Introduction to C++

Procedural Programming

In a procedural program data is typically stored in a collection of variables and there is a set of functions that perform operations on the data. The data and the functions are separate entities. Usually the variables are passed to the functions that perform the desired operations. As you might imagine, the focus of procedural programming is on creating theunctions, or procedures, that operate on the program's data. Procedural programming works well. However, as programs become larger and more complex, the separation of a program's data and the code that operates on the data can lead to problems.

Object Oriented programming

The object oriented programming design models the real world well and overcomes the shortcomings of procedural paradigm. It views a problem in terms of objects and thus emphasizes on both procedures as well as data.

An object is an entity that combines both data and procedures in a single unit. An object's data items, also referred to as its attributes, are stored in member variables. The procedures that an object performs are called its member functions. This wrapping of an object's data and procedures together is calledencapsulation.Not only objects encapsulate associated data and procedures, they also permit data hiding. Data hiding refers to an object's ability to hide its data from code outside the object. Only the object's member functions can directly access and make changes to the object's data.

- Advantages of Object oriented programming.
- Software complexity can be easily managed
- Object-oriented systems can be easily upgraded
- It is quite easy to partition the work in a project based on object

C++ programming language developed by AT&T Bell Laboratories in 1979 byBjarne Stroustrup. C++ is fully based on Object Oriented Technology i.e. C++ isultimate paradigm for the modeling of information.

- C++ is the successor of C language.
- It is a case sensitive language.
- Character Set- Set of characters which are recognized by c++compiler i.e

Digits (0-9), Alphabets (A-Z & a-z) and special characters + - * , . " '<> = { ( ]) spaceetc i.e 256 ASCII characters.

Tokens- Smallest individual unit. Following are the tokens

Keyword-**Reserve word having special meaning the language and can't be used asidentifier**.

1. asm	11. private	21. catch	30. for	40. using	50. int	60. while
2. else	12. true	22. false	31. return	41. continue	51. static_cast	61. dynamic_cast
3. new	13. break	23. register	32. union	42. if	52. volatile	62. namespace
4. this	14. export	24. typeid	33. const	43. sizeof	53. do	63. template
5. auto	15. protected	25. char	34. friend	44. virtual	54. long	
6. enum	16. try	26. float	35. short	45. default	55. struct	
7. operator	17. case	27. reinterpret_ca	36. unsigned	46. inline	56. wchar_t	
8. throw	18. extern	s	37. const_cast	47. static	57. double	
9. bool	19. public	28. typename	38. goto	48. void	58. mutable	
10. explicit	20. typedef	29. class	39. signed	49. delete	59. switch	

Literals-Value of specific data type assign to a variable or constant. Four type of Literals:

i) Integer Literal i.e int x =10ii) Floating point Literal i.e float x=123.45

iii) Character Literal i.e char x= 'a', enclosed in single quotes and single characteronly.

iv) String Literal i.e cout<<"Welcome" ,anything enclosed in double quotes

Data type- A specifier to create memory block of some specific size and type. C++offers two types of data types:

1) Fundamental type :Which are not composed any other data type i.e. int, char, float and void

2) Derived data type :Which are made up of fundamental data type i.e array, function, class,union etc

Data type conversion- Conversion of one data type into another data type. Two type of conversion i.e

i) Implicit Conversion – It is automatically taken care by complier in the case of lower range to higher range e.g. int x, char c='A' then x=c is valid i.e character value in c is automatically converted to integer.

ii) Explicit Conversion- It is user-defined that forces an expression to be of specific type.e.g. double x1,x2 and int res then res=int(x1+x2)

Variable- Memory block of certain size where value can be stored and changed during program execution. e.g. int x, float y, float amount, char c;

Constant- Memory block where value can be stored once but can't changed later on during program execution.e.g. const int pi =3.14;

cout– It is an object of ostream_withassign class defined in iostream.h header file and used to display value on monitor.

cin– It is an object of istream_withassign class defined in iostream.h header file and used to read value from keyboard for specific variable.

comment- Used for better understanding of program statements and escaped by the compiler to compile .e.g. – single line (//) and multi-line(/*….*/)

Cascading – Repeatedly use of input or output operators(">>" or "<<") in one statement with cin or cout.

