to even out the widely different rates of performance improvement of disks against those in memory and microprocessor. Raid technology employs the technique of data striping to achieve higher transfer rates.

87. What are serial, non serial schedule?

A schedule S is serial if, for every transaction T participating in the schedule, all the operations of T is executed consecutively in the schedule, otherwise, the schedule is called non-serial schedule.

88. What are conflict serializable schedules?

A schedule S of n transactions is serializable if it is equivalent to some serial schedule of the same n transactions.

89. What is view serializable?

A schedule is said to be view serializable if it is view equivalent with some serial schedule.

90. What is a foreign key?

A key of a relation schema is called as a foreign key if it is the primary key of some other relation to which it is related to.

91. What are the disadvantages of using a dbms?

1) High initial investments in h/w, s/w, and training.
2) Generality that a DBMS provides for defining and processing data.
3) Overhead for providing security, concurrency control, recovery, and integrity functions.

92. What is Lossless join property?
It guarantees that the spurious tuple generation does not occur with respect to relation schemas after decomposition.

93. What is a Phantom Deadlock?
In distributed deadlock detection, the delay in propagating local information might cause the deadlock detection algorithms to identify deadlocks that do not really exist. Such situations are called phantom deadlocks and they lead to unnecessary aborts.

94. What is a checkpoint and When does it occur?
A Checkpoint is like a snapshot of the DBMS state. By taking checkpoints, the DBMS can reduce the amount of work to be done during restart in the event of subsequent crashes.

95. What is schema?
The description of a data base is called the database schema , which is specified during database design and is not expected to change frequently . A displayed schema is called schema diagram .We call each object in the schema as schema construct.

SQL Advanced Interview Questions

1.What is REDO in database?

A. Opposite of UNDO
B. Re-does the previous operation on database again.
C. REDO is used for ROLLBACK.
D. None of the above.
Answer: C
The most important point to remember is REDO is not the opposite of UNDO. Whenever a DML transaction happens in database, the data to be updated goes to the DATABASE BUFFER CACHE. From here the data is written to REDO BUFFER and then to REDO Logs. These logs are saved for future use. Future ROLLBACK and DATA RECOVERY operations require these logs. Without these logs it is impossible to do DATA RECOVERY. If ARCHIVING is enabled then these logs are bundled or archived and stored.

2. COMMIT takes more time than ROLLBACK .

A. True
B. False
Answer: B
COMMIT simply confirms the transaction and writes the committed data to disk and clears UNDO file. While ROLLBACK does the opposite transaction. ROLLBACK also clears UNDO file. ROLLBACK takes much longer time because it has to execute one full transaction (opposite) and COMMIT it. Hence COMMIT is faster than ROLLBACK.

3. What is the difference between ORDERBY and GROUPBY?

A. ORDERBY performs sorting while GROUPBY AGGREGATES Data

B. GROUPBY sorts data while ORDERBY puts data in order
C. Both perform sorting.
D. None of the above
Answer: A
The ORDER BY performs a sort operation. So think of a telephone phone directory.
SELECT NAME FROM DIRECTORY ORDER BY NAME
This would ensure that the result set would be sorted in (by default) ascending order.
The GROUP BY operation aggregates data in your result set. Continuing the example of the telephone directory
SELECT CITY, COUNT(CITY) FROM DIRECTORY GROUP BY CITY
This would ensure that the result set would be grouped according to the city where the individual lives. The COUNT and GROUP BY works in conjunction.

4. Which of the following records all modifications to data?

A. UNDO file
B. Alert Log file
C. Archive file
D. Both A & B
Answer: C
Alert log file records all modifications to the database but modifications to data alone is recorded by Archive files. UNDO file stores UNDO tables which have opposite transactions recorded. Archive files also help in recovery of data.

5. Which is better ?

A. SQL
B. Procedures
Answer: SQL

• SQL is often much shorter to write - you can do an update or summary procedure in one line of code that would take you several lines of procedural.
• For set-based problems - SQL is much faster processor-wise and IO wise too because all the underlining looping iteration is delegated to a database server process that does it in a very low level way and uses IO/processor more efficiently and knows the current state of the data - e.g. what other processes are asking for the data
If you were to update say a sales person of all customers in a particular region - your procedural way would look something like this
do until eof
if rs("state") = "NH" then
rs("salesperson") = "Mike"
end if
rs.next
loop
The SQL way would be: UPDATE customers SET salesperson = "Mike" WHERE state = "NH"
If you had, say 2 or 3 tables you need to check, your procedural quickly becomes difficult to manage as you pile on nested loop after loop.

OS Interview Questions

1. What is an operating system?

An operating system is a program that acts as an intermediary between the user and the computer hardware. The purpose of an OS is to provide a convenient environment in which user can execute programs in a convenient and efficient manner.

2. What are the different operating systems?

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

5. Real-time operating systems

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

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

4. What is kernel?

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

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

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

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

6. What is dead lock?

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

7. What is a process?

A program in execution is called a process.

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

8. What are the states of a process?

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

9. What is starvation and aging?

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

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

10. What is semaphore?

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

11. What is context switching?

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

12. What is a thread?

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

13. What is process synchronization?

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

14. What is virtual memory?

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

15. What is thrashing?

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

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

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

17. What are necessary conditions for dead lock?

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

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

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

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

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

else 1)

18. What is cache memory?

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

19. What is logical and physical addresses space?

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

20. Differentiate between Complier and Interpreter?

An interpreter reads one instruction at a time and carries out the actions implied by that instruction. It does not perform any translation. But a compiler translates the entire instructions

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

Throughput – number of processes that complete their execution per time unit

Turnaround time – amount of time to execute a particular process

Waiting time – amount of time a process has been waiting in the ready queue

Response time – amount of time it takes from when a request was submitted until the first response is produced, not output (for time-sharing environment)

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

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

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

23. What is a Real-Time System?

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

24. What is a trap and trapdoor?

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

25. When is a system in safe state?

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

26. Explain the concept of the Distributed systems?

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

27. What is cache-coherency?

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

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

Long term schedulers are the job schedulers that select processes from the job queue and load them into memory for execution. The short term schedulers are the CPU schedulers that select a process from the ready queue and allocate the CPU to one of them.

29. Explain the meaning of mutex.

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

30. What is cycle stealing?

We encounter cycle stealing in the context of Direct Memory Access (DMA). Either the DMA controller can use the data bus when the CPU does not need it, or it may force the CPU to temporarily suspend operation. The latter technique is called cycle stealing. Note that cycle stealing can be done only at specific break points in an instruction cycle.

31. What is Marshalling?

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

32. What is a daemon?

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

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

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

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

34. What is busy waiting?

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

35. What is page cannibalizing?

Page swapping or page replacements are called page cannibalizing.

36. What is SMP?

To achieve maximum efficiency and reliability a mode of operation known as symmetric multiprocessing is used. In essence, with SMP any process or threads can be assigned to any processor.

37. What is process migration?

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

38. Difference between Primary storage and secondary storage?

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

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

39. Define compactions.

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

40. What are residence monitors?

Early operating systems were called residence monitors.

41. What is dual-mode operation?

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

42. What is a device queue?

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

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

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

44. What is relative path and absolute path?

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

45. What are the disadvantages of context switching?

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

46. What is a data register and address register?

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

47. What is DRAM?

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

48. What are local and global page replacements?

Local replacement means that an incoming page is brought in only to the relevant process' address space. Global replacement policy allows any page frame from any process to be replaced. The latter is applicable to variable partitions model only.

49. Explain the concept of the batched operating systems?

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

50. What is SCSI?

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

51.When is a system in safe state?

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

52. What is cycle stealing?

We encounter cycle stealing in the context of Direct Memory Access (DMA). Either the DMA controller can use the data bus when the CPU does not need it, or it may force the CPU to temporarily suspend operation. The latter technique is called cycle stealing. Note that cycle stealing can be done only at specific break points in an instruction cycle.

53. What is an idle thread?

The special thread a dispatcher will execute when no ready thread is found.

54. What is FtDisk?

It is a fault tolerance disk driver for Windows NT.

55.What is Dispatcher?

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

56. When does the condition 'rendezvous' arise?

In message passing, it is the condition in which, both, the sender and receiver are blocked until the message is delivered.

57. What is process spawning?

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

58. What are the reasons for process suspension?

1) swapping
2) interactive user request
3) timing
4) parent process request

59. What are the sub-components of I/O manager in Windows NT?

1) Network redirector/ Server
2) Cache manager.
3) File systems
4) Network driver
5) Device driver

60. What is a drawback of MVT?

1) ability to support multiple processors
2) virtual storage
3) source level debugging

Latest Software Testing Questions with Answers

1. What is traceability matrix?

The relationship between test cases and requirements is shown with the help of a document. This document is known as traceability matrix.

2. What is Equivalence partitioning testing?

Equivalence partitioning testing is a software testing technique which divides the application input test data into each partition at least once of equivalent data from which test cases can be derived. By this testing method it reduces the time required for software testing.

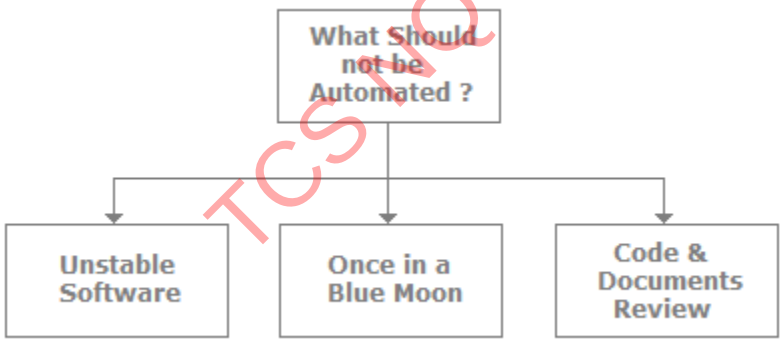
3. Does automation replace manual testing?

Automation is the integration of testing tools into the test environment in such a manner that the test execution, logging, and comparison of results are done with little human intervention. A testing tool is a software application which helps automate the testing process. But the testing tool is not the complete answer for automation. One of the huge mistakes done in testing automation is automating the wrong things during development. Many testers learn the hard way that everything cannot be automated. The best components to automate are repetitive tasks. So some companies first start with manual testing and then see which tests are the most repetitive ones and only those are then automated.

As a rule of thumb do not try to automate:

1. Unstable software: If the software is still under development and undergoing many changes automation testing will not be that effective.
2. Once in a blue moon test scripts: Do not automate test scripts which will be run once in a while.
3. Code and document review: Do not try to automate code and document reviews; they will just cause trouble.

The following figure shows what should not be automated.



All repetitive tasks which are frequently used should be automated. For instance, regression tests are prime candidates for automation because they're typically executed many times. Smoke, load, and performance tests are other examples of repetitive tasks that are suitable for automation. White box testing can also be automated using various unit testing tools. Code coverage can also be a good candidate for automation.

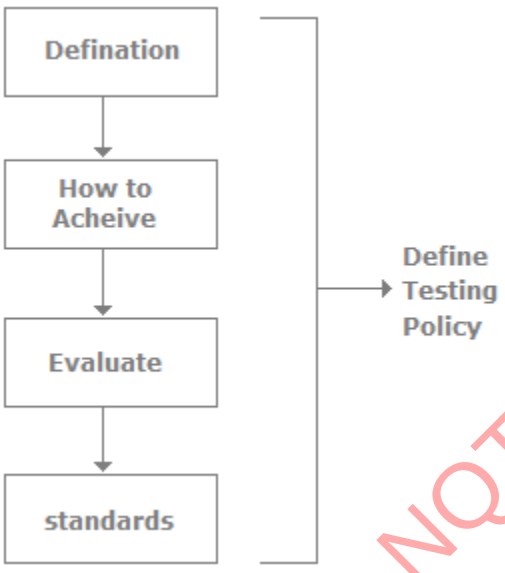
4. What is white box testing and list the types of white box testing?

White box testing technique involves selection of test cases based on an analysis of the internal structure (Code coverage, branches coverage, paths coverage, condition coverage etc.) of a component or system. It is also known as Code-Based testing or Structural testing. Different types of white box testing are :

1. Statement Coverage
2. Decision Coverage

5. How do you define a testing policy?

The following are the important steps used to define a testing policy in general. But it can change according to your organization. Let's discuss in detail the steps of implementing a testing policy in an organization.



Definition: The first step any organization needs to do is define one unique definition for testing within the organization so that everyone is of the same mindset.
How to achieve: How are we going to achieve our objective? Is there going to be a testing committee, will there be compulsory test plans which need to be executed, etc?.

Evaluate: After testing is implemented in a project how do we evaluate it? Are we going to derive metrics of defects per phase, per programmer, etc. Finally, it's important to let everyone know how testing has added value to the project?.

Standards: Finally, what are the standards we want to achieve by testing? For instance, we can say that more than 20 defects per KLOC will be considered below standard and code review should be done for it.

6. What is the MAIN benefit of designing tests early in the life cycle?

It helps prevent defects from being introduced into the code.

7. What is risk-based testing?

Risk-based testing is the term used for an approach to creating a test strategy that is based on prioritizing tests by risk. The basis of the approach is a detailed risk analysis and prioritizing of risks by risk level. Tests to address each risk are then specified, starting with the highest risk first.

8. What is the KEY difference between preventative and reactive approaches to testing?

Preventative tests are designed early; reactive tests are designed after the software has been produced.

9. In white box testing what do you verify?

In white box testing following steps are verified.

