**Questions related to Java**

**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 un-instantiable 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.

**TCS Questions**

**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 overloadingis 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(int nX, int nY)  
    {  
      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.

**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:  
  
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.  
  
Many inconsistencies are identified and resolved before loading of information in data warehousing. This makes the reporting and analyzing process simpler.  
  
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.  
  
Because of being different from operational systems, a data warehouse helps in retrieving data without slowing down the operational system.  
  
Data warehousing enhances the value of operational business applications and customer relationship management systems.

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 will 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 Mozilla 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**

int binarySearch(int arr[],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: enum shapes{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.

# Wipro Technical Interview Questions

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;  
}

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 clustered index ?

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?

int i=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 definition in base it defined as :  
virtual void fun()=0;  
This means that this function not going to do anything, In case of pure virtual function derived function has to implement pure virtual function or redeclare it as pure virtual function

Data Structure Questions

**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 Questions

**1. How do you count number of bits in a Integer?**

1. Not Possible

2. Possible but have to convert Integer to binary format and check manually   
3. Solution exists in C   
4. Possible using assembly language

Solution: 3

int no\_of\_bits = 0;   
int given\_number;        //this is the number taken as input   
while (given\_number != 0)   
{   
if (given\_number % 2)

no\_of\_bits ++;

given\_number = given\_number >> 1;   
}

This algorithm checks if the number is zero, in which case the number of bits set will be zero, and enters ‘while’ loop if it is not zero. Every time it enters the loop it will check if the right most digit is set or not by doing mod 2 (any number mod 2 returns 1 if the right most digit is one else returns 0). If it is set then it will increment the counter by 1 and then right shifts the number by 1 digit. Like this it will check for all digits until the number becomes zero and exits the loop. When the loop exits no\_of\_bits will be the answer.

Alternate Solution:

int count = 0;

int n;         //input number

while (n)

{

n = n & (n-1);

count ++;

}

**2. Given a string, can you find the first non-repeated character in it?**

1. Solution does not exists

2. Solution exists @ O(n^2)

3. Solution exists @ O(n.logn)

Solution: 3

/\*\* declare a linked list named llist, also write basic functions to add and delete node from a linked list \*\*/

char given\_array [];                    //this is the array taken as input

add (llist, given\_array [0] );        // adds the first character of array to linked list (make sure                         //the add function appends the new value at the end)

for (int i = 1; given\_number[i]; i++)

{

do

{

if (llist->value == given\_array [i] )

delete (llist, given\_array [i] );

else

add (llist, given\_array [i] );

}while (llist = llist->next);

}

Form a linked list with the characters in the string as nodes. While adding the character to the list, check if its already existing. If it exists then delete that node from the linked list and go for the next character. Once the whole string is completed, the node at the head of the linked list contains the first non-repeated character of the string.

**3. What does the following algorithm do?**

1. Reverse an integer bit-wise. E.g., if input is 12 (00001110) output will be 01110000.

2. Reverse an Integer normally. E.g., if input is 1234, output will be 4321

3. Right Rotate a number by N positions

4. Left Rotate a number by N positions

Solution:1

int given\_number;        //this is the number taken as input   
int output\_number = 0;

for ( int i = 0; i < INTEGER\_SIZE; i++ )

{

output\_number = output\_number << 1;

if (given\_number % 2)

output\_number ++;

given\_number = given\_number >> 1;

}

**4. Given an algorithm to revers an integer. Output of 1234 should be 4321.**

1. Reverse an integer bit-wise. E.g., if input is 12 (00001110) output will be 01110000.

2. Reverse an Integer normally. E.g., if input is 1234, output will be 4321

3. Right Rotate a number by N positions

4. Left Rotate a number by N positions

Solution:2

int given\_number;        //this is the number taken as input   
int output\_number = 0;

while (given\_number != 0)

{

output\_number = output\_number \* 10;

output\_number = given\_number % 10;

given\_number = given\_number / 10;

}

**5. Can you right-rotate a string by k-positions.**

1. Not Possible in C

2. Solution exists @ O(log n)

3. Solution exists @ O(n^2)

4. Solution exists @ O(n.log n)

Solution:4

int k;            // given as input - ‘k’ position to be rotated

char input [];        // given as input

int len;            // length of the input string

for (int i = 0; i < k; i++)

