**C++ Basics**

**C++  Introduction**  
  
The C++ programming language provides a model of memory and computation that closely matches that of most computers. In addition, it provides powerful and flexible mechanisms for abstraction; that is, language constructs that allow the programmer to introduce and use new types of objects that match the concepts of an application. Thus, C++ supports styles of programming that rely on fairly direct manipulation of hardware resources to deliver a high degree of efficiency plus higher-level styles of programming that rely on user-defined types to provide a model of data and computation that is closer to a human’s view of the task being performed by a computer. These higher-level styles of programming are often called data abstraction, object-oriented programming, and generic programming.  
  
**C++ History**  
In the early 1980's, also at Bell Laboratories, another programming language was created which was based upon the C language.This new language was developed by Bjarne Stroustrup and was called C++.  According to Stroustrup, the purpose of C++ is to make writing good programs easier and more pleasant for the individual programmer.When he designed C++, he added OOP (Object Oriented Programming) features to C without significantly changing the C component. Thus C++ is a "relative" of C, meaning that any valid C program is also a valid C++ program.  
  
**C++ Features**  
1)Class  
   User-defined types  
2)Operator overloading  
    Attach different meaning to expressions such as a + b  
3)References  
   Pass-by-reference function arguments  
4)Virtual Functions  
    Dispatched depending on type at run time  
5)Templates  
   Macro-like polymorphism for containers (e.g., arrays)  
6)Exceptions  
  
**C++ Structure**  
1)Introduction  
2)Memory alignment  
3)Bit Fields  
4)Using structure in Assembly

# C++ Advanced

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

a. Internal Iterators

b. External Iterators

c. Both

d. None

*Answer:b External Iterators*

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

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

a.mask  = FFFF;

  mask   = mask << p;

  output   = mask & x;

b.mask  = FFFF;

   mask   = mask << p;

   output   = mask ^ x;

c.mask  = FFFF;

   mask   = mask >> p;

   output   = mask & x

d.mask  = FFFF;

   mask   = mask >> p;

   output   = mask ^ x;;

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

a. Both are same

b Method overriding is available only in JAVA.

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

d. Both are different

*Answer:d. Both are different*

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

# C++ Interview Questions

**1.  What is C++?**

Released in 1985, C++ is an object-oriented programming language created by Bjarne Stroustrup. C++ maintains almost all aspects of the C language, while simplifying memory management and adding several features - including a new datatype known as a class (you will learn more about these later) - to allow object-oriented programming. C++ maintains the features of C which allowed for low-level memory access but also gives the programmer new tools to simplify memory management.   
C++ used for:  
C++ is a powerful general-purpose programming language. It can be used to create small programs or large applications. It can be used to make CGI scripts or console-only DOS programs. C++ allows you to create programs to do almost anything you need to do. The creator of C++, Bjarne Stroustrup, has put together a partial list of applications written in C++.

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

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

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

a. Base method   
b. Derived method  
Ans. B

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

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

**6.  What are the advantages of inheritance?**  
It permits code reusability. Reusability saves time in program development. It encourages the reuse of proven and debugged high-quality software, thus reducing problem after a system becomes functional.