1. Verify the security holes in the code
2. Verify the incomplete or broken paths in the code
3. Verify the flow of structure according to the document specification
4. Verify the expected outputs
5. Verify all conditional loops in the code to check the complete functionality of the application
6. Verify the line by line coding and cover 100% testing

10. What is the difference between static and dynamic testing?

a) Static testing: During Static testing method, the code is not executed and it is performed using the software documentation.

b) Dynamic testing: To perform this testing the code is required to be in an executable form.

11. What are different test levels?

There are four test levels

1. Unit/component/program/module testing
2. Integration testing
3. System testing
4. Acceptance testing

12. What is Integration testing?

Integration testing is a level of software testing process, where individual units of an application are combined and tested. It is usually performed after unit and functional testing.

13. What are the tables in test plans?

Test design, scope, test strategies , approach are various details that Test plan document consists of.

1. Test case identifier
2. Scope
3. Features to be tested
4. Features not to be tested
5. Test strategy & Test approach
6. Test deliverables
7. Responsibilities
8. Staffing and training
9. Risk and Contingencies

14. What is configuration management?

Configuration management is the detailed recording and updating of information for hardware and software components. When we say components we not only mean source code. It can be tracking of changes for software documents such as requirement, design, test cases, etc.

When changes are done in adhoc and in an uncontrolled manner chaotic situations can arise and more defects injected. So whenever changes are done it should be done in a controlled fashion and with proper versioning. At any moment of time we should be able to revert back to the old version. The main intention of configuration management is to track our changes if we have issues with the current system. Configuration management is done using baselines.

15. What is the difference between UAT (User Acceptance Testing) and System testing?

System Testing: System testing is finding defects when the system under goes testing as a whole, it is also known as end to end testing. In such type of testing, the application undergoes from beginning till the end.

UAT: User Acceptance Testing (UAT) involves running a product through a series of specific tests which determines whether the product wil meet the needs of its users.

16. How does a coverage tool work?

While doing testing on the actual product, the code coverage testing tool is run simultaneously. While the testing is going on, the code coverage tool monitors the executed statements of the source code. When the final testing is completed we get a complete report of the pending statements and also get the coverage percentage.

17. What is Fault Masking?

Error condition hiding another error condition.

18. What does COTS represent?

COTS - Commercial off The Shelf.

The purpose of which is allow specific tests to be carried out on a system or network that resembles as closely as possible the environment where the item under test will be used upon release.

Test Environment

What can be thought of as being based on the project plan, but with greater amounts of detail?

Phase Test Plan

19. Should testing be done only after the build and execution phases are complete?

In traditional testing methodology testing is always done after the build and execution phases.But that's a wrong way of thinking because the earlier we catch a defect, the more cost effective it is. For instance, fixing a defect in maintenance is ten times more costly than fixing it during execution.

In the requirement phase we can verify if the requirements are met according to the customer needs. During design we can check whether the design document covers all the requirements. In this stage we can also generate rough functional data. We can also review the design document from the architecture and the correctness perspectives. In the build and execution phase we can execute unit test cases and generate structural and functional data. And finally comes the testing phase done in the traditional way. i.e., run the system test cases and see if the system works according to the requirements. During installation we need to see if the system is compatible with the software. Finally, during the maintenance phase when any fixes are made we can retest the fixes and follow the regression testing.Therefore, Testing should occur in conjunction with each phase of the software development.

20. When should testing be stopped?

It depends on the risks for the system being tested. There are some criteria bases on which you can stop testing.

1. Deadlines (Testing, Release)
2. Test budget has been depleted
3. Bug rate fall below certain level
4. Test cases completed with certain percentage passed
5. Alpha or beta periods for testing ends
6. Coverage of code, functionality or requirements are met to a specified point

21. Which of the following is the main purpose of the integration strategy for integration testing in the small?

The main purpose of the integration strategy is to specify which modules to combine when and how many at once.

22. What are semi-random test cases?

Semi-random test cases are nothing but when we perform random test cases and do equivalence partitioning to those test cases, it removes redundant test cases, thus giving us semi-random test cases.1 test for statement coverage, 2 for branch coverage

23. What is black box testing? What are the different black box testing techniques?

Black box testing is the software testing method which is used to test the software without knowing the internal structure of code or program. This testing is usually done to check the functionality of an application. The different black box testing techniques are :

1. Equivalence Partitioning
2. Boundary value analysis
3. Cause effect graphing

24. Which review is normally used to evaluate a product to determine its suitability for intended use and to identify discrepancies?

Technical Review.

25. Why we use decision tables?

The techniques of equivalence partitioning and boundary value analysis are often applied to specific situations or inputs. However, if different combinations of inputs result in different actions being taken,

this can be more difficult to show using equivalence partitioning and boundary value analysis, which tend to be more focused on the user interface. The other two specification-based techniques, decision tables and state transition testing are more focused on business logic or business rules. A decision table is a good way to deal with combinations of things (e.g. inputs). This technique is sometimes also referred to as a 'cause-effect' table. The reason for this is that there is an associated logic diagramming technique called 'cause-effect graphing' which was sometimes used to help derive the decision table

26. Faults found should be originally documented by whom?

By testers.

27. Are there more defects in the design phase or in the coding phase?

The design phase is more error prone than the execution phase. One of the most frequent defects which occur during design is that the product does not cover the complete requirements of the customer. Second is wrong or bad architecture and technical decisions make the next phase, execution, more prone to defects. Because the design phase drives the execution phase it's the most critical phase to test. The testing of the design phase can be done by good review. On average, 60% of defects occur during design and 40% during the execution phase.

28. What are the Experience-based testing techniques?

In experience-based techniques, people's knowledge, skills and background are a prime contributor to the test conditions and test cases. The experience of both technical and business people is important, as they bring different perspectives to the test analysis and design process. Due to previous experience with similar systems, they may have insights into what could go wrong, which is very useful for testing.

29. What type of review requires formal entry and exit criteria, including metrics?

Inspection

30. Could reviews or inspections be considered part of testing?

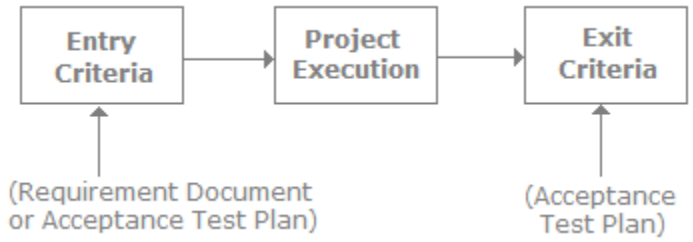
Yes, because both help detect faults and improve quality.To test a function, what has to write a programmer, which calls the function to be tested and passes it test data.

31. What is a test log?

The IEEE Std. 829-1998 defines a test log as a chronological record of relevant details about the execution of test cases. It's a detailed view of activity and events given in chronological manner.

32. What does entry and exit criteria mean in a project?

Entry and exit criteria are a must for the success of any project. If you do not know where to start and where to finish then your goals are not clear. By defining exit and entry criteria you define your boundaries.For instance, you can define entry criteria that the customer should provide the requirement document or acceptance plan. If this entry criteria is not met then you will not start the project. On the other end, you can also define exit criteria for your project. For instance, one of the common exit criteria in projects is that the customer has successfully executed the acceptance test plan.



33. What is the difference between verification and validation?

Verification is a review without actually executing the process while validation is checking the product with actual execution. For instance, code review and syntax check is verification while actually running the product and checking the results is validation.

34. A Type of functional Testing, which investigates the functions relating to detection of threats, such as virus from malicious outsiders?

a) Security Testing

Testing where in we subject the target of the test , to varying workloads to measure and evaluate the performance behaviours and ability of the target and of the test to continue to function properly under these different workloads?

b) Load Testing

Testing activity which is performed to expose defects in the interfaces and in the interaction between integrated components is?

c) Integration Level Testing

35. Can you explain process areas in CMMI?

A process area is the area of improvement defined by CMMI. Every maturity level consists of process areas. A process area is a group of practices or activities performed collectively to achieve a specific objective. For instance, you can see from the following figure we have process areas such as project planning, configuration management, and requirement gathering.

36. What is random/monkey testing? When it is used?

Random testing often known as monkey testing. In such type of testing data is generated randomly often using a tool or automated mechanism. With this randomly generated input the system is tested and results are analysed accordingly. These testing are less reliable; hence it is normally used by the beginners and to see whether the system will hold up under adverse effects.

37. Which of the following are valid objectives for incident reports?

Provide developers and other parties with feedback about the problem to enable identification, isolation and correction as necessary.

1. Provide ideas for test process improvement.
2. Provide a vehicle for assessing tester competence.
3. Provide testers with a means of tracking the quality of the system under test.

38. How does load testing work for websites?

Websites have software called a web server installed on the server. The user sends a request to the web server and receives a response. So, for instance, when you type www.google.com the web server senses it and sends you the home page as a response. This happens each time you click on a link, do a submit, etc. So if we want to do load testing you need to just multiply these requests and responses "N" times. This is what an automation tool does. It first captures the request and response and then just multiplies it by "N" times and sends it to the web server, which results in load simulation.

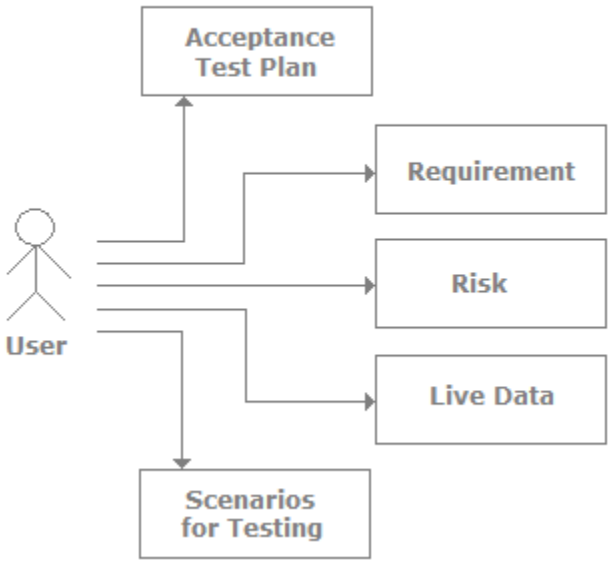
So once the tool captures the request and response, we just need to multiply the request and response with the virtual user. Virtual users are logical users which actually simulate the actual physical user by sending in the same request and response. If you want to do load testing with 10,000 users on an application it's practically impossible. But by using the load testing tool you only need to create 1000 virtual users.

39. What is functional system testing?

Testing the end to end functionality of the system as a whole is defined as a functional system testing.

40. What kind of input do we need from the end user to begin proper testing?

The product has to be used by the user. He is the most important person as he has more interest than anyone else in the project.



From the user we need the following data:

The first thing we need is the acceptance test plan from the end user. The acceptance test defines the entire test which the product has to pass so that it can go into production.We also need the requirement document from the customer. In normal scenarios the customer never writes a formal document until he is really sure of his requirements. But at some point the customer should sign saying yes this is what he wants.

The customer should also define the risky sections of the project. For instance, in a normal accounting project if a voucher entry screen does not work that will stop the accounting functionality completely. But if reports are not derived the accounting department can use it for some time. The customer is the right person to say which section will affect him the most. With this feedback the testers can prepare a proper test plan for those areas and test it thoroughly.
The customer should also provide proper data for testing. Feeding proper data during testing is very important. In many scenarios testers key in wrong data and expect results which are of no interest to the customer.

41. Why can be tester dependent on configuration management?

Because configuration management assures that we know the exact version of the testware and the test object.

42. What is a V-Model?

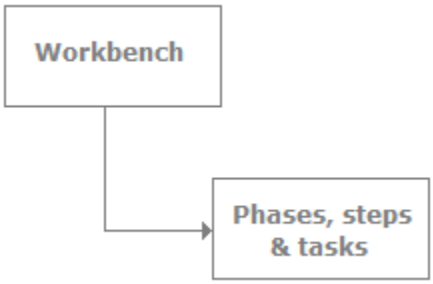
A software development model that illustrates how testing activities integrate with software development phases.

43. What is maintenance testing?

Triggered by modifications, migration or retirement of existing software

45. Can you explain the workbench concept?

In order to understand testing methodology we need to understand the workbench concept. A Workbench is a way of documenting how a specific activity has to be performed. A workbench is referred to as phases, steps, and tasks as shown in the following figure.