Macro:#define <macro function>(parameters)function_defination not allow to use , and =

#define CNAME value OR #define CNAME (expression)

Define Macro with suitable example #define VN Value ,UnDefine Macro with suitable example #undef VN

Do NOT put a semicolon character at the end of #define statements. This is a common mistake.

Example:- Number: #define age =10, String: #define NAME "TechOnTheNet.com", Process : #define AGE (20 / 2)

Escape sequences: in Single quotes ' ' like '\','\n',\a','\t' etc

Pre Define Drived DataType : int, float, long, char, double

User Define Datatype: class, Structure,Union, Enumeration

What is Identifier ? : Any used defined name given to the program element is called as identifier. (i.e Program elements are identified by program with the identifier name)

Identifiers/variables -Names given to any variable, function, class, union etc. Naming convention(rule) for writing identifier is as under: **1. Names of functions 2. Names of arrays 3. Names of variables 4. Names of classes**

i) First letter of identifier is always alphabet.

ii) Reserve word cannot be taken as identifier name.

iii) No special character in the name of identifier except under score sign '_'.

Here are some examples of acceptable identifiers:

1.	mohd	**3.**	abc	**5.**	a_123	**7.**	e50	**9.**	J	**11.**	retVal
2.	zara	**4.**	move_na	**6.**	mynam	**8.**	_temp	**10.**	a23b9		

Some Facts About Identifier :

1. It is name given to program element.
2. Identifier is the names are given by the programmer.
3. We can give any valid name to the identifier.
4. Keywords cannot be used as Identifier.
5. Only Alphabets,Digits and Underscores are permitted.
6. Identifier name cannot start with a digit.
7. Key words cannot be used as a name.
8. Upper case and lower case letters are distinct.
9. Special Characters are not allowed
10. Global Identifier cannot be used as "Identifier".
11. An identifier is used for any variable, function, data definition etc.
12. Other special characters are not allowed for naming a variable / identifier
13. C++ is case-sensitive so that Uppercase Letters and Lower Case letters are different
14. The name of identifier cannot begin with a digit. However, Underscore can be used as first character while declaring the identifier.
15. Only alphabetic characters, digits and underscore (_) are permitted in C++ language for declaring identifier.

Valid Or Invalid Examples With Explanation Are :

Identifier	Explanation
Name	Capital Letter and Small Letters are Allowed
Name	Small Letters are allowed
name_1	Digits and Underscore is allowed along with alphabets
Int	Keywords are allowed but we have to change case of any letter or complete word
INT	Keywords are allowed but we have to change case of any letter or complete word
_SUM	Underscore at the first position is allowed in C++ language
sum_of_the_numbers	We can concatenate multiple words with underscore
firstName	Best Style to concatenate multiple words (Changing case of First Letter of Successive Word)
Identifier	We can give concept name as Identifier name
printf	As we are not going to include stdio.h header file we can use printf as identifier.
int	Keyword name cannot be given to Variable/Identifier
pow	pow() is defined in math.h. This variable is legal if we haven't included math.h in our program.
	As soon as we include math.h header file in program this identifier will be illegal.
$sum	$ sign can be used in other programming language for creating identifier, however C/C++ do not support '$' sign.
num^2	special characters are not allowed.
num 1	Spaces are not allowed in C++ programming language for declaring identifier.
2num	Digits are allowd but not as first Character
1digit	Digit at first location is not allowed
digit-1	Special characters other than underscore is not allowed
num 1	Space not allowed

Bytes	Data Type	Data Range	Description
2	int	-32,768 to 32,767	integer value
4	long int	-2,147,483,648 to2,147,483,647	integer value with an extended range
2	short int	-32,768 to 32,767	exactly the same as *int*
2	unsigned int	0 to 65,535	integer value
1	char	0 to 255	character data
4	float	3.4×10-38 to 3.4×10+38	floating point number
8	double	1.7×10-308 to 1.7×10+308	double precision floatingpoint number