{

char c = input [len - 1];

for (int j = len -1; j > 0; j++)

input [j] = input [j -1];

input [0] = c;

}

**6. Can you compare two strings whether the second string is rotated version of the first? E.g., ‘GOOGLE’ is rotated version of ‘GLEGOO’, ‘OOGLEG’, etc,.**

1. No Solution

2. Solution exists @ O(log n)

3. Solution exists @ O(n)

4. Solution exists @ O(n.log n)

Solution:3

Solution for this problem is a bit tricky one. First we have to form a circularly linked list of the two strings. Now  declare two pointers for the two lists and move both the pointers forward. If the current characters match, move both the pointers by 1 node else move only the first pointer. One more condition which has to be checked is lets say both the strings are moved by few characters and they matched but after that they are different, in this case the second pointer has to be reset to its head. At some point if both lists have same nodes for the iterations equal to length of the string then they are rotated versions else if first list reaches the end (i.e., completes traversing for the length of the string) then they are not rotated versions.

**7. What does the following algorithm do?**

int f1 (int x,int y)

{

if (!y)

return(x);

else

return(f1(y,x(mod)y);

}

1. Find X^Y

2. Find GCD of 2 Numbers

3. Find LCM of 2 Numbers

4. Find Yth element in GP of X, XY, XY2,..

Solution:2

**8. In selecting the pivot for QuickSort, which is the best choice for optimal partitioning:**

a.The first element of the array

b.The last element of the array

c.The middle element of the array

d.The largest element of the array

e.The median of the array

Solution:e

While the choices a,b,c will always not guarantee **O(NlogN)**complexity,choice d always gives quadratic run time.choice e guarantees even partition of the array.Hence it is the optimal partition.

hence the sol is e.

**9. What is the worst case scenario for QuickSort.**

1. Pivot is Maximum

2. Pivot is Median

3. Both of the above.

Solution:1

In the worst case,the pivot selected will always be the maximum element leading to quadratic time complexity.In this case as it depicts the behaviour of bubble sort,where in maximum element always bubbles to the end

**10. What the following algorithm do?**

void rep\_str (char \*str)

{

if (\*str!=NULL)

rep\_str(str+1);

printf (“%c”,str);

}

1. Prints next character of every character in the string

2. Prints the string character by character

3. Prints reverse of the string

4. Prints just last character of the string

Solution:3

OS Advanced Questions

1. What is the best solution to external fragmentation problem?

a. Mutual Exclusion

b. Synchronization

c. Priority Queue

d. Paging

Answer:d. Paging

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

2.What is the average waiting time for the following processes with non preemptive SJF (Shortes Job First).

Process    Arrival Time        Burst Time

P1        0            8  
P2        1            4  
P3        2            9  
P4        3            5

a.  6.5

b.  6.75

c.  7.5

d  7.75

*Solution: d.  7.75*

Gantt Chart for non-preemptive SJF

|  |  |  |  |
| --- | --- | --- | --- |
| P1 | P2 | P3 | P4 |

0                                8                                 12                               17                                26

Here the average waiting time is 0 + (8-1) + (17-2) + (12 - 3) = 31/4 = 7.75

3. What is the average waiting time for the following processes with preemptive SJF (Shortes Job First).

Process    Arrival Time        Burst Time

P1        0            8  
P2        1            4  
P3        2            9  
P4        3            5

1.  6.5    2.  6.75     3.  7.5      4.  7.75

*Solution: 1.  6.5*  
  
Gantt Chart for preemptive SJF

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P1 | P2 | P4 | P1 | P3 |

0                            1                             5                            10                            17                          26  
  
The average waiting time for this example is ((10-1) + (1-1) + (17-2) + (5-3))/4 = 26/4 = 6.5  
So, preemptive SJF is better than SJF.

4. Which of the following is the amount of time to execute a particular process ?

a. Throughput

b. Turnaround time

c. Waiting time

d Response time

*Answer: b Turnaround time*

Turnaround time – amount of time to execute a particular process.

5. Which of the following is the number of processes that complete their execution per time unit?

a. Throughput

b. Turnaround time

c. Waiting time

d. Response time

*Answer: a. Throughput*

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).