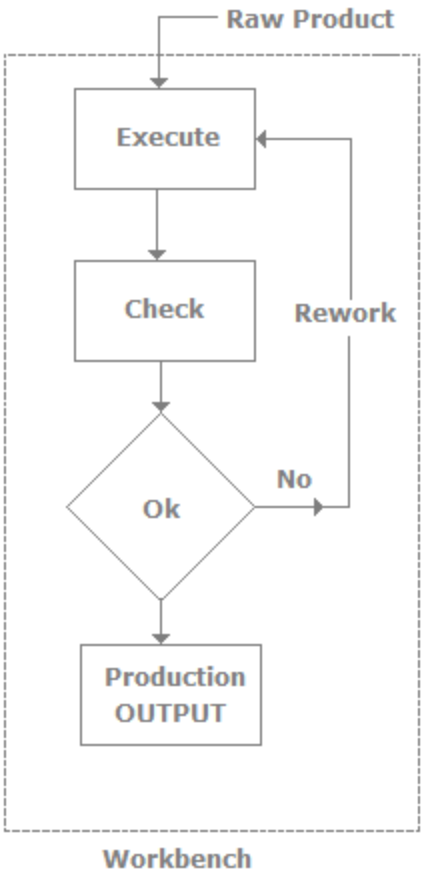


There are five tasks for every workbench:

Input: Every task needs some defined input and entrance criteria. So for every workbench we need defined inputs. Input forms the first steps of the workbench.
Execute: This is the main task of the workbench which will transform the input into the expected

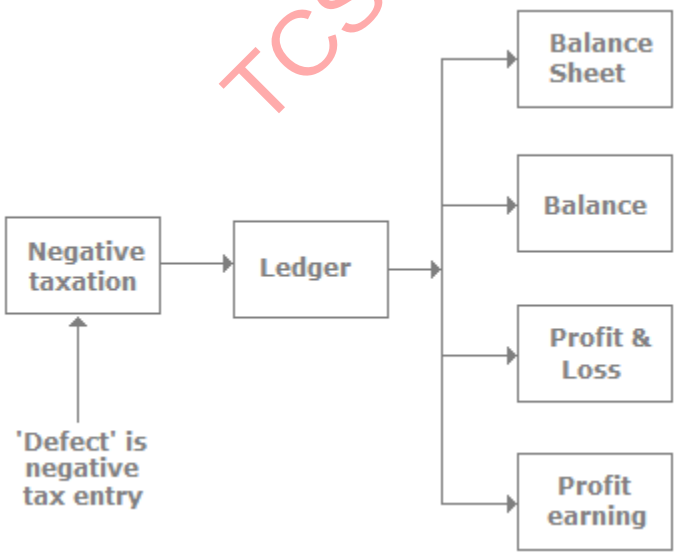
Output.

Check: Check steps assure that the output after execution meets the desired result.
Production output: If the check is right the production output forms the exit criteria of the workbench.
Rework: During the check step if the output is not as desired then we need to again start from the execute step.



46. Can you explain the concept of defect cascading?

Defect cascading is a defect which is caused by another defect. One defect triggers the other defect. For instance, in the accounting application shown here there is a defect which leads to negative taxation. So the negative taxation defect affects the ledger which in turn affects four other modules.



47. Can you explain cohabiting software?

When we install the application at the end client it is very possible that on the same PC other applications also exist. It is also very possible that those applications share common DLLs, resources etc., with your application. There is a huge chance in such situations that your changes can affect the cohabiting software. So the best practice is after you install your application or after any changes, tell other application owners to run a test cycle on their application.

48. What are Test comparators?

Is it really a test if you put some inputs into some software, but never look to see whether the software produces the correct result? The essence of testing is to check whether the software produces the correct result, and to do that, we must compare what the software produces to what it should produce. A test comparator helps to automate aspects of that comparison.Who is responsible for document all the issues, problems and open point that were identified during the review meeting

49. What is the difference between pilot and beta testing?

The difference between pilot and beta testing is that pilot testing is nothing but actually using the product (limited to some users) and in beta testing we do not input real data, but it's installed at the end customer to validate if the product can be used in production.

50. What is the role of moderator in review process?

The moderator (or review leader) leads the review process. He or she determines, in co-operation with the author, the type of review, approach and the composition of the review team. The moderator performs the entry check and the follow-up on the rework, in order to control the quality of the input and output of the review process. The moderator also schedules the meeting, disseminates documents before the meeting, coaches other team members, paces the meeting, leads possible discussions and stores the data that is collected.

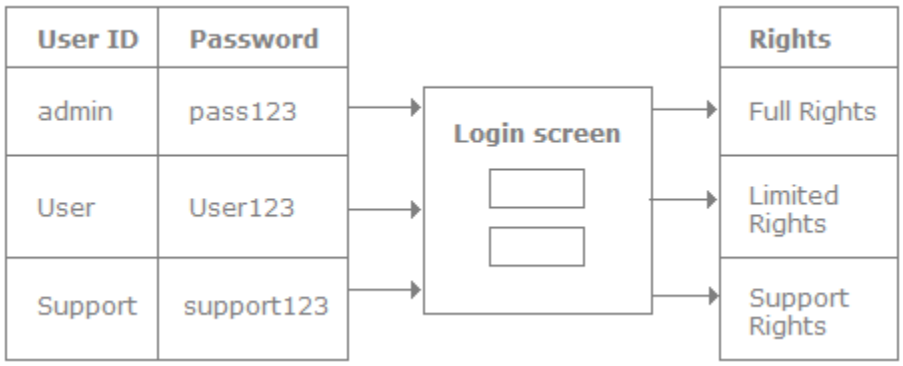
51. What is an equivalence partition (also known as an equivalence class)?

An input or output ranges of values such that only one value in the range becomes a test case.

52. Can you explain data-driven testing?

Normally an application has to be tested with multiple sets of data. For instance, a simple login screen, depending on the user type, will give different rights. For example, if the user is an admin he will have full rights, while a user will have limited rights and support if he only has read-only support rights. In this scenario the testing steps are the same but with different user ids and passwords. In data-driven testing, inputs to the system are read from data files such as Excel, CSV (comma separated values), ODBC, etc.

So the values are read from these sources and then test steps are executed by automated testing.



53. When should configuration management procedures be implemented?

During test planning.

54. What are the different strategies for rollout to end users?

There are four major ways of rolling out any project:

Pilot : The actual production system is installed at a single or limited number of users. Pilot basically means that the product is actually rolled out to limited users for real work.

Gradual Implementation : In this implementation we ship the entire product to the limited users or all users at the customer end. Here, the developers get instant feedback from the recipients which allow them to make changes before the product is available. But the downside is that developers and testers maintain more than one version at one time.
Phased Implementation: In this implementation the product is rolled out to all users in incrementally. That means each successive rollout has some added functionality. So as new functionality comes in, new installations occur and the customer tests them progressively. The benefit of this kind of rollout is that customers can start using the functionality and provide valuable feedback progressively. The only issue here is that with each rollout and added functionality the integration becomes more complicated.

Parallel Implementation : In these types of rollouts the existing application is run side by side with the new application. If there are any issues with the new application we again move back to the old application. One of the biggest problems with parallel implementation is we need extra hardware, software, and resources.

55. What is the purpose of exit criteria?

The purpose of exit criteria is to define when a test level is completed.

56. What determines the level of risk?

The likelihood of an adverse event and the impact of the event determine the level of risk.

57. When is used Decision table testing?

Decision table testing is used for testing systems for which the specification takes the form of rules or cause-effect combinations. In a decision table the inputs are listed in a column, with the outputs in the same column but below the inputs. The remainder of the table explores combinations of inputs to define the outputs produced.

58. Can you explain tailoring?

As the name suggests, tailoring is nothing but changing an action to achieve an objective according to conditions. Whenever tailoring is done there should be adequate reasons for it. Remember when a process is defined in an organization it should be followed properly. So even if tailoring is applied the process is not bypassed or omitted.

59. What is Six Sigma?

Six Sigma is a statistical measure of variation in a process. We say a process has achieved Six Sigma if the quality is 3.4 DPMO (Defect per Million Opportunities). It's a problem-solving methodology that can be applied to a process to eliminate the root cause of defects and costs associated with it.

60. What are the benefits of Independent Testing?

Independent testers are unbiased and identify different defects at the same time.

61. In a REACTIVE approach to testing when would you expect the bulk of the test design work to be begun?

The bulk of the test design work begun after the software or system has been produced.

62. What's the difference between System testing and Acceptance testing?

Acceptance testing checks the system against the "Requirements." It is similar to System testing in that the whole system is checked but the important difference is the change in focus:
System testing checks that the system that was specified has been delivered. Acceptance testing checks that the system will deliver what was requested. The customer should always do Acceptance testing and not the developer.

The customer knows what is required from the system to achieve value in the business and is the only person qualified to make that judgement. This testing is more about ensuring that the software is delivered as defined by the customer. It's like getting a green light from the customer that the software meets expectations and is ready to be used.

63. Which of the following defines the expected results of a test?

Test case specification or test design specification.

Test case specification defines the expected results of a test.

64. What is the benefit of test independence?

It avoids author bias in defining effective tests.

65. As part of which test process do you determine the exit criteria?

The exit criteria is determined on the bases of 'Test Planning'.

66. Rapid Application Development?

Rapid Application Development (RAD) is formally a parallel development of functions and subsequent integration. Components/functions are developed in parallel as if they were mini projects, the developments are time-boxed, delivered, and then assembled into a working prototype. This can very quickly give the customer something to see and use and to provide feedback regarding the delivery and their requirements. Rapid change and development of the product is possible using this methodology. However the product specification will need to be developed for the product at some point, and the project will need to be placed under more formal controls prior to going into production.

67. What is the difference between Testing Techniques and Testing Tools?

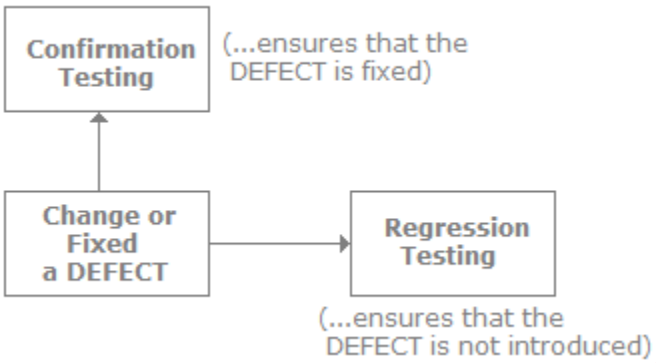
Testing technique : Is a process for ensuring that some aspects of the application system or unit functions properly there may be few techniques but many tools.

Testing Tools : Is a vehicle for performing a test process. The tool is a resource to the tester, but itself is insufficient to conduct testing

68. Can you explain regression testing and confirmation testing?

Regression testing is used for regression defects. Regression defects are defects occur when the functionality which was once working normally has stopped working. This is probably because of changes made in the program or the environment. To uncover such kind of defect regression testing is conducted.

The following figure shows the difference between regression and confirmation testing.



If we fix a defect in an existing application we use confirmation testing to test if the defect is removed. It's very possible because of this defect or changes to the application that other sections of the application are affected. So to ensure that no other section is affected we can use regression testing to confirm this.

69. What are the different Methodologies in Agile Development Model?

There are currently seven different agile methodologies, they are :

1. Extreme Programming (XP)
2. Scrum
3. Lean Software Development
4. Feature-Driven Development
5. Agile Unified Process
6. Crystal
7. Dynamic Systems Development Model (DSDM)

70. Which activity in the fundamental test process includes evaluation of the testability of the requirements and system?

A ‘Test Analysis’ and ‘Design’ includes evaluation of the testability of the requirements and system.

71. What is typically the MOST important reason to use risk to drive testing efforts?

Because testing everything is not feasible.

72. Consider the following techniques. Which are static and which are dynamic techniques?

1. Equivalence Partitioning.
2. Use Case Testing.
3. Data Flow Analysis.
4. Exploratory Testing.
5. Decision Testing.
6. Inspections.

Data Flow Analysis and Inspections are **static**; Equivalence Partitioning, Use Case Testing, Exploratory Testing and Decision Testing are **dynamic**.

73. Can you explain requirement traceability and its importance?

In most organizations testing only starts after the execution/coding phase of the project. But if the organization wants to really benefit from testing, then testers should get involved right from the requirement phase.If the tester gets involved right from the requirement phase then requirement traceability is one of the important reports that can detail what kind of test coverage the test cases have.

74. Why are static testing and dynamic testing described as complementary?

Because they share the aim of identifying defects but differ in the types of defect they find.

75. What are the phases of a formal review?

In contrast to informal reviews, formal reviews follow a formal process. A typical formal review process consists of six main steps:

1. Planning
2. Kick-off
3. Preparation

4. Review meeting
5. Rework
6. Follow-up.

76. What are the Structure-based (white-box) testing techniques?

Structure-based testing techniques (which are also dynamic rather than static) use the internal structure of the software to derive test cases. They are commonly called 'white-box' or 'glass-box' techniques (implying you can see into the system) since they require knowledge of how the software is implemented, that is, how it works. For example, a structural technique may be concerned with exercising loops in the software. Different test cases may be derived to exercise the loop once, twice, and many times. This may be done regardless of the functionality of the software.

77. When "Regression Testing" should be performed?

After the software has changed or when the environment has changed Regression testing should be performed.

78. What is negative and positive testing?

A negative test is when you put in an invalid input and receives errors. While a positive testing, is when you put in a valid input and expect some action to be completed in accordance with the specification.

79. What is the purpose of a test completion criterion?

The purpose of test completion criterion is to determine when to stop testing

80. What can static analysis NOT find?

For example memory leaks.

81. What is the difference between re-testing and regression testing?

Re-testing ensures the original fault has been removed; regression testing looks for unexpected side effects.

82. What is the one Key reason why developers have difficulty testing their own work?

Lack of Objectivity

83. “How much testing is enough?”

The answer depends on the risk for your industry, contract and special requirements.

84. Why does the boundary value analysis provide good test cases?

Because errors are frequently made during programming of the different cases near the ‘edges’ of the range of values.

85. What makes an inspection different from other review types?

It is led by a trained leader, uses formal entry and exit criteria and checklists.

86. What are the different kinds of variations used in Six Sigma?

Variation is the basis of Six Sigma. It defines how many changes are happening in the output of a process. So if a process is improved then this should reduce variations. In Six Sigma we identify variations in the process, control them, and reduce or eliminate defects.

87. What is test coverage?

Test coverage measures in some specific way the amount of testing performed by a set of tests (derived in some other way, e.g. using specification-based techniques). Wherever we can count things and can tell whether or not each of those things has been tested by some test, then we can measure coverage.

88. Why is incremental integration preferred over “big bang” integration?

Because incremental integration has better early defects screening and isolation ability

89. When do we prepare RTM (Requirement traceability matrix), is it before test case designing or after test case designing?

