S.P.M College,Udantpuri

Bachelor Of Computer Application (BCA)

Part -3 – Hira Kumar

C++ Programming

- C++ = High level language & General purpose language (किसी भी काम के लिए)
- C++ Extension of C language. OR C++ is a super set of C language.
- Designed / Developed by = Bjarne Stroustrup
- Year = 1979 (Invented) at AT&T Bell laboratories.
- C++ = Partial / Semi Object oriented language (it also support Procedure oriented language)
- Based on = Modular Programming (s/w की सबसे छोटी unit – module)
- Approach / follow – Bottom to UP
- C++ → Plateform independent source code
- Application / Used in = System Software, Video game, Embedded systems, IOT device, AI application,…
- Extension of C++ is = .cpp & .cxx
- Java is written in C++
- C++ → Best Competitive programming for beginner.
- C++ world 5th most used programming language.

(1. Python, 2. Javascript, 3. Java, 4. C#, 5. C++)

- C++ used Concept of Classes and object.
- C++ supports the OOP's = 4 pillar

  1. Abstraction (function / process को hide करके, output को display

करना)

2. Polymorphism (एक से ज्यादा form को बनाना)
3. Inheritance (किसी दुसरे की प्रॉपर्टी को अपने में शामिल करना e.g. – parent-child)
4. Encapsulation (function को binding/warpping/hide करना)

- C++ used = Compiler only (GCC(g++), MinGW, clang,MSVC)
- C++ called Earlier (before) = C with classes / C with Objects
- C++ is a case sensitive language.
- Used Compiler/Source code where C++ Run i.e. IDE (Integrated Development environment)
  - ➔ Turbo C++ / Borland C++
  - ➔ Code :: Block
  - ➔ Dev c++ (Developer C++)
  - ➔ Eclipse
  - ➔ Visual Studio Code (Microsoft)

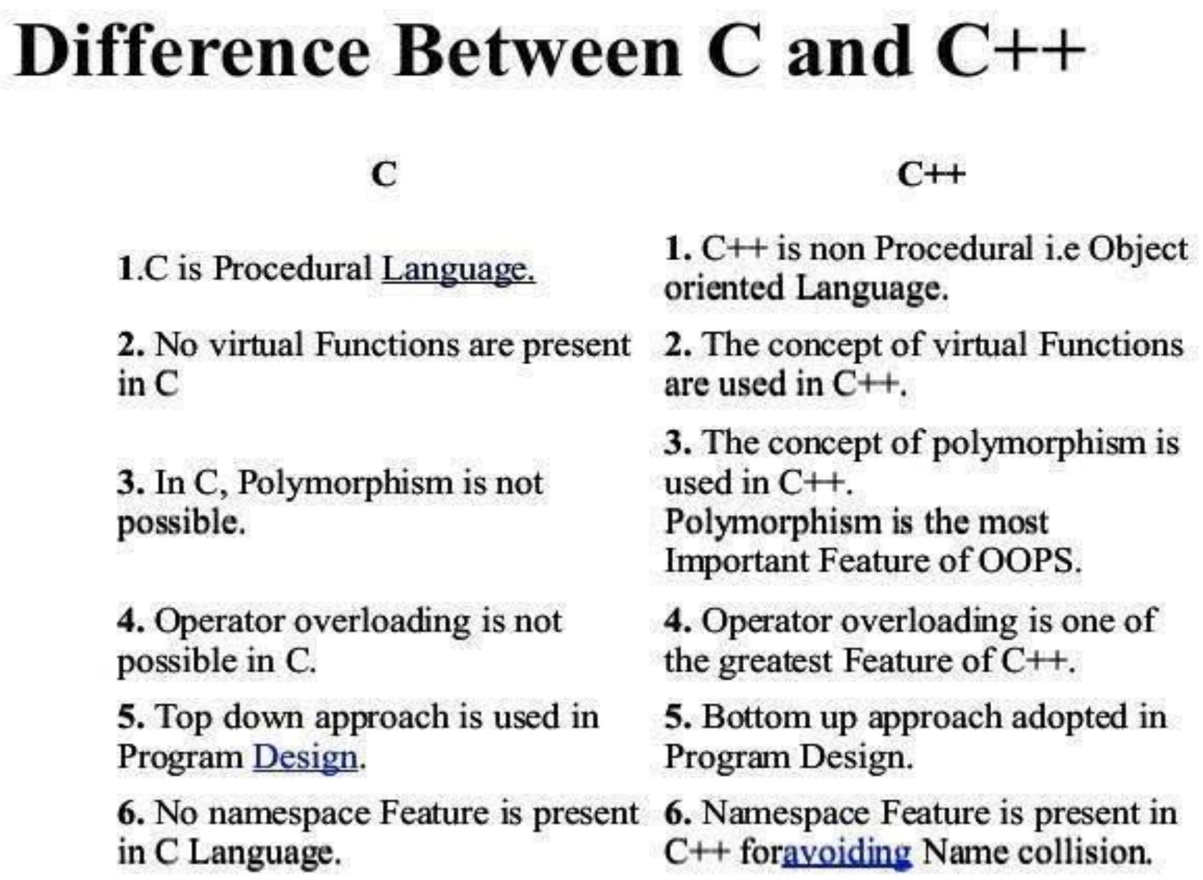
  GCC (GNU Compiler Collection)

• What is IDE ?