6. Consider a system with 12 magnetic tape drivers (TD) and 3 processes (P0,P1 and P2).  Suppose that, at time t0, process P0 is holding 5 TD, P1 is holding 2 TD and P2 is holding 2 TD and there are 3 free TDs.

Process         Maximum Needs

P0                     10

P1                     4  
P2                     9

Provide the sequence which satisfies the safety condition (non-deadlock state).  
a. P1, P0, P2

b. P2, P0, P1

c. P1, P2, P0

d. P2, P0, P1

*Solution:a. P1, P0,P2*

The sequence P1, P0, P2 satisfies the safety condition, since process P1 can immediately be allocated all its TDs and then return them (so 5 available TDs),then P0 can get all its TDs and return them (now 10 available TDs) and finally P2 could get all its TDs and return them.

Software Testing Questions

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?

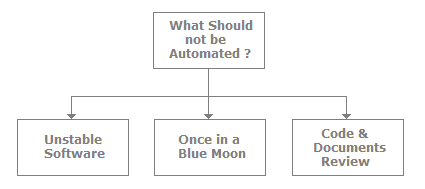
Automation is the integration of testing tools into the test environment in such a manner that the test execution, logging, and comparison of results are done with little human intervention. A testing tool is a software application which helps automate the testing process. But the testing tool is not 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:

Unstable software: If the software is still under development and undergoing many changes automation testing will not be that effective.

Once in a blue moon test scripts: Do not automate test scripts which will be run once in a while.

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.

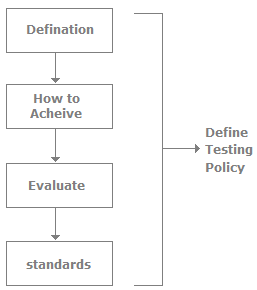
4. What is white box testing and list the types of white box testing?

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 :

Statement Coverage

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.

Verify the security holes in the code

Verify the incomplete or broken paths in the code

Verify the flow of structure according to the document specification

Verify the expected outputs

Verify all conditional loops in the code to check the complete functionality of the application

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

Unit/component/program/module testing

Integration testing

System testing

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.

Test case identifier

Scope

Features to be tested

Features not to be tested

Test strategy & Test approach

Test deliverables

Responsibilities

Staffing and training

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.

Deadlines (Testing, Release)

Test budget has been depleted

Bug rate fall below certain level

Test cases completed with certain percentage passed

Alpha or beta periods for testing ends

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 :

Equivalence Partitioning

Boundary value analysis

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?

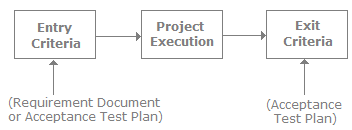
Yes, because both help detect faults and improve quality.To test a function, what has to write a programmer, which calls the function to be tested and passes it test data.

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.

Provide ideas for test process improvement.

Provide a vehicle for assessing tester competence.

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.

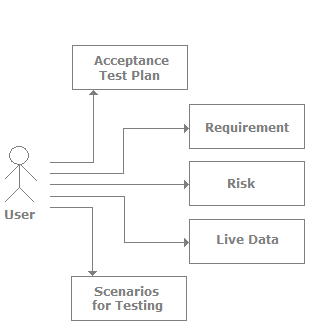
So once the tool captures the request and response, we just need to multiply the request and response with the virtual user. Virtual users are logical users which actually simulate the actual physical user by sending in the same request and response. If you want to do load testing with 10,000 users on 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.

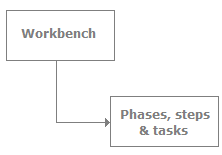
42. What is a V-Model?

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?

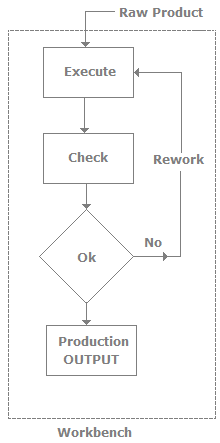
In order to understand testing methodology we need to understand the workbench concept. A Workbench is a way of documenting how a specific activity has to be performed. A workbench is referred to as phases, steps, and tasks as shown in the following figure.  