It would be before test case designing. Requirements should already be traceable from Review activities since you should have traceability in the Test Plan already. This question also would depend on the organisation. If the organisations do test after development started then requirements must be already traceable to their source. To make life simpler use a tool to manage requirements.

90. What is called the process starting with the terminal modules?

Bottom-up integration

91. Explain Unit Testing, Integration Tests, System Testing and Acceptance Testing?

Unit testing : Testing performed on a single, stand-alone module or unit of code.
Integration Tests : Testing performed on groups of modules to ensure that data and control are passed properly between modules.
System testing : Testing a predetermined combination of tests that, when executed successfully meets requirements.
Acceptance testing : Testing to ensure that the system meets the needs of the organization and the end user or customer (i.e. validates that the right system was built).

92. How would you estimate the amount of re-testing likely to be required?

Metrics from previous similar projects and discussions with the development team.When testing a grade calculation system, a tester determines that all scores from 90 to 100 will yield a grade of A, but scores below 90 will not. This analysis is known as:

Equivalence partitioning:

A test manager wants to use the resources available for the automated testing of a web application. The best choice is Tester, test automater, web specialist, DBA

93. During the testing of a module tester 'X' finds a bug and assigned it to developer. But developer rejects the same, saying that it's not a bug. What 'X' should do?

Send to the detailed information of the bug encountered and check the reproducibility

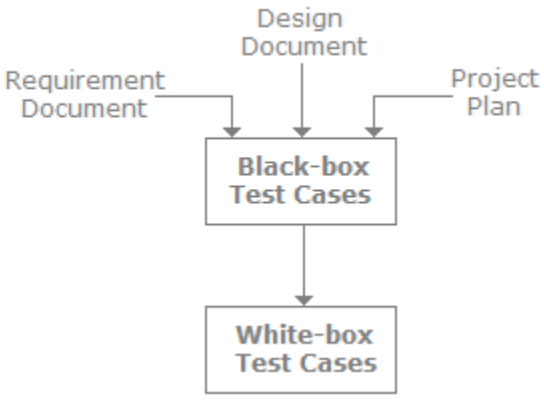
94. Does an increase in testing always improve the project?

No an increase in testing does not always mean improvement of the product, company, or project. In real test scenarios only 20% of test plans are critical from a business angle. Running those critical test plans will assure that the testing is properly done. The following graph explains the impact of under testing and over testing. If you under test a system the number of defects will increase, but if you over test a system your cost of testing will increase. Even if your defects come down your cost of testing has gone up.

95. Which test cases are written first: white boxes or black boxes?

Normally black box test cases are written first and white box test cases later. In order to write black box test cases we need the requirement document and, design or project plan. All these documents are easily available at the initial start of the project. White box test cases cannot be started in the initial phase of the project because they need more architecture clarity which is not available at the start of the project. So normally white box test cases are written after black box test cases are written.Black box test cases do not require system understanding but white box testing needs more structural

understanding. And structural understanding is clearer i00n the later part of project, i.e., while executing or designing. For black box testing you need to only analyze from the functional perspective which is easily available from a simple requirement document.



A type of integration testing in which software elements, hardware elements, or both are combined all at once into a component or an overall system, rather than in stages.

Big-Bang Testing

Which technique can be used to achieve input and output coverage? It can be applied to human input, input via interfaces to a system, or interface parameters in integration testing.

Equivalence partitioning

Conditions, test cases or test scripts. This does not mean that other, more formal testing techniques will not be used. For example, the tester may decide to use boundary value analysis but will think through and test the most important boundary values without necessarily writing them down. Some notes will be written during the exploratory-testing session, so that a report can be produced afterwards.

96. What is “use case testing”?

In order to identify and execute the functional requirement of an application from end to finish “use case” is used and the techniques used to do this is known as “Use Case Testing”

97. What is the difference between STLC (Software Testing Life Cycle) and SDLC (Software Development Life Cycle) ?

The complete Verification and Validation of software is done in SDLC, while STLC only does Validation of the system. SDLC is a part of STLC.

98. Describe software review and formal technical review (FTR).

Software reviews works as a filter for the software process. It helps to uncover errors and defects in software. Software reviews enhance the quality of software. Software reviews refine software, including requirements and design models, code, and testing data.

A formal technical review (FTR) is a software quality control activity. In this activity, software developer and other team members are involved. The objectives of an FTR are:

1. Uncover the errors.
2. Verify that the software under technical review meets its requirements.
3. To ensure that the software must follow the predefined standards.
4. To make projects more manageable.

The FTR includes walkthroughs and inspections.Each FTR is conducted as a normal meeting. FTR will be successful only if it is properly planned, and executed.

99. What are the attributes of good test case?

The following are the attributes of good test case.

A good test has a high probability of finding an error. To find the maximum error, the tester and developer should have complete understanding of the software and attempt to check all the conditions that how the software might fail.

A good test is not redundant. Every test should have a different purpose from other, otherwise tester will repeat the testing process for same condition.

A good test should be neither too simple nor too complex. In general, each test should be executed separately. If we combine more than one test into one test case, it might be very difficult to execute. Sometimes we can combine tests but it may hide some errors.

100. Describe cyclomatic complexity with example.

Cyclomatic complexity is a software metric that measure the logical strength of the program. It was developed by Thomas J. McCabe. Cyclomatic complexity is calculated by using the control flow graph of the program. In the flow graph, nodes are represented by circle. Areas bounded by edges and nodes are called regions. When counting regions, we also include the area outside the graph as a region.

1. What's the Software Testing?
A set of activities conducted with the intent of finding errors in software.

2.What is Acceptance Testing?

Testing conducted to enable a user/customer to determine whether to accept a software product. Normally performed to validate the software meets a set of agreed acceptance criteria.

3. What is Accessibility Testing?

Verifying a product is accessible to the people having disabilities (deaf, blind, mentally disabled etc.).

4. What is Ad Hoc Testing?

A testing phase where the tester tries to 'break' the system by randomly trying the system's functionality.

5. What is Application Programming Interface (API)?

A formalized set of software calls and routines that can be referenced by an application program in order to access supporting system or network services.

6. What is Backus-Naur Form?

A metalanguage used to formally describe the syntax of a language.

7. What is Beta Testing?

Testing of a release of a software product conducted by customers.

8. What is Application Binary Interface (ABI)?

A specification defining requirements for portability of applications in binary forms across different system platforms and environments.

9. What is Binary Portability Testing?

Testing an executable application for portability across system platforms and environments, usually for conformation to an ABI specification.

10. What is Black Box Testing?

Testing based on an analysis of the specification of a piece of software without reference to its internal workings. The goal is to test how well the component conforms to the published requirements for the component.

11. What is Bottom Up Testing?

An approach to integration testing where the lowest level components are tested first, then used to facilitate the testing of higher level components. The process is repeated until the component at the top of the hierarchy is tested.

12. What is Boundary Testing?

Test which focus on the boundary or limit conditions of the software being tested. (Some of these tests are stress tests).

13. What is the difference between verification and validation?

Verification is a review without actually executing the process while validation is checking the product with actual execution. For instance, code review and syntax check is verification while actually running the product and checking the results is validation.

14. What is Bug?

A fault in a program which causes the program to perform in an unintended or unanticipated manner.

15. What is Defect?

If software misses some feature or function from what is there in requirement it is called as defect.

16. What is Branch Testing?

Testing in which all branches in the program source code are tested at least once.

17. What is Breadth Testing?

A test suite that exercises the full functionality of a product but does not test features in detail.

18. What's the Alpha Testing ?

The Alpha Testing is conducted at the developer sites and in a controlled environment by the end user of the software

19. What's the Beta Testing ?

Testing the application after the installation at the client place.

20. What is Component Testing ?

Testing of individual software components (Unit Testing).

21. What is End-to-End testing ?

Testing a complete application environment in a situation that mimics real-world use, such as interacting with a database, using network communications, or interacting with other hardware, applications, or systems if appropriate.

22. What is CAST?

Computer Aided Software Testing.

23. What is CMM?

The Capability Maturity Model for Software (CMM or SW-CMM) is a model for judging the maturity of the software processes of an organization and for identifying the key practices that are required to increase the maturity of these processes.

24. What is Cause Effect Graph?

A graphical representation of inputs and the associated outputs effects which can be used to design test cases.

25. What is Coding?

The generation of source code.

26. What is Compatibility Testing?

Testing whether software is compatible with other elements of a system with which it should operate, e.g. browsers, Operating Systems, or hardware.

27. What is Cyclomatic Complexity?

A measure of the logical complexity of an algorithm, used in white-box testing.

28. What is Debugging?

The process of finding and removing the causes of software failures.

29. What is Dependency Testing?

Examines an application's requirements for pre-existing software, initial states and configuration in order to maintain proper functionality.

30. What are the different Ways of doing Black Box testing?

There are five methodologies most frequently used:
A)Top down according to budget
B)WBS (Work Breakdown Structure)

C)Guess and gut feeling
D)Early project data
E)TPA (Test Point Analysis)

31 What's the Database testing?
In database testing, we can check the integrity of database field values.

32. How many types of testing?
There are two types of testing-
Functional- Black Box Testing
Structural- white Box Testing

33. What does the mclabe cyclomatic complexity of a program determine?
Cyclomatic complexity is likely the most widely used complexity metric in software engineering. It describes the complexity of a procedure by measuring the linearly independent paths through its source code.

34. What is the difference between interoperability and compatibility testing with some examples?
Interoperatability:-To check if the software can co exist with other supporting softwares in the system
Compatibility:-To check if the software runs on different types of operating systems according to customer requirements.

35. Which testing method is used to check the software in abnormal condition?

1) Stress testing
2) Security testing
3) Recovery testing
4) Beta testing

36. What's the Test Case?
A set of test inputs, execution, and expected result developed for a particular objective.

37. What's the Traceability Matrix?
A document that showing the relationship between Test Requirements and Test Cases.

38. How many types of approaches are used in Integration Testing?
There are two types of approaches used-
Bottom-Up
Top-Down

39. What is Emulator?

A device, computer program, or system that accepts the same inputs and produces the same outputs as a given system.

40. What is Functional Decomposition?

A technique used during planning, analysis and design; creates a functional hierarchy for the software.

41. What is Glass Box Testing?
A synonym for White Box Testing.

42. What is Gorilla Testing?
Testing one particular module, functionality heavily.

43. What is Gray Box Testing?

A combination of Black Box and White Box testing methodologies testing a piece of software against its specification but using some knowledge of its internal workings.

44. What is Integration Testing?
Testing of combined parts of an application to determine if they function together correctly. Usually

performed after unit and functional testing. This type of testing is especially relevant to client/server and distributed systems.

45. What is Metric?

A standard of measurement. Software metrics are the statistics describing the structure or content of a program. A metric should be a real objective measurement of something such as number of bugs per lines of code.

46. What is Quality Assurance?

All those planned or systematic actions necessary to provide adequate confidence that a product or service is of the type and quality needed and expected by the customer.

47. What is Quality Control?

The operational techniques and the activities used to fulfill and verify requirements of quality.

48. What is Race Condition?

A cause of concurrency problems. Multiple accesses to a shared resource, at least one of which is a write, with no mechanism used by either to moderate simultaneous access.

49. What is Scalability Testing?

Performance testing focused on ensuring the application under test gracefully handles increases in work load.

50. What is Software Requirements Specification?

A deliverable that describes all data, functional and behavioral requirements, all constraints, and all validation requirements for software.

Data Structure Interview Questions

1.What is data structure?

A data structure is a way of organizing data that considers not only the items stored, but also their relationship to each other. Advance knowledge about the relationship between data items allows designing of efficient algorithms for the manipulation of data.

2.Minimum number of queues needed to implement the priority queue?

Two. One queue is used for actual storing of data and another for storing priorities.

3.What are the notations used in Evaluation of Arithmetic Expressions using prefix and postfix forms?

Polish and Reverse Polish notations.

4.List out few of the Application of tree data-structure?

i)The manipulation of Arithmetic expression
ii)Symbol Table construction
iii)Syntax analysis.

5.What is the type of the algorithm used in solving the 8 Queens problem?

Backtracking

6.In RDBMS, what is the efficient data structure used in the internal storage representation?
B+ tree. Because in B+ tree, all the data is stored only in leaf nodes, that makes searching easier. This corresponds to the records that shall be stored in leaf nodes.

7. What is a spanning Tree?

A spanning tree is a tree associated with a network. All the nodes of the graph appear on the tree once. A minimum spanning tree is a spanning tree organized so that the total edge weight between nodes is minimized.

8. List out the areas in which data structures are applied extensively?

Compiler Design, Operating System, Database Management System, Statistical analysis package, Numerical Analysis, Graphics, Artificial Intelligence, Simulation

9. Translate infix expression into its equivalent post fix expression: (A-B)*(D/E)

(A-B)*(D/E) = [AB-]*[DE/] = AB-DE/*

10. What are priority queues?

A priority queue is a collection of elements such that each element has been assigned a priority.

11. What is a string?

A sequential array of characters is called a string.

12. What is Brute Force algorithm?

Algorithm used to search the contents by comparing each element of array is called Brute Force algorithm.

13. 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.

14. How can you overcome the limitations of arrays?

Limitations of arrays can be solved by using the linked list.

15. What is a linked list?

Linked list is a data structure which store same kind of data elements but not in continuous memory locations and size is not fixed. The linked lists are related logically.

16. What is a node?

The data element of a linked list is called a node.

17. What does node consist of?

Node consists of two fields:data field to store the element and link field to store the address of the next node.