→Integrated Development Enviroment (एक तरह का tool box हैं, जिसमें debug,compiler,loder,linker,……..होते हैं)

IDE Consist of-

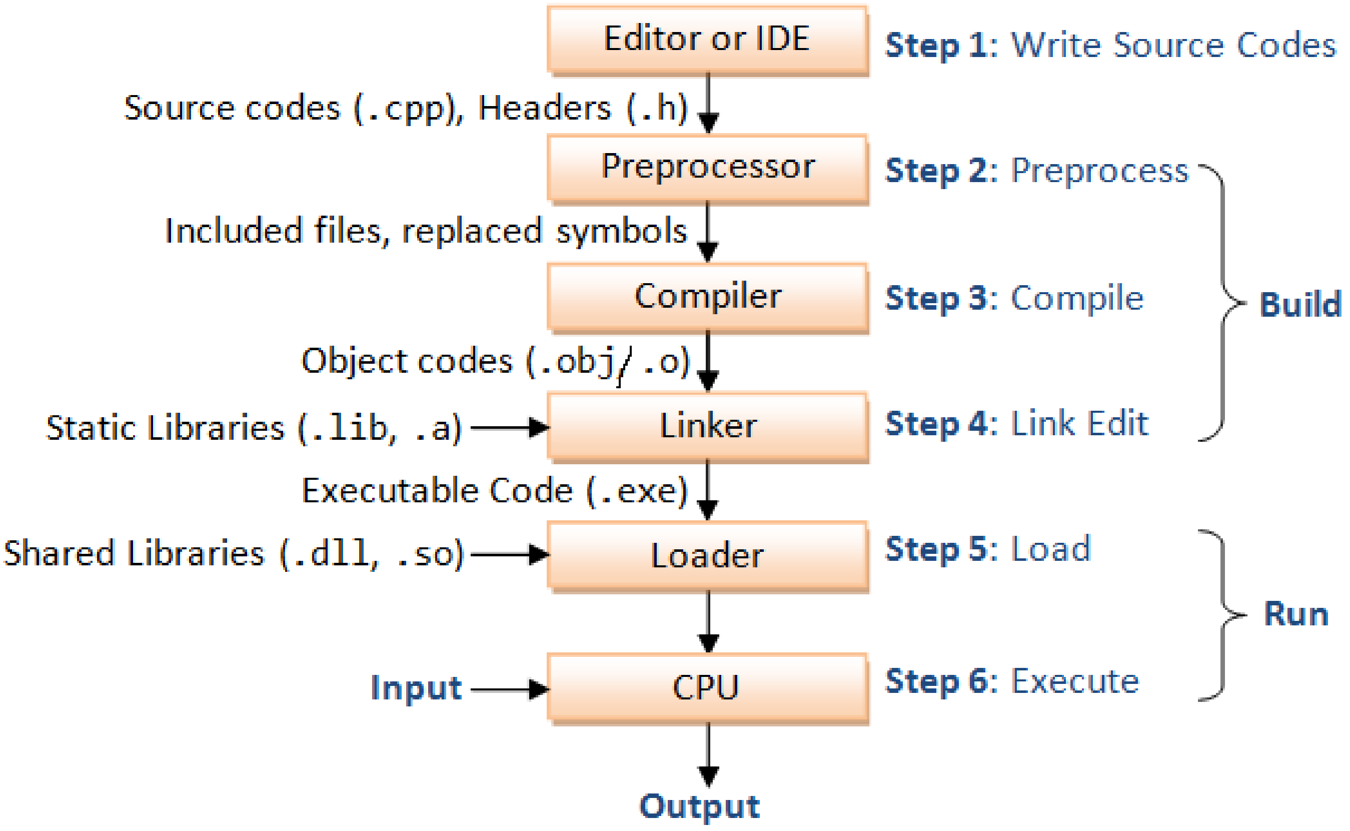
i. Source Code Editor
ii. Build Automation Tool
iii. Debugger
iv. Compiler/ Interpreter



Difference Between C and C++

C	C++
1.C is Procedural Language.	1. C++ is non Procedural i.e Object oriented Language.
2. No virtual Functions are present in C	2. The concept of virtual Functions are used in C++.
3. In C, Polymorphism is not possible.	3. The concept of polymorphism is used in C++. Polymorphism is the most Important Feature of OOPS.
4. Operator overloading is not possible in C.	4. Operator overloading is one of the greatest Feature of C++.
5. Top down approach is used in Program Design.	5. Bottom up approach adopted in Program Design.
6. No namespace Feature is present in C Language.	6. Namespace Feature is present in C++ foravoiding Name collision.