There are five tasks for every workbench:

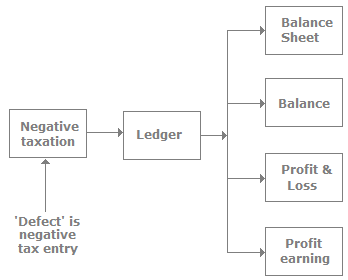
Input: Every task needs some defined input and entrance criteria. So for every workbench we need defined inputs. Input forms the first steps of the workbench.  
Execute: This is the main task of the workbench which will transform the input into the expected

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?

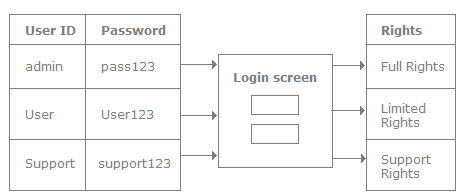
The moderator (or review leader) leads the review process. He or she determines, in co-operation with the author, the type of review, approach and the composition of the review team. The moderator performs the entry check and the follow-up on the rework, in order to control the quality of the input and 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.

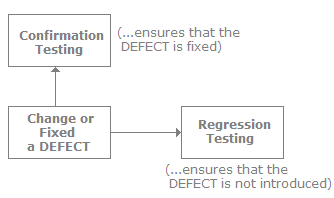
67. What is the difference between Testing Techniques and Testing Tools?

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 :

Extreme Programming (XP)

Scrum

Lean Software Development

Feature-Driven Development

Agile Unified Process

Crystal

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?

Equivalence Partitioning.

Use Case Testing.

Data Flow Analysis.

Exploratory Testing.

Decision Testing.

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:

Planning

Kick-off

Preparation

Review meeting

Rework

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

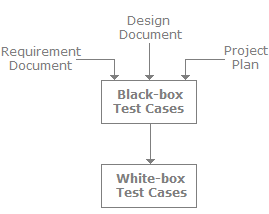
93. During the testing of a module tester ‘X’ finds a bug and assigned it to developer. But developer rejects the same, saying that it’s not a bug. What ‘X’ should do?

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:

Uncover the errors.

Verify that the software under technical review meets its requirements.

To ensure that the software must follow the predefined standards.

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.

IBS Technical Interview Questions

IBS Technical interview Questions mainly from C,C++ and DBMS. In Technical interview, be prepared about your favorite subject . Suppose they asked, Which is your favorite Subject/Programming language ? you can easily answer. So be Aware About that....

what you know about 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++.

What is an object?  
  
Object is a software bundle of variables and related methods. Objects have state and behavior.

What do you mean by inheritance?  
  
Inheritance is the process of creating new classes, called derived classes, from existing classes or base classes. The derived class inherits all the capabilities of the base class, but can add embellishments and refinements of its own.

What is polymorphism?

Polymorphism is the idea that a base class can be inherited by several classes. A base class pointer can point to its child class and a base class array can store different child class objects.

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

Anything wrong with this code?  
T \*p = new T[10];  
delete p;  
Everything is correct, Only the first element of the array will be deleted”, The entire array will be deleted, but only the first element destructor will be called.

What is Boyce Codd Normal form?  
  
A relation schema R is in BCNF with respect to a set F of functional dependencies if for all functional dependencies in F+ of the form a-> , where a and b is a subset of R, at least one of the following holds:  
\* a- > b is a trivial functional dependency (b is a subset of a)  
\* a is a superkey for schema R  
  
What is virtual class and friend class?  
  
Friend classes are used when two or more classes are designed to work together and need access to each other's implementation in ways that the rest of the world shouldn't be allowed to have. In other words, they help keep private things private. For instance, it may be desirable for class DatabaseCursor to have more privilege to the internals of class Database than main() has.  
  
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.  
  
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.  
  
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).  
  
What is the difference between declaration and definition?  
  
The declaration tells the compiler that at some later point we plan to present the definition of this declaration.  
E.g.: void stars () //function declaration  
The definition contains the actual implementation.  
E.g.: void stars () // declarator  
{  
for(int j=10; j > =0; j--) //function body  
cout << \*;  
cout <<>  
  
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.  
  