18. What is a queue ?

A Queue is a sequential organization of data. A queue is a first in first out type of data structure. An element is inserted at the last position and an element is always taken out from the first position.

19. What are the types of Collision Resolution Techniques and the methods used in each of the type?

Open addressing (closed hashing),The methods used include:Overflow block
Closed addressing (open hashing),The methods used include:Linkedlist,Binary tree

20. What are the methods available in storing sequential files ?

Straight merging, Natural merging, Polyphase sort, Distribution of Initial runs.

21. Mention some of the problem solving strategies?

The most widely strategies are listed below
i)Divide and conquer
ii)Binary doubling strategy
iii)Dynamic programming

22. 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 then together to get the solution for the main problem.

23. What is the need for the header?

Header of the linked list is the first element in the list and it stores the number of elements in the list. It points to the first data element of the list.

24. Define leaf?

In a directed tree any node which has out degree o is called a terminal node or a leaf.

25. What are the applications of binary tree?

Binary tree is used in data processing.

26. What are the different types of traversing?

The different types of traversing are
i)Pre-order traversal-yields prefix from of expression.
ii)In-order traversal-yields infix form of expression.
iii)Post-order traversal-yields postfix from of expression.

27. Define pre-order traversal?

i)Process the root node
ii)Process the left subtree
iii)Process the right subtree

28. Define post-order traversal?

i)Process the left subtree
ii)Process the right subtree
iii)Process the root node

29. Define in -order traversal?

i)Process the left subtree
ii)Process the root node
iii)Process the right subtree

30. What is meant by sorting?

Ordering the data in an increasing or decreasing fashion according to some relationship among the data item is called sorting.

31. What's the major distinction in between Storage structure and file structure and how?

The expression of an specific data structure inside memory of a computer system is termed storage structure in contrast to a storage structure expression in auxiliary memory is normally known as a file structure.

32. Stack can be described as a pointer. Explain?

Because stack will contain a head pointer which will always point to the top of the Stack.All Stack Operations are done using Head Pointer. Hence Stack ca be Described as a Pointer

33. What do you mean by: Syntax Error, Logical Error, Run time Error?

Syntax Error-Syntax Error is due to lack of knowledge in a specific language. It is due to somebody does not know how to use the features of a language.We can know the errors at the time of compilation.
logical Error-It is due to the poor understanding of the requirement or problem.
Run time Error-The exceptions like divide a number by 0,overflow and underflow comes under this.

34. What is mean by 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.

35. What is AVL tree?

Avl tree is self binary tree in which balancing factor lie between the -1 to 1.It is also known as self balancing tree.

36. what is binary tree?

Binary tree is a tree which has maximum no. of childrens either 0 or 1 or 2. i.e., there is at the most 2 branches in every node.

37. What is the difference between a stack and a Queue?

Stack – Represents the collection of elements in Last In First Out order. Operations includes testing null stack, finding the top element in the stack, removal of top most element and adding elements on the top of the stack.
Queue - Represents the collection of elements in First In First Out order.Operations include testing null queue, finding the next element, removal of elements and inserting the elements from the queue. Insertion of elements is at the end of the queue.Deletion of elements is from the beginning of the queue

38. What actions are performed when a function is called?

i)arguments are passed
ii)local variables are allocated and initialized
iii)transferring control to the function

39. What is precision?

Precision refers the accuracy of the decimal portion of a value. Precision is the number of digits allowed after the decimal point.

40. 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.

Data Structure Advanced

1. Is it possible to find a loop in a Linked list ?
a. Possilbe at O(n)
b. Not possible
c. Possible at O(n^2) only
d. Depends on the position of loop

Solution: a. Possible at O(n)
Have two pointers say P1 and P2 pointing to the first node of the list.
Start a loop and Increment P1 once and P2 twice in each iteration. At any point of time if P1==P2 then there is a loop in that linked list. If P2 reaches NULL (end of linked list) then no loop exists.

2. Two linked lists L1 and L2 intersects at a particular node N1 and from there all other nodes till the end are common. The length of the lists are not same. What are the possibilities to find N1?.

a. Solution exist for certain cases only
b. No linear solution exist
c. Linear solution is possible
d Only Non-linear solution exist.
Solution: c. Linear solution is possible
Have two pointers say P1 pointing to the first node of L1 and P2 to that of L2. Traverse through both the lists. If P1 reaches L1's last node, point it to the first node of L2 and continue traversing. Do the same thing for P2 when it reaches L2's last node. (By doing this, we are balancing the difference in the length between the linked lists. The shorter one will get over soon and by redirecting to longer list's head, it will traverse the extra nodes also.) Finally they will Meet at the Intersection node.

3. void PrintTree (Tree T)

```
{
if (T != NULL)
{
PrintTree (T-> Left);
PrintElement (T-> Element);
PrintTree (T->Right);
}
}
```

The above method 'PrintTree' results in which of the following traversal
a Inorder
b. Preorder
c. Postorder
d. None of the above
Solution: a. Inorder
Inorder:

```
void PrintTree (Tree T)
{
if (T != NULL)
{
PrintTree (T-> Left);
PrintElement (T-> Element);
PrintTree (T->Right);
}
}
```

For preorder use this order

```
PrintElement (T-> Element);
PrintTree (T-> Left);
PrintTree (T->Right);
```

For postorder use this order
PrintTree (T-> Left);
PrintTree (T->Right);
PrintElement (T-> Element);

4. Given a Binary Search Tree (BST), print its values in ascending order.

a. Perform Depth first traversal
b. Perform Breadth first traversal
c. Perform Postorder traversal
d. Perform Inorder traversal
Solution: d. Perform Inorder traversal
It is the properfy of BST and Inorder traversal.

5. Is it possible to implement a queue using Linked List ?. Enqueue & Dequeue should be O(1).

a. Not possible to implement.
b Only Enqueue is possible at O(1).
c. Only Dequeue is possible at O(1).
d. Both Enqueue and Dequeue is possible at O(1)
Solution: d. Both Enqueue and Dequeue is possible at O(1)
Have two pointers H pointing to the Head and T pointing to the Tail of the linked list. Perform enqueue at T and perform dequeue at H. Update the pointers after each operations accordingly.

6. Given a Tree, is it possible to find the greatest and least among leaves in linear time?.

a. Solution depends on the tree structure
b.Linear solution exist
c. Only Non-linear solution exist.
d. No linear solution exist
Solution: b. Linear solution exist
Have two variables Min and Max. Perform any tree traversal.Assign the first traversed leaf element to Min and Max for all other leaf elements check with these variables and update it accordingly. If a current element is <Min then update Min with that element. If it is >Min then check with Max.
Note: If you want to find the greatest and least among all nodes perform the checks for each node traversed.

7. Is it possible to find find the greatest and least value among the nodes in a given BST without using any extra variables?

a. No solution exist.
b. Solution need 2 extra variables
c. Solution exist without any extra variables
d Solution need 1 extra variable
Solution:c Solution exist without any extra variables
As per BST property, the left most node should be the least one and the rightmost node should be the greatest. In other words, the first and last node of an Inorder traversal are the least and greatest among the nodes respectively.

8. Is it possible to implement 2 stack in an array?

Condition: None of the stack should indicate an overflow until every slot of an array is used.
a. Only 1 stack can be implemented for the given condition
b. Stacks can not be implemented in array
c. 2 stacks can be implemented for the given condition.
d. 2 stacks can be implemented if the given condition is applied only for 1 stack.
Solution:c. 2 stacks can be implemented for the given condition
Start 1st stack from left (1st position of an array) and 2nd from right (last position say n). Move 1st stack towards right(i.e 1,2,3 ...n) and 2nd towards left (i.e n,n-1,n-2...1).

9. Given two keys K1 & K2, write an algorithm to print all the elements between them with K1<=K2 in a BST.

a. Solution need 2 extra spaces
b. Linear solution is possible without using any extra space
c No linear solution exist
d Solution need 1 extra space
Solution:b. Linear solution is possible without using any extra space
Perform an inorder traversal. Once you find K1 print it and continue traversal now, print all other traversed elements until you reach K2.
Note: If K1 == K2 stop once you find K1.

10. How many stacks are required to implement a Queue.

a. One
b. Two
c. Three
d. Two + one extra space.
Solution:b Two
Have two stacks S1 and S2.
For Enqueue, perform push on S1.
For Dequeue, if S2 is empty pop all the elements from S1 and push it to S2. The last element you popped from S1 is an element to be dequeued. If S2 is not empty, then pop the top element in it.

DATA STRUCTURES:

1. Is it possible to find a loop in a Linked list ?

a. Possilbe at O(n)

b. Not possible

c. Possible at O(n^2) only

d. Depends on the position of loop

Solution: a. Possible at O(n)

Have two pointers say P1 and P2 pointing to the first node of the list.

Start a loop and Increment P1 once and P2 twice in each iteration. At any point of time if P1==P2 then there is a loop in that linked list. If P2 reaches NULL (end of linked list) then no loop exists.

2. Two linked lists L1 and L2 intersects at a particular node N1 and from there all other nodes till the end are common. The length of the lists are not same. What are the possibilities to find N1?.

a. Solution exist for certain cases only

b. No linear solution exist

c. Linear solution is possible

d Only Non-linear solution exist.

Solution: c. Linear solution is possible
Have two pointers say P1 pointing to the first node of L1 and P2 to that of L2. Traverse through both the lists. If P1 reaches L1's last node, point it to the first node of L2 and continue traversing. Do the same thing for P2 when it reaches L2's last node. (By doing this, we are balancing the difference in the length between the linked lists. The shorter one will get over soon and by redirecting to longer list's head, it will traverse the extra nodes also.) Finally they will Meet at the Intersection node.

3. void PrintTree (Tree T)

```
{
if (T != NULL)
{
PrintTree (T-> Left);
PrintElement (T-> Element);
PrintTree (T->Right);
}
}
```

The above method 'PrintTree' results in which of the following traversal

a Inorder

b. Preorder

c. Postorder

d. None of the above

Solution: a. Inorder
Inorder:

```
void PrintTree (Tree T)
{
if (T != NULL)
{
PrintTree (T-> Left);
PrintElement (T-> Element);
PrintTree (T->Right);
}
}
```

For preorder use this order

```
PrintElement (T-> Element);
PrintTree (T-> Left);
```

PrintTree (T->Right);

For postorder use this order
PrintTree (T-> Left);

PrintTree (T->Right);

PrintElement (T-> Element);

4. Given a Binary Search Tree (BST), print its values in ascending order.

a. Perform Depth first traversal

b. Perform Breadth first traversal

c. Perform Postorder traversal

d. Perform Inorder traversal

Solution: d. Perform Inorder traversal
It is the properfy of BST and Inorder traversal.

5. Is it possible to implement a queue using Linked List ?. Enqueue & Dequeue should be O(1).

a. Not possible to implement.

b Only Enqueue is possible at O(1).

c. Only Dequeue is possible at O(1).

d. Both Enqueue and Dequeue is possible at O(1)

Solution: d. Both Enqueue and Dequeue is possible at O(1)
Have two pointers H pointing to the Head and T pointing to the Tail of the linked list. Perform enqueue at T and perform dequeue at H. Update the pointers after each operations accordingly.

6. Given a Tree, is it possible to find the greatest and least among leaves in linear time?.

a. Solution depends on the tree structure

b.Linear solution exist

c. Only Non-linear solution exist.

d. No linear solution exist

Solution: b. Linear solution exist
Have two variables Min and Max. Perform any tree traversal.Assign the first traversed leaf element to Min and Max for all other leaf elements check with these variables and update it accordingly. If a current element is <Min then update Min with that element. If it is >Min then check with Max.
Note: If you want to find the greatest and least among all nodes perform the checks for each node traversed.

7. Is it possible to find find the greatest and least value among the nodes in a given BST without using any extra variables?

a. No solution exist.

b. Solution need 2 extra variables

c. Solution exist without any extra variables

d Solution need 1 extra variable

Solution:c Solution exist without any extra variables
As per BST property, the left most node should be the least one and the rightmost node should be the greatest. In other words, the first and last node of an Inorder traversal are the least and greatest among the nodes respectively.

8. Is it possible to implement 2 stack in an array?
Condition: None of the stack should indicate an overflow until every slot of an array is used.

a. Only 1 stack can be implemented for the given condition

b. Stacks can not be implemented in array

c. 2 stacks can be implemented for the given condition.

d. 2 stacks can be implemented if the given condition is applied only for 1 stack.

Solution:c. 2 stacks can be implemented for the given condition
Start 1st stack from left (1st position of an array) and 2nd from right (last position say n). Move 1st stack towards right(i.e 1,2,3 ...n) and 2nd towards left (i.e n,n-1,n-2...1).

9. Given two keys K1 & K2, write an algorithm to print all the elements between them with K1<=K2 in a BST.

a. Solution need 2 extra spaces

b. Linear solution is possible without using any extra space

c No linear solution exist

d Solution need 1 extra space

Solution:b. Linear solution is possible without using any extra space
Perform an inorder traversal. Once you find K1 print it and continue traversal now, print all other traversed elements until you reach K2.
Note: If K1 == K2 stop once you find K1.

10. How many stacks are required to implement a Queue.

a. One

b. Two

c. Three

d. Two + one extra space.

Solution:b Two
Have two stacks S1 and S2.

For Enqueue, perform push on S1.

For Dequeue, if S2 is empty pop all the elements from S1 and push it to S2. The last element you popped from S1 is an element to be dequeued. If S2 is not empty, then pop the top element in it.

Algorithms Interview Questions

1. Define the concept of an algorithm.

An algorithm is any well-defined computational procedure that takes some value (or set of values) as input and produces some value (or set of values) as output. In short, it can be seen as a sequence of computational steps that transform the input into the output.