❖ C++ Flow Diagram



Step 1: Preprocessing / Preprocessor

The first step in the compilation process is preprocessing. This step is where the compiler processes the source code and performs various tasks such as **including header files, expanding macros, and removing comments.** The result of this step is a modified version of the source code, which is then passed on to the next step of the compilation process.

Step 2: Compilation (Compiler)

The next step in the compilation process is compilation. This step is where the preprocessed **source code is compiled into object code(.obj /.o) or Machine code**. Object code is a low-level representation of the code that can be executed by a computer.

During the compilation step, the compiler reads the preprocessed source code and performs the following tasks: **Syntax analysis** (grammatically correct)**, Code generation** (generates object code from the source code)**, Semantic analysis** (checking for variable declarations, function definitions, and other language-specific features). If any error then show **Compiler error**.

Step 3: Linking / Linker

The final step in the compilation process is linking. This step is where the object files are linked together to form an executable program. The linker performs the following tasks: Symbol resolution, Relocation, and Output generation.

Object file + required libraries = Executable/binary file (.exe file → Windows)

Step 4: Optimization

After the executable file is generated, it can be further optimized to improve its performance. Optimization is the process of improving the efficiency of the compiled code by making it execute faster, use less memory, or both. Optimization can be done at various levels, including the compiler, linker, and operating system.

Step 5: Debugging

The Next step in the C++ compilation process is debugging. Debugging is the process of identifying and fixing errors in the compiled code. Debugging can be done using various tools, including debuggers, profilers, and memory checkers.

Step 6: Execution (Run Program)

Execute .exe file by the CPU.

❖ Library Function

A library function in C++ is a pre-written, pre-compiled function that is part of the C++ Standard Library or other external libraries. (ऐसा लाइब्रेरी जिसमें पहले से ही लिखा होता हैं कि इस function का क्या काम हैं |)

e.g. = cin() , cout(), sqrt(), pow(), strlen(),……

❖ Header File

C++ header files are files with a **.h** extension (old compilers e.g- Turbo C++,..)without .h means **no extension** because use standard library headers like <iostream>,<vector>,… (New modern C++) that contain declarations of functions, classes, variables, and other entities. (library function को use करने के लिए हम header file का use करते हैं)

e.g. = #include <iostream> , #include <cmath>,…….

❖ Standard Library

The C++ standard library is a collection of data-structures and algorithms/methods formerly known as the Standard Template Library (STL). which must be provided with any standard-compliant implementation of C++. As a result, using the standard library is portable across different systems and compilers, and does not require downloading and linking additional libraries. It does, however, require the use of header files, as we'll see in a moment. (ये library function की तरह ही होता हैं जिसके लिए हम #include <......> के लाइन के बाद **using namespace std;** का use करते हैं, जो यह बताता हैं की जो यह function c++ standard file के अंदर मौजूद हैं ना की user द्वारा declear किया गया हैं |)

e.g.

```
 #include<iostream>
using namespace std;
```

❖ Some Library function & header function with works/purpose

Header File	**Purpose**	**Example Functions**
<iostream>	Input/output streams	cin, cout, endl

Header File	**Purpose**	**Example Functions**
<string>	String handling	length(), substr(), find()
<vector>	Dynamic arrays	push_back(), size(), at()
<algorithm>	Algorithms	sort(), reverse(), find()
<cmath>	Math functions	sqrt(), pow(), sin(), abs()
<cstdlib>	General utilities	rand(), malloc(), exit()
<ctime>	Time manipulation	time(), clock(), difftime()
<map>	Sorted associative containers	insert(), find(), erase()
<set>	Set containers	insert(), find(), count()
<queue>	Queue containers	push(), pop(), front()
<stack>	Stack containers	push(), pop(), top()
<list>	Doubly linked list	push_back(), remove(), sort()
<array>	Fixed-size array	at(), size()
<bitset>	Bit manipulation	set(), reset(), test()
<functional>	Function objects	std::function, bind, mem_fn
<thread>	Multithreading	thread, join, detach
<mutex>	Synchronization primitives	mutex, lock_guard

Header File	Purpose	Example Functions
<chrono>	Time measurement	steady_clock, duration
<fstream>	File handling	ifstream, ofstream, open()
<sstream>	String stream	stringstream, getline()
<numeric>	Numeric operations	accumulate(), iota()
<regex>	Regular expressions	regex_match(), regex_search()
<conio>	Take any key input and clrscr	Clrscr() , getch()