How do you write a function that can reverse a linked-list?  
  
void reverselist(void)  
{  
if(head==0)  
return;  
if(head->next==0)  
return;  
if(head->next==tail)  
{  
head->next = 0;  
tail->next = head;  
}  
else  
{  
node\* pre = head;  
node\* cur = head->next;  
node\* curnext = cur->next;  
head->next = 0;  
cur-> next = head;  
  
for(; curnext!=0; )  
{  
cur->next = pre;  
pre = cur;  
cur = curnext;  
curnext = curnext->next;  
}  
curnext->next = cur;  
}  
}  
  
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.  
  
Write a program that ask for user input from 5 to 9 then calculate the average  
  
#include "iostream.h"  
int main() {  
int MAX = 4;  
int total = 0;  
int average;  
int numb;  
for (int i=0; icout << "Please enter your input between 5 and 9: ";  
cin >> numb;  
while ( numb<5>9) {  
cout << "Invalid input, please re-enter: ";  
cin >> numb;  
}  
total = total + numb;  
}  
average = total/MAX;  
cout << "The average number is: " <<>return 0;  
}  
  
What is public, protected, private?  
  
Public, protected and private are three access specifiers in C++.  
Public data members and member functions are accessible outside the class.  
Protected data members and member functions are only available to derived classes.  
Private data members and member functions can’t be accessed outside the class. However there is an exception can be using friend classes.

What is scope & storage allocation of global and extern variables? Explain with an example

Extern variables: belong to the External storage class and are stored in the main memory. extern is used when we have to refer a function or variable that is implemented in other file in the same project.   
The scope of the extern variables is Global.  
  
Global variables: are variables which are declared above the main( ) function. These variables are accessible throughout the program. They can be accessed by all the functions in the program. Their default value is zero.

What is scope & storage allocation of static, local and register variables? Explain with an example.  
  
Register variables: belong to the register storage class and are stored in the CPU registers. The scope of the register variables is local to the block in which the variables are defined. The variables which are used for more   
number of times in a program are declared as register variables for faster access.  
Example: loop counter variables.  
register int y=6;  
Static variables: Memory is allocated at the beginning of the program execution and it is reallocated only after the program terminates. The scope of the static variables is local to the block in which the variables are defined.  
Example:  
  
#include  
void decrement(){  
static int a=5;  
a--;  
printf("Value of a:%d\n", a);  
}  
  
int main(){  
decrement();  
return 0;  
}  
Local variables: are variables which are declared within any function or a block. They can be accessed only by function or block in which they are declared. Their default value is a garbage value.

What are the advantages of using unions?

Union is a collection of data items of different data types.  
It can hold data of only one member at a time though it has members of different data types.  
  
If a union has two members of different data types, they are allocated the same memory. The memory allocated is equal to maximum size of the members. The data is interpreted in bytes depending on which member is being accessed.  
  
Example:  
  
union pen {  
char name;  
float point;  
};  
  
Here name and point are union members. Out of these two variables, ‘point’ is larger variable which is of float data type and it would need 4 bytes of memory. Therefore 4 bytes space is allocated for both the variables. Both the variables have the same memory location. They are accessed according to their type.  
Union is efficient when members of it are not required to be accessed at the same time.  
  
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\");  
}  
}

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, it’s either 1 or 2 jumps until they meet.  
  
What is virtual constructors/destructors?

Virtual destructors: If an object (with a non-virtual destructor) is destroyed explicitly by applying the delete operator to a base-class pointer to the object, the base-class destructor function (matching the pointer type) is called on the object.  
There is a simple solution to this problem – declare a virtual base-class destructor. This makes all derived-class destructors virtual even though they don’t have the same name as the base-class destructor. Now, if the object in the hierarchy is destroyed explicitly by applying the delete operator to a base-class pointer to a derived-class object, the destructor for the appropriate class is called.  
  
Virtual constructor: Constructors cannot be virtual. Declaring a constructor as a virtual function is a syntax error.

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.

Does c++ support multilevel and multiple inheritance?  
Yes.

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 sequencial access for members.

What is a template?

Templates allow to create generic functions that admit any data type as parameters and return value without having to overload the function with all the possible data types. Until certain point they fulfill the functionality of a macro. Its prototype is any of the two following ones:

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.

What is encapsulation?

Packaging an object’s variables within its methods is called encapsulation.

What is a COPY CONSTRUCTOR and when is it called?  
  