2.What are the arguments present in pattern matching algorithms?

These are the following arguments which are present in pattern matching Algorithms.
1) Subject,
2) Pattern
3) Cursor
4) MATCH_STR

5) REPLACE_STR
6) REPLACE_FLAG

3. Explain the function SUB in algorithmic notation?

In the algorithmic notation rather than using special marker symbols, generally people use the cursor position plus a substring length to isolate a substring. The name of the function is SUB.
SUB returns a value the sub string of SUBJECT that is specified by the parameters i and j and an assumed value of j.

4. In Algorithmic context how would you define book keeping operations?

Usually when a user wants to estimate time he isolates the specific function and brands it as active operation. The other operations in the algorithm, the assignments, the manipulations of the index and the accessing of a value in the vector, occur no more often than the addition of vector values. These operations are collectively called as “book keeping operations”.

5. Define and describe an iterative process with general steps of flow chart?

There are four parts in the iterative process they are
Initialization: -The decision parameter is used to determine when to exit from the loop.
Decision: -The decision parameter is used to determine whether to remain in the loop or not.
Computation: - The required computation is performed in this part.
Update: - The decision parameter is updated and a transfer to the next iteration results.

6. State recursion and its different types?

Recursion is the name given to the technique of defining a set or a process in terms of itself. There are essentially two types of recursion. The first type concerns recursively defined function and the second type of recursion is the recursive use of a procedure.

7. Define and state the importance of sub algorithm in computation and its relation ship with main algorithm?

A sub algorithm is an independent component of an algorithm and for this reason is defined separately from the main algorithm. The purpose of a sub algorithm is to perform some computation when required, under control of the main algorithm. This computation may be performed on zero or more parameters passed by the calling routine.

8. Name any three skills which are very important in order to work with generating functions.

The three most important skills which are used extensively while working with generating functions are
1)Manipulate summation expressions and their indices.
2)Solve algebraic equations and manipulate algebraic expressions, including partial function decompositions.
3)Identify sequences with their generating functions

9. What is the general strategy for Markov Algorithm?

The general strategy in a Markov Algorithm is to take as input a string x and, through a number of steps in the algorithm, transform x to an output string y. this transformation process is generally performed in computers for text editing or program compilation.

10. Define string in an algorithmic notation and an example to support it?

In the algorithmic notation, a string is expressed as any sequence of characters enclosed in single quote marks.

11. How to find median of a BST?

Find the no. of elements on the left side.
If it is n-1 the root is the median.
If it is more than n-1, then it has already been found in the left subtree.
Else it should be in the right subtree

12. What is Diffie-Hellman?

It is a method by which a key can be securely shared by two users without any actual exchange.

13. What is the goal of the shortest distance algorithm?
The goal is completely fill the distance array so that for each vertex v, the value of distance[v] is the weight of the shortest path from start to v.

14. Explain the depth of recursion?

This is another recursion procedure which is the number of times the procedure is called recursively in the process of enlarging a given argument or arguments. Usually this quantity is not obvious except in the case of extremely simple recursive functions, such as FACTORIAL (N), for which the depth is N.

15. Explain about the algorithm ORD_WORDS?

This algorithm constructs the vectors TITLE, KEYWORD and T_INDEX.

16. Which are the sorting algorithms categories?

Sorting algorithms can be divided into five categories:
a) insertion sorts
b) exchange sorts
c) selection sorts
d) merge sorts
e) distribution sorts

17.Define a brute-force algorithm. Give a short example.

A brute force algorithm is a type of algorithm that proceeds in a simple and obvious way, but requires a huge number of steps to complete. As an example, if you want to find out the factors of a given number N, using this sort of algorithm will require to get one by one all the possible number combinations.

18. What is a greedy algorithm? Give examples of problems solved using greedy algorithms.

A greedy algorithm is any algorithm that makes the local optimal choice at each stage with the hope of finding the global optimum. A classical problem which can be solved using a greedy strategy is the traveling salesman problem. Another problems that can be solved using greedy algorithms are the graph coloring problem and all the NP-complete problems.

19. What is a backtracking algorithm? Provide several examples.

It is an algorithm that considers systematically all possible outcomes for each decision. Examples of backtracking algorithms are the eight queens problem or generating permutations of a given sequence.

20. What is the difference between a backtracking algorithm and a brute-force one?

Due to the fact that a backtracking algorithm takes all the possible outcomes for a decision, it is similar from this point of view with the brute force algorithm. The difference consists in the fact that sometimes a backtracking algorithm can detect that an exhaustive search is unnecessary and, therefore, it can perform much better.

21. Describe divide and conquer paradigm.

When a problem is solved using a divide and conquer algorithm, it is subdivided into one or more subproblems which are all similar to the original problem in such a way that each of the subproblems can be solved independently. In the end, the solutions to the subproblems are combined in order to obtain the solution to the original problem.

22. Describe on short an insertion sorting algorithm.

An algorithm that sorts by insertion takes the initial, unsorted sequence and computes a series of sorted sequences using the following rules:
a) the first sequence in the series is the empty sequence
b) given a sequence S(i) in the series, for 0<=i<="" p="" style="box-sizing: border-box;">

23. Which are the advantages provided by insertion sort?

Insertion sort provides several advantages:
a) simple implementation
b) efficient for small data sets
c) adaptive - efficient for data sets that are already substantially sorted: the time complexity is O(n + d), where d is the number of inversions
d) more efficient in practice than most other simple quadratic, i.e. O(n2) algorithms such as selection sort or bubble sort; the best case (nearly sorted input) is O(n)
e) stable - does not change the relative order of elements with equal keys
f) in-place - only requires a constant amount O(1) of additional memory space
g) online - can sort a list as it receives it

24. Shortly describe the quicksort algorithm.

In quicksort, the steps performed are the following:
a) pick an element, called a pivot, from the list
b) reorder the list so that all elements with values less than the pivot come before the pivot, while all elements with values greater than the pivot come after it (equal values can go either way)
c) recursively sort the sub-list of lesser elements and the sub-list of greater elements

25. What is the difference between selection and insertion sorting?

In insertion sorting elements are added to the sorted sequence in an arbitrary order. In selection sorting, the elements are added to the sorted sequence in order so they are always added at one end.

26. What is merge sorting?

Merging is the sorting algorithm which combines two or more sorted sequences into a single sorted sequence. It is a divide and conquer algorithm, an O(n log n) comparison-based sorting algorithm. Most implementations produce a stable sort, meaning that the implementation preserves the input order of equal elements in the sorted output.

27. Which are the main steps of a merge sorting algorithm?

Sorting by merging is a recursive, divide-and-conquer strategy. The basic steps to perform are the following:
a) divide the sequence into two sequences of length
b) recursively sort each of the two subsequences
c) merge the sorted subsequences to obtain the final result

28. Provide a short description of binary search algorithm.

Binary search algorithm always chooses the middle of the remaining search space, discarding one half or the other, again depending on the comparison between the key value found at the estimated position and the key value sought. The remaining search space is reduced to the part before or after the estimated position.

29. What is the linear search algorithm?

Linear search is a method for finding a particular value in a list which consists of checking every one of its elements, one at a time and in sequence, until the desired one is found. It is the simplest search algorithm, a special case of brute-force search. Its worst case cost is proportional to the number of elements in the list; and so is its expected cost, if all list elements are equally likely to be searched for. Therefore, if the list has more than a few elements, other methods (such as binary search or hashing) may be much more efficient.

30. What is best-first search algorithm?

It is a search algorithm that considers the estimated best partial solution next. This is typically implemented with priority queues.

31. What is Huffman coding?

In computer science and information theory, Huffman coding is an entropy encoding algorithm used for lossless data compression. The term refers to the use of a variable-length code table for encoding a source symbol (such as a character in a file) where the variable-length code table has been derived in a particular way based on the estimated probability of occurrence for each possible value of the source symbol.

.Net Interview Questions

1.What is .NET?

NET is an integral part of many applications running on Windows and provides common functionality for those applications to run. This download is for people who need .NET to run an application on their computer. For developers, the .NET Framework provides a comprehensive and consistent programming model for building applications that have visually stunning user experiences and seamless and secure communication.

2.How many languages .NET is supporting now?

When .NET was introduced it came with several languages.
VB.NET,
C#,
COBOL
and
Perl, etc.

3. What is an IL?

Intermediate Language is also known as MSIL (Microsoft Intermediate Language) or CIL (Common Intermediate Language). All .NET source code is compiled to IL. IL is then converted to machine code at the point where the software is installed, or at run-time by a Just-In-Time (JIT) compiler.

4. What is code access security (CAS)?

Code access security (CAS) is part of the .NET security model that prevents unauthorized access of resources and operations, and restricts the code to perform particular tasks.

5. What is Difference between NameSpace and Assembly?

Assembly is physical grouping of logical units, Namespace, logically groups classes.
Namespace can span multiple assembly.

6. Mention the execution process for managed code.

A)Choosing a language compiler
B) Compiling the code to MSIL
C) Compiling MSIL to native code
D) Executing the code.

7. What is Microsoft Intermediate Language (MSIL)?

The .NET Framework is shipped with compilers of all .NET programming languages to develop programs. There are separate compilers for the Visual Basic, C#, and Visual C++ programming languages in .NET Framework. Each .NET compiler produces an intermediate code after compiling the source code. The intermediate code is common for all languages and is understandable only to .NET environment. This intermediate code is known as MSIL.

8. What is managed extensibility framework?

Managed extensibility framework (MEF) is a new library that is introduced as a part of .NET 4.0 and Silverlight 4. It helps in extending your application by providing greater reuse of applications and components. MEF provides a way for host application to consume external extensions without any configuration requirement.

9. Which method do you use to enforce garbage collection in .NET?

The System.GC.Collect() method.

10. What is the difference between int and int32.

There is no difference between int and int32. System.Int32 is a .NET Class and int is an alias name for System.Int32.

11. What are tuples?

Tuple is a fixed-size collection that can have elements of either same or different data types. Similar to arrays, a user must have to specify the size of a tuple at the time of declaration. Tuples are allowed to hold up from 1 to 8 elements and if there are more than 8 elements, then the 8th element can be defined as another tuple. Tuples can be specified as parameter or return type of a method.

12. What is the full form of ADO?

The full form of ADO is ActiveX Data Object.

13. What are the two fundamental objects in ADO.NET?

DataReader and DataSet are the two fundamental objects in ADO.NET.

14. What is the meaning of object pooling?

Object pooling is a concept of storing a pool (group) of objects in memory that can be reused later as needed. Whenever, a new object is required to create, an object from the pool can be allocated for this request; thereby, minimizing the object creation. A pool can also refer to a group of connections and threads. Pooling, therefore, helps in minimizing the use of system resources, improves system scalability, and performance.

15. Mention the namespace that is used to include .NET Data Provider for SQL server in .NET code.

The System.Data.SqlClient namespace.

16. Which architecture does Datasets follow?

Datasets follow the disconnected data architecture.

17. What is the role of the DataSet object in ADO.NET?

One of the major component of ADO.NET is the DataSet object, which always remains disconnected from the database and reduces the load on the database.

18. Which property is used to check whether a DataReader is closed or opened?

The IsClosed property is used to check whether a DataReader is closed or opened. This property returns a true value if a Data Reader is closed, otherwise a false value is returned.

19. Name the method that needs to be invoked on the DataAdapter control to fill the generated DataSet with data?

The Fill() method is used to fill the dataset with data.

20. What are the pre-requisites for connection pooling?

There must be multiple processes to share the same connection describing the same parameters and security settings. The connection string must be identical.

21. Which adapter should you use, if you want to get the data from an Access database?

OleDbDataAdapter is used to get the data from an Access database.

22. What are different types of authentication techniques that are used in connection strings to connect .NET applications with Microsoft SQL Server?

The Windows Authentication option

The SQL Server Authentication option

23. What are the parameters that control most of connection pooling behaviors?

Connect Timeout
Max Pool Size
Min Pool Size
Pooling

24. What is AutoPostBack?

If you want a control to postback automatically when an event is raised, you need to set the AutoPostBack property of the control to True.

25. What is the function of the ViewState property?

The ASP.NET 4.0 introduced a new property called ViewStateMode for the Control class. Now you can enable the view state to an individual control even if the view state for an ASP.NET page is disabled.

26. Which properties are used to bind a DataGridView control?

The DataSource property and the DataMember property are used to bind a DataGridView control.

27. What is the basic difference between ASP and ASP.NET?

The basic difference between ASP and ASP.NET is that ASP is interpreted; whereas, ASP.NET is compiled. This implies that since ASP uses VBScript; therefore, when an ASP page is executed, it is interpreted. On the other hand, ASP.NET uses .NET languages, such as C# and VB.NET, which are compiled to Microsoft Intermediate Language (MSIL).

28. In which event are the controls fully loaded?

Page load event guarantees that all controls are fully loaded. Controls are also accessed in Page_Init events but you will see that view state is not fully loaded during this event

29. How can we identify that the Page is Post Back?

Page object has an "IsPostBack" property, which can be checked to know that is the page posted back.

30. Which is the parent class of the Web server control?

The System.Web.Ul.Control class is the parent class for all Web server controls.

31. What are the advantages of the code-behind feature?

i)Makes code easy to understand and debug by separating application logic from HTML tags
ii)Provides the isolation of effort between graphic designers and software engineers
iii)Removes the problems of browser incompatibility by providing code files to exist on the Web server and supporting Web pages to be compiled on demand.

32. Define a multilingual Web site.

A multilingual Web site serves content in a number of languages. It contains multiple copies for its content and other resources, such as date and time, in different languages.