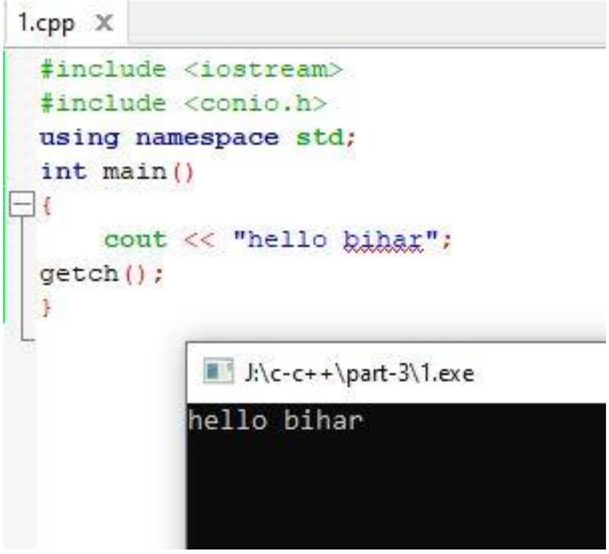
- Cin → take input from user
- Cout → print output
- Endl → change line / new line **OR** \n
- // → Single line comment
- /*………*/ → Multi line comment
- << → Insertion operator (use in cout)
- >> → Extraction operator (use in cin>

❖ Let’s Start programming in C++

Q1. Print “Hello Bihar” in C++ language.

1. #include<iostream> // For Definitions/declarations
2. Using namespace std; // for direct access from the std namespace
3. Int main()
4. {
5. Cout << “Hello Bihar”; // Works because iostream included and std namespace used

6. Return 0;
7. }

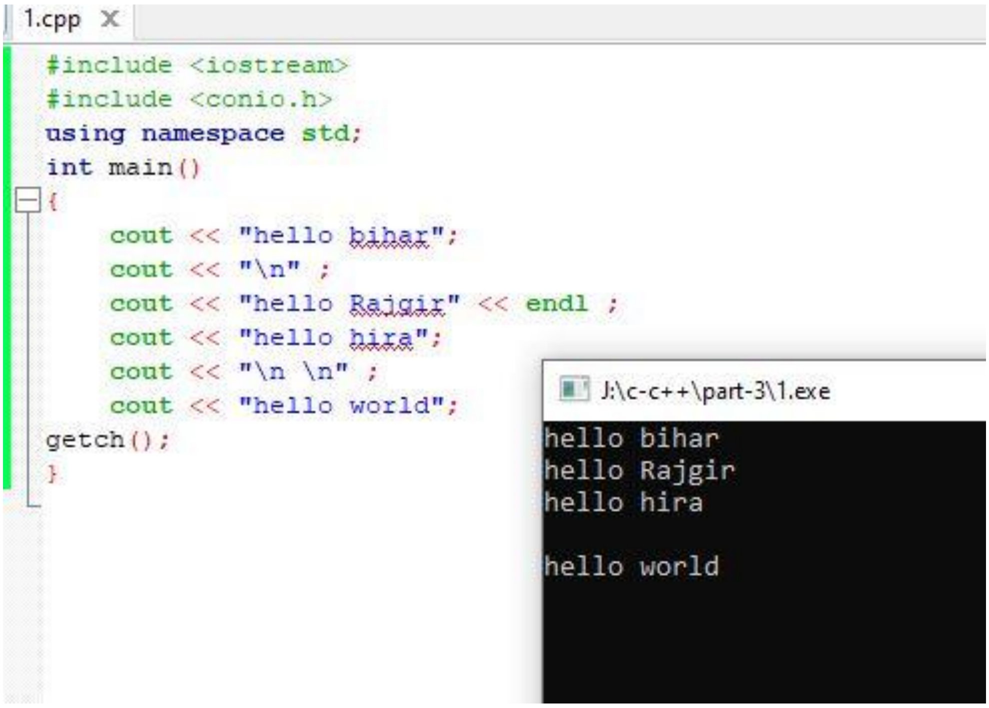


1.cpp

```cpp
#include <iostream>
#include <conio.h>
using namespace std;
int main()
{
    cout << "hello bihar";
getch();
}
```

J:\c-c++\part-3\1.exe

```
hello bihar
```



1.cpp

```cpp
#include <iostream>
#include <conio.h>
using namespace std;
int main()
{
    cout << "hello bihar";
    cout << "\n" ;
    cout << "hello Rajgir" << endl ;
    cout << "hello hira";
    cout << "\n \n" ;
    cout << "hello world";
getch();
}
```

J:\c-c++\part-3\1.exe

```
hello bihar
hello Rajgir
hello hira

hello world
```

Q2. Print Your name

Q3. Print your name,age,class,address & Gender.

=============HIRA KUMAR=====================