A copy constructor is a method that accepts an object of the same class and copies it’s data members to the object on the left part of assignment:  
class Point2D{  
int x; int y;  
public int color;  
protected bool pinned;  
public Point2D() : x(0) , y(0) {}//default (no argument) constructor  
public Point2D( const Point2D & ) ;  
};  
Point2D::Point2D( const Point2D & p )  
{  
this->x = p.x;  
this->y = p.y;  
this->color = p.color;  
this->pinned = p.pinned;  
}  
main(){yu  
Point2D MyPoint;  
MyPoint.color = 345;  
Point2D AnotherPoint = Point2D( MyPoint ); // now AnotherPoint has color = 345

Program: To calculate the factorial value using recursion.

Program: To calculate the factorial value using recursion.  
#include  
int fact(int n);  
  
int main() {  
int x, i;  
printf("Enter a value for x: \n");  
scanf("%d", &x);  
i = fact(x);  
printf("\nFactorial of %d is %d", x, i);  
return 0;  
}  
  
int fact(int n) {  
/\* n=0 indicates a terminating condition \*/  
if (n <= 0) {  
return (1);  
}else {  
/\* function calling itself \*/  
return (n \* fact(n - 1));  
/\*n\*fact(n-1) is a recursive expression \*/  
}  
}  
  
Output:  
Enter a value for x:4  
  
Factorial of 4 is 24

swap 2 numbers without using third variable?

#include  
void main()  
{  
int a,b;  
printf("enter number1: ie a");  
scanf("%d",a);  
printf("enter number2:ie b ");  
scanf("%d",b);  
printf(value of a and b before swapping is a=%d,b=%d"a,b);  
a=a+b;  
b=a-b;  
a=a-b;  
printf(value of a and b after swapping is a=%d,b=%d"a,b);  
}

Write a C++ Program to check whether a number is prime number or not?

#include  
#include  
  
  
void main()  
{  
clrscr();  
int n,i,flag=1;  
cout<<"Enter any number:";  
cin>>n;  
  
  
for(i=2;i<=n/2;++i)  
{  
if(n%i==0)  
{  
flag=0;  
break;  
}  
}  
if(flag)  
cout<<"\n"<<n<<" is="" a="" prime="" number";  
else  
cout<<"\n"<<n<<" is="" not="" a="" prime="" number";  
getch();  
}</n<<"></n<<">

Write a program in c to replace any vowel in a string with z?

// Replace all vowels in str with 'z'   
void replaceWithZ(char\* str) {   
int i = 0;   
while(str[i] != 'z') {   
if(isVowel(str[i])) {   
str[i] = 'z';   
}   
++i;   
}   
}   
// Returns 1 if ch is a vowel, 0 otherwise   
int isVowel(const char ch) {   
  
switch(ch) {   
case 'a':case 'A':   
case 'e':case 'E':   
case 'i':case 'I':   
case 'o':case 'O':   
case 'u':case 'U':   
return 1;   
}   
return 0;   
}   
// Sample call   
int main() {   
char str[] = "HELLO";   
printf("%s\n", str);   
replaceWithZ(str);   
printf("%s\n", str);   
return 0;   
}

Question from Java

What is the final keyword denotes?

 final keyword denotes that it is the final implementation for that method or variable or class. You can’t override that method/variable/class any more.

What is the significance of ListIterator?

 You can iterate back and forth.

What is the major difference between LinkedList and ArrayList?

 Linked List are meant for sequential accessing. ArrayList are meant for random accessing.

What is nested class?

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

What is inner class?

 If the methods of the inner class can only be accessed via the instance of the inner class, then it is called inner class.

What is composition?

 Holding the reference of the other class within some other class is known as composition.

What is aggregation?

It is a special type of composition. If you expose all the methods of a composite class and route the method call to the composite method through its reference, then it is called aggregation.

What are the methods in Object?

 clone, equals, wait, finalize, getClass, hashCode, notify, notifyAll, toString

Can you instantiate the Math class?

You can’t instantiate the math class. All the methods in this class are static. And the constructor is not public.

What is singleton? - It is one of the design pattern. This falls in the creational pattern of the design pattern. There will be only one instance for that entire JVM. You can achieve this by having the private constructor in the class. For eg., public class Singleton { private static final Singleton s = new Singleton(); private Singleton(){}public static Singleton getInstance(){return s; }// all non static methods … }

SQL Advanced

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.