33. What is IIS? Why is it used?

Internet Information Services (IIS) is created by Microsoft to provide Internet-based services to ASP.NET Web applications. It makes your computer to work as a Web server and provides the functionality to develop and deploy Web applications on the server. IIS handles the request and response cycle on the Web server. It also offers the services of SMTP and FrontPage server extensions. The SMTP is used to send emails and use FrontPage server extensions to get the dynamic features of IIS, such as form handler.

34. How can you register a custom server control to a Web page?

You can register a custom server control to a Web page using the @Register directive.

35. Which ASP.NET objects encapsulate the state of the client and the browser?

The Session object encapsulates the state of the client and browser.

36. Differentiate globalization and localization.

The globalization is a technique to identify the specific part of a Web application that is different for different languages and make separate that portion from the core of the Web application. The localization is a procedure of configuring a Web application to be supported for a specific language or locale.

37. What is ViewState?

The ViewState is a feature used by ASP.NET Web page to store the value of a page and its controls just before posting the page. Once the page is posted, the first task by the page processing is to restore the ViewState to get the values of the controls.

38. Which method is used to force all the validation controls to run?

The Page.Validate() method is used to force all the validation controls to run and to perform validation.

39. What does the Orientation property do in a Menu control?

Orientation property of the Menu control sets the horizontal or vertical display of a menu on a Web page. By default, the orientation is vertical.

40. Differentiate between client-side and server-side validations in Web pages.

Client-side validations take place at the client end with the help of JavaScript and VBScript before the Web page is sent to the server. On the other hand, server-side validations take place at the server end.

41. What is garbage collection?

Garbage collection is a heap-management strategy where a run-time component takes responsibility for managing the lifetime of the memory used by objects. This concept is not new to .NET - Java and many other languages/runtimes have used garbage collection for some time.

42. What is serialization?

Serialization is the process of converting an object into a stream of bytes.Deserialization is the opposite process, i.e. creating an object from a stream of bytes. Serialization/Deserialization is mostly used to transport objects (e.g. during remoting), or to persist objects (e.g. to a file or database).

43. Where do you add an event handler?

It's the Attributesproperty, the Add function inside that property.
e.g.btnSubmit.Attributes.Add("onMouseOver","someClientCode();")

44. What do you mean by authentication and authorization?

Authentication is the process of validating a user on the credentials(username and password) and authorization performs after authentication. After Authentication a user will be verified for performing the various tasks, It access is limited it is known as authorization.

45. What is portable executable (PE) ?

The file format used for executable programs and for files to be linked together to form executable programs

46. Differences between DLL and EXE?

.exe

1.These are outbound file.
2.Only one .exe file exists per application.
3..Exe cannot be shared with other applications.

.dll
1.These are inbound file .
2.Many .dll files may exists in one application.
3. .dll can be shared with other applications.

47. What is shadowing?

Shadowing is either through scope or through inheritance. Shadowing through inheritance is hiding a method of a base class and providing a new implementation for the same. This is the default when a derived class writes an implementation of a method of base class which is not declared as overridden in the base class. This also serves the purpose of protecting an implementation of a new method against subsequent addition of a method with the same name in the base class.'shadows' keyword is recommended although not necessary since it is the default.

48. What is Method Overriding? How to override a function in C#?

An override method provides a new implementation of a member inherited from a base class. The method overridden by an override declaration is known as the overridden base method. The overridden base method must have the same signature as the override method.
Use the override modifier to modify a method, a property, an indexer, or an event. You cannot override a non-virtual or static method. The overridden base method must be virtual, abstract, or override.

49. Differences between dataset.clone and dataset.copy?

Clone - Copies the structure of the DataSet, including all DataTable schemas, relations, and constraints. Does not copy any data.
Copy - Copies both the structure and data for this DataSet.

50. What is the managed and unmanaged code in .net?

The .NET Framework provides a run-time environment called the Common Language Runtime, which manages the execution of code and provides services that make the development process easier. Compilers and tools expose the runtime's functionality and enable you to write code that benefits from this managed execution environment. Code that you develop with a language compiler that targets the runtime is called managed code; it benefits from features such as cross-language integration, cross-language exception handling, enhanced security, versioning and deployment support, a simplified model for component interaction, and debugging and profiling services.

51. Whats an assembly?

Assemblies are the building blocks of .NET Framework applications; they form the fundamental unit of deployment, version control, reuse, activation scoping, and security permissions. An assembly is a collection of types and resources that are built to work together and form a logical unit of functionality. An assembly provides the common language runtime with the information it needs to be aware of type implementations. To the runtime, a type does not exist outside the context of an assembly.

52. How do you create a permanent cookie?

Setting the Expires property to MinValue means that the Cookie never expires.

53. What's a Windows process in .NET?

Windows process is an application that's running and had been allocated memory in .NET

54. What is Delegation in .NET?

A delegate acts like a strongly type function pointer. Delegates can invoke the methods that they reference without making explicit calls to those methods.
Delegate is an entity that is entrusted with the task of representation, assign or passing on information. In code sense, it means a Delegate is entrusted with a Method to report information back to it when a certain task (which the Method expects) is accomplished outside the Method's class.

55. What is Serialization in .NET?

The serialization is the process of converting the objects into stream of bytes.
they or used for transport the objects(via remoting) and persist objects(via files and databases)

56. Difference between Class And Interface in .NET?

Class is logical representation of object. It is collection of data and related sub procedures with definition.
Interface is also a class containing methods which is not having any definitions.
Class does not support multiple inheritance. But interface can support

57. Can any object be stored in a Viewstate in .NET?

An object that either is serializable or has a TypeConverter defined for it can be persisted in ViewState.

58 What is the use of ErrorProvider Control in .NET?

The ErrorProvider control is used to indicate invalid data on a data entry form. Using this control, you can attach error messages that display next to the control when the data is invalid, as seen in the following image. A red circle with an exclamation point blinks, and when the user mouses over the icon, the error message is displayed as a tooltip.

59. How do you validate the controls in an ASP .NET page?

Using special validation controls that are meant for validation of any controle.
We have Range Validator, Email Validator in .NET to validate any control.

60. How to manage pagination in a page using .NET?

Using pagination option in DataGrid control is available in .NET. We have to set the number of records for a page, then it takes care of pagination by itself automatically.

Networking Interview Questions

1. 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.

2. What is Protocol?
A protocol is a set of rules that govern all aspects of information communication.

3. 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.

4. 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.

5. 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.

6. Name the factors that affect the performance of the network?
a.Number of Users
b. Type of transmission medium
c. Hardware
d. Software

7. 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.

8. List the layers of OSI
a. Physical Layer
b. Data Link Layer
c. Network Layer
d. Transport Layer
e. Session Layer
f. Presentation Layer
g. Application Layer

9. Which layers are network support layers?

a. Physical Layer
b. Data link Layer and
c. Network Layers

10. Which layers are user support layers?
a. Session Layer
b. Presentation Layer and
c. Application Layer

11. What is Pipelining ?
In networking and in other areas, a task is often begun before the previous task has ended. This is known as pipelining.

12. What is Piggy Backing?
A technique called piggybacking is used to improve the efficiency of the bidirectional protocols. When a frame is carrying data from A to B, it can also carry control information about arrived (or lost) frames from B; when a frame is carrying data from B to A, it can also carry control information about the arrived (or lost) frames from A.

13. What are the two types of transmission technology available?
(i) Broadcast and (ii) point-to-point

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

15. Explain RIP (Routing Information Protocol)
It is a simple protocol used to exchange information between the routers.

16. What is subnet?
A generic term for section of a large networks usually separated by a bridge or router.

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

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

19. What is simplex?
It is the mode of communication between two devices in which flow of data is unidirectional. i.e. one can transmit and other can receive.
E.g. keyboard and monitor.

20. What is half-duplex?
It is the mode of communication between two devices in which flow of data is bi-directional but not at the same time. ie each station can transmit and receive but not at the same time.
E.g walkie-talkies are half-duplex system.

21.What is full duplex?
It is the mode of communication between two devices in which flow of data is bi-directional and it occurs simultaneously. Here signals going in either direction share the capacity of the link.
E.g. telephone

22. What is sampling?
It is the process of obtaining amplitude of a signal at regular intervals.

23. What is Asynchronous mode of data transmission?
It is a serial mode of transmission.
In this mode of transmission, each byte is framed with a start bit and a stop bit. There may be a variable length gap between each byte.

24. What is Synchronous mode of data transmission?
It is a serial mode of transmission.In this mode of transmission, bits are sent in a continuous stream without start and stop bit and without gaps between bytes. Regrouping the bits into meaningful bytes is the responsibility of the receiver.

25. What are the different types of multiplexing?
Multiplexing is of three types. Frequency division multiplexing and wave division multiplexing is for analog signals and time division multiplexing is for digital signals.

26. What are the different transmission media?
The transmission media is broadly categorized into two types
i)Guided media(wired)
i)Unguided media(wireless)

27. What are the duties of data link layer?
Data link layer is responsible for carrying packets from one hop (computer or router) to the next. The duties of data link layer include packetizing, adderssing, error control, flow control, medium access control.

28. .What are the types of errors?
Errors can be categorized as a single-bit error or burst error. A single bit error has one bit error per data unit. A burst error has two or more bits errors per data unit.

29. What do you mean by redundancy?
Redundancy is the concept of sending extra bits for use in error detection. Three common redundancy methods are parity check, cyclic redundancy check (CRC), and checksum.

30. Define parity check.
In parity check, a parity bit is added to every data unit so that the total number of 1s is even (or odd for odd parity).Simple parity check can detect all single bit errors. It can detect burst errors only if the total number of errors in each data unit is odd.In two dimensional parity checks, a block of bits is divided into rows and a redundant row of bits is added to the whole block.

31. Define cyclic redundancy check (CRC).
C RC appends a sequence of redundant bits derived from binary division to the data unit. The divisor in the CRC generator is often represented as an algebraic polynomial.

32. What is hamming code?
The hamming code is an error correction method using redundant bits. The number of bits is a function of the length of the data bits. In hamming code for a data unit of m bits, we use the formula 2r >= m+r+1 to determine the number of redundant bits needed. By rearranging the order of bit transmission of the data units, the hamming code can correct burst errors.

33.Define stop and wait ARQ.
In stop and wait ARQ, the sender sends a frame and waits for an acknowledgement from the receiver before sending the next frame.

34. What do you mean by network control protocol?
Network control protocol is a set of protocols to allow the encapsulation of data coming from network layer protocol that requires the services of PPP

35. What do you mean by CSMA?
To reduce the possibility of collision CSMA method was developed. In CSMA each station first listen to the medium (Or check the state of the medium) before sending. It can't eliminate collision.

36. What do you mean by Bluetooth?

It is a wireless LAN technology designed to connect devices of different functions such as telephones, notebooks, computers, cameras, printers and so on.

37. What is IP address?
The internet address (IP address) is 32bits that uniquely and universally defines a host or router on the internet.The portion of the IP address that identifies the network is called netid. The portion of the IP address that identifies the host or router on the network is called hostid.

38. What do you mean by ALOHA ?
It is the method used to solve the channel allocation problem .It is used for:
i)ground based radio broadcasting
ii)In a network in which uncoordinated users are competing for the use of single channel.
It is of two types:
1.Pure aloha
2.Slotted aloha

39. What is Firewalls?
It is an electronic downbridge which is used to enhance the security of a network. It's configuration has two components.
i)Two routers
ii)Application gateway
the packets traveling through the LAN are inspected here and packets meeting certain criteria are forwarded and others are dropped.

40. What is Repeaters ?
A receiver receives a signal before it becomes too weak or corrupted,regenerates the original bit pattern,and puts the refreshed copy back onto the link.It operates on phycal layer of OSI model.

41. What is Bridges?
They divide large network into smaller components.They can relay frames between two originally separated LANs.They provide security through partitioning traffic.They operate on physical and data link layer of OSI model.

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

43. 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.

44. What is WDM?
WDM is conceptually the same as FDM, except that the multiplexing and demultiplexing involve light signals transmitted through fiber optics channel.

45. 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.

46. List the steps involved in creating the checksum.
a. Divide the data into sections
b. Add the sections together using 1's complement arithmetic
c. Take the complement of the final sum, this is the checksum.

47. Compare Error Detection and Error Correction:
The correction of errors is more difficult than the detection. In error detection, checks only any error has occurred. In error correction, the exact number of bits that are corrupted and location in the message are known. The number of the errors and the size of the message are important factors.

48. What are the protocols in application layer ?
The protocols defined in application layer are

- TELNET
- FTP
- SMTP
- DNS

49. What are the protocols in transport layer ?
The protocols defined in transport layer are
- TCP
- UDP

50. What do you mean by client server model ?
In client server model ,the client runs a program to request a service and the server runs a program to provide the service.These two programs communicate with each other. One server program can provide services to many client programs.

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

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

53. What is World Wide Web ?
Ans: World Wide Web is a repository of information spread all over the world and linked together.It is a unique combination of flexibility,portability,and user-friendly features .The World Wide Web today is a distributed client-server service,in which a client using a browser can access a service using a server.The service provided is distributed over many locations called web sites.

54. What is Beaconing?

The process that allows a network to self-repair networks problems. The stations on the network notify the other stations on the ring when they are not receiving the transmissions. Beaconing is used in Token ring and FDDI networks.

55. What is RAID?
A method for providing fault tolerance by using multiple hard disk drives.

56. What is NETBIOS and NETBEUI?
NETBIOS is a programming interface that allows I/O requests to be sent to and received from a remote computer and it hides the networking hardware from applications.
NETBEUI is NetBIOS extended user interface. A transport protocol designed by microsoft and IBM for the use on small subnets.

57. What is difference between ARP and RARP?
The address resolution protocol (ARP) is used to associate the 32 bit IP address with the 48 bit physical address, used by a host or a router to find the physical address of another host on its network by sending a ARP query packet that includes the IP address of the receiver.
The reverse address resolution protocol (RARP) allows a host to discover its Internet address when it knows only its physical address.

58. What is the minimum and maximum length of the header in the TCP segment and IP datagram?
The header should have a minimum length of 20 bytes and can have a maximum length of 60 bytes.

59. What are major types of networks and explain?
Server-based network: provide centralized control of network resources and rely on server computers to provide security and network administration
Peer-to-peer network: computers can act as both servers sharing resources and as clients using the resources.

60. What are the important topologies for networks?
BUS topology: In this each computer is directly connected to primary network cable in a single line.
Advantages: Inexpensive, easy to install, simple to understand, easy to extend.

STAR topology: In this all computers are connected using a central hub.
Advantages: Can be inexpensive, easy to install and reconfigure and easy to trouble shoot physical problems.

RING topology: In this all computers are connected in loop.
Advantages: All computers have equal access to network media, installation can be simple, and signal does not degrade as much as in other topologies because each computer regenerates it.

61. What is mesh network?
A network in which there are multiple network links between computers to provide multiple paths for data to travel.

62. What is difference between baseband and broadband transmission?
In a baseband transmission, the entire bandwidth of the cable is consumed by a single signal. In broadband transmission, signals are sent on multiple frequencies, allowing multiple signals to be sent simultaneously.

63. What is packet filter?
Packet filter is a standard router equipped with some extra functionality. The extra functionality allows every incoming or outgoing packet to be inspected. Packets meeting some criterion are forwarded normally. Those that fail the test are dropped.

64. What is traffic shaping?
One of the main causes of congestion is that traffic is often busy. If hosts could be made to transmit at a uniform rate, congestion would be less common. Another open loop method to help manage congestion is forcing the packet to be transmitted at a more predictable rate. This is called traffic shaping.

65. What is multicast routing?
Sending a message to a group is called multicasting, and its routing algorithm is called multicast routing.

66. What is Kerberos?
It is an authentication service developed at the Massachusetts Institute of Technology. Kerberos uses encryption to prevent intruders from discovering passwords and gaining unauthorized access to files.

67. What is passive topology?
When the computers on the network simply listen and receive the signal, they are referred to as passive because they don't amplify the signal in any way. Example for passive topology - linear bus.

68. What are the advantages of Distributed Processing?
a. Security/Encapsulation
b. Distributed database
c. Faster Problem solving
d. Security through redundancy
e. Collaborative Processing

69. Name the factors that affect the reliability of the network?
a. Frequency of failure
b. Recovery time of a network after a failure

70. 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.

Networking Advanced

1. How many numbers of addresses are usable for addressing in a Class C network?

a. 256

b. 255

c. 254

d. 258

Answer: c. 254

The number of addresses usable for addressing specific hosts in each network is always 2 power N - 2 (where N is the number of rest field bits, and the subtraction of 2 adjusts for the use of the all-bits-zero host portion for network address and the all-bits-one host portion as a broadcast address. Thus, for a Class C address with 8 bits available in the host field, the number of hosts is 254

Class A 0.0.0.0 - 127.255.255.255

Class B 128.0.0.0 - 191.255.255.255

Class C 192.0.0.0 - 223.255.255.255

Class D 224.0.0.0 - 239.255.255.255

Class E 240.0.0.0 - 247.255.255.255

2. How are the data units at Application layer is called?

a. Message

b. Datagram

c. User Datagram

d. Signals

Answer:a.Message

The data unit created at the application layer is called a message, at the transport layer the data unit created is called either a segment or an user datagram, at the network layer the data unit created is called the datagram, at the data link layer the datagram is encapsulated in to a frame and finally transmitted as signals along the transmission media

3. What protocol is used by DNS name servers? Justify.

a. TCP

b. SNMP

c. UDP d. It can use any routing protocol

Answer:c. UDP

DNS uses UDP for communication between servers. It is a better choice than TCP because of the improved speed a connectionless protocol offers. Of course, transmission reliability suffers with UDP

4. Which of the following is used to direct a packet inside an internal networks?

a. Routers

b. Modem

c. Gateway

d None of the above

Answer: a.Routers

Routers are machines that direct a packet through the maze of networks that stand between its source and destination. Normally a router is used for internal networks while a gateway acts a door for the packet to reach the 'outside' of the internal network

PHP Interview Questions

1. Who is the father of PHP ?
Rasmus Lerdorf is known as the father of PHP.

2. What is the difference between $name and $$name?
$name is variable where as $$name is reference variable like $name=sonia and $$name=singh so $sonia value is singh.

3. What are the method available in form submitting?

GET and POST

4.How can we get the browser properties using PHP?

```
<?php

echo $_SERVER['HTTP_USER_AGENT']."\n\n";
$browser=get_browser(null,true);
print_r($browser);
?>
```

5. What Is a Session?

A session is a logical object created by the PHP engine to allow you to preserve data across subsequent HTTP requests. Sessions are commonly used to store temporary data to allow multiple PHP pages to offer a complete functional transaction for the same visitor.

6. How can we register the variables into a session?

```
<?php
session_register($ur_session_var);
?>
```

7. How many ways we can pass the variable through the navigation between the pages?

Register the variable into the session
Pass the variable as a cookie
Pass the variable as part of the URL

8. How can we know the total number of elements of Array?

sizeof($array_var)
count($array_var)

9. How can we create a database using php?

mysql_create_db();

10. What is the functionality of the function strstr and stristr?

strstr() returns part of a given string from the first occurrence of a given substring to the end of the string.
For example:strstr("user@example.com","@") will return "@example.com".
stristr() is idential to strstr() except that it is case insensitive.

11. What are encryption functions in PHP?

CRYPT(), MD5()

12. How to store the uploaded file to the final location?

move_uploaded_file(string filename, string destination)

13. Explain mysql_error().

The mysql_error() message will tell us what was wrong with our query, similar to the message we would receive at the MySQL console.

14. What is Constructors and Destructors?

CONSTRUCTOR : PHP allows developers to declare constructor methods for classes. Classes which have a constructor method call this method on each newly-created object, so it is suitable for any initialization that the object may need before it is used.
DESTRUCTORS : PHP 5 introduces a destructor concept similar to that of other object-oriented languages, such as C++. The destructor method will be called as soon as all references to a particular object are removed or when the object is explicitly destroyed or in any order in shutdown sequence.

15. Explain the visibility of the property or method.

The visibility of a property or method must be defined by prefixing the declaration with the keywords public, protected or private.
Class members declared public can be accessed everywhere.
Members declared protected can be accessed only within the class itself and by inherited and parent classes.
Members declared as private may only be accessed by the class that defines the member.

16. What are the differences between Get and post methods.

There are some defference between GET and POST method
1. GET Method have some limit like only 2Kb data able to send for request
But in POST method unlimited data can we send
2. when we use GET method requested data show in url but
Not in POST method so POST method is good for send sensetive request

17. What are the differences between require and include?

Both include and require used to include a file but when included file not found
Include send Warning where as Require send Fatal Error

18. What is use of header() function in php ?

The header() function sends a raw HTTP header to a client.We can use herder() function for redirection of pages. It is important to notice that header() must be called before any actual output is seen.

19. List out the predefined classes in PHP?

Directory
stdClass
__PHP_Incomplete_Class
exception
php_user_filter

20. What type of inheritance that PHP supports?

In PHP an extended class is always dependent on a single base class,that is, multiple inheritance is not supported. Classes are extended using the keyword 'extends'.

21. How can we encrypt the username and password using php?

You can encrypt a password with the following Mysql>SET PASSWORD=PASSWORD("Password");
We can encode data using base64_encode($string) and can decode using base64_decode($string);

22. What is the difference between explode and split?

Split function splits string into array by regular expression. Explode splits a string into array by string.
For Example:explode(" and", "India and Pakistan and Srilanka");
split(" :", "India : Pakistan : Srilanka");
Both of these functions will return an array that contains India, Pakistan, and Srilanka.

23. How do you define a constant?

Constants in PHP are defined using define() directive, like define("MYCONSTANT", 100);

24. How do you pass a variable by value in PHP?

Just like in C++, put an ampersand in front of it, like $a = &$b;

25. What does a special set of tags <?= and ?> do in PHP?

The output is displayed directly to the browser.

26. How do you call a constructor for a parent class?

parent::constructor($value)

27. What's the special meaning of __sleep and __wakeup?

__sleep returns the array of all the variables than need to be saved, while __wakeup retrieves them.

28. What is the difference between PHP and JavaScript?

javascript is a client side scripting language, so javascript can make popups and other things happens on someone's PC. While PHP is server side scripting language so it does every stuff with the server.

29. What is the difference between the functions unlink and unset?

unlink() deletes the given file from the file system.
unset() makes a variable undefined.

30. How many ways can we get the value of current session id?

session_id() returns the session id for the current session.

31. What are default session time and path?

default session time in PHP is 1440 seconds or 24 minutes
Default session save path id temporary folder /tmp

32. for image work which library?

we will need to compile PHP with the GD library of image functions for this to work. GD and PHP may also require other libraries, depending on which image formats you want to work with.

33. How can we get second of the current time using date function?

```
<?php
$second = date(“s”);
?>
```

34. What are the Formatting and Printing Strings available in PHP?

printf()- Displays a formatted string
sprintf()-Saves a formatted string in a variable
fprintf() -Prints a formatted string to a file
number_format()-Formats numbers as strings

35. How can we find the number of rows in a result set using PHP?

```
$result = mysql_query($sql, $db_link);
$num_rows = mysql_num_rows($result);
echo "$num_rows rows found";
```

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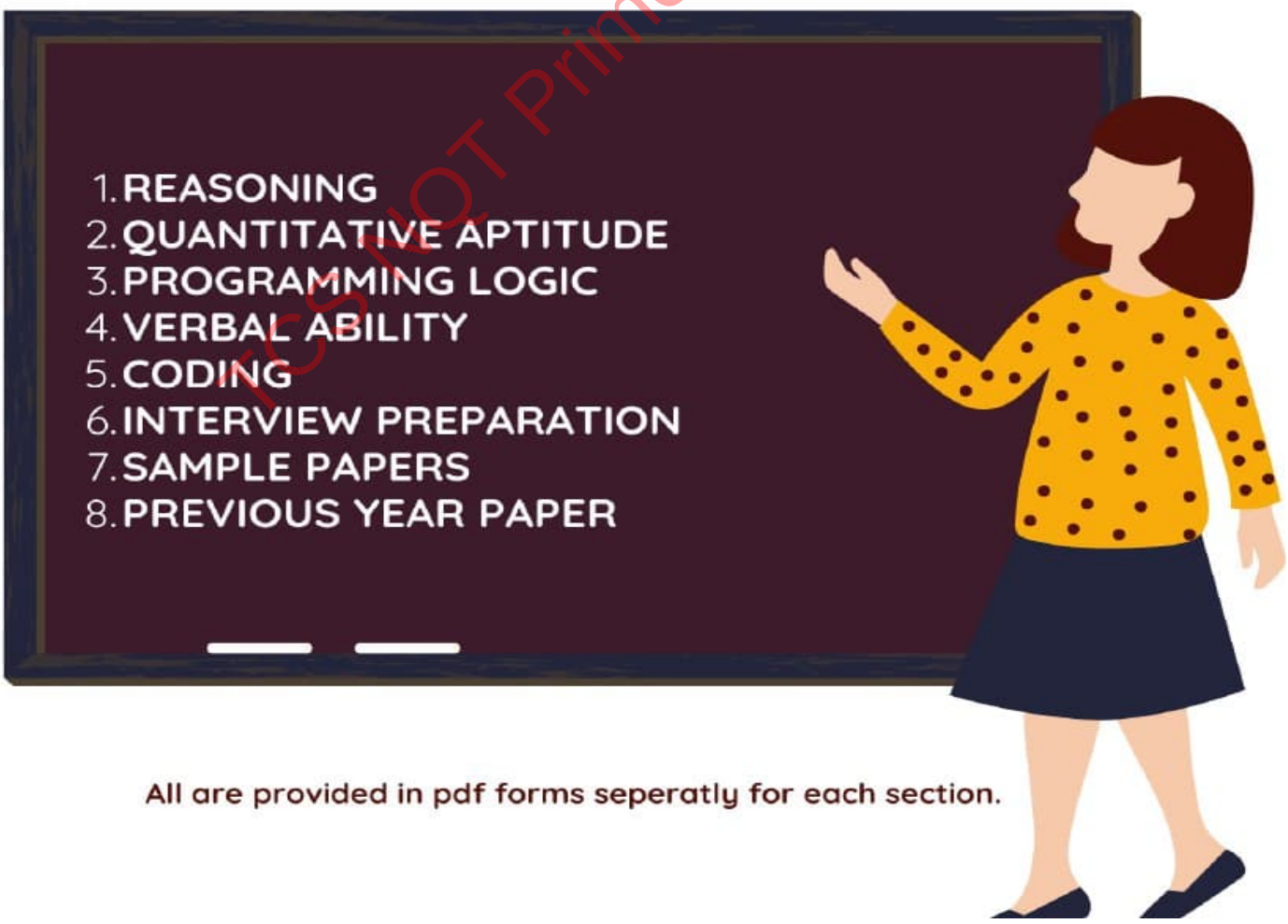

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