ALGOMANIAX

Introduction to C++

and

Competitive Coding

What is C++ ?

- Object-Oriented Programming Language

- Developed by 1979, by Bjarne Stroustrup at Bell Labs

- Evolved from C

- Most widely used language in Competitive Coding

Parts of a C++ Program

- Header files
- Preprocessor Directives
- Global Variables
- Global Functions
- Classes and Data Structures
- Main function body
  - Literals (variables)
  - Loops
  - Function calls
  - Comments

Hello, World !

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

int main()
{
    cout << "Hello, World!";
}
```

Header Files

- contain definitions of Functions and Variables

- imported or used into any C++ program

- Imported using the **#include** pre-processor directive.

- Some popular Header files we use :

  - iostream.h - Input / Output Stream

  - math.h - Contains most mathematical functions (sin, cos, abs….)

  - ctype.h - Contains functions related to characters and strings

  - algorithm.h - Some popular algorithms like sort, min, max

using namespace std;

TO MAKE CODE EASIER !

- std::cout ---> cout
- std::cin ---> cin
- std::stack --->stack
- std::queue ---> queue

Main( ) function

- The main( ) is the function where all the execution takes place at runtime.
- Necessary in a program
- Can call other defined functions from main
- Program won't compile without main( )
- Return type : int

Literals (Variables)

- Used to store values
- Need to be declared
- Have a Data Type
- Gets a fixed amount of memory in the memory space, depending upon its data type.

Declaration:

- `<data-type> <variable-name>;`
- `<data-type> <variable-name> = <initialisation value>;`

Data Types

- Defines the behaviour of a Variable.

Popular Data types :

- int - Integer variable (4 bytes)
- char - Single character variable (1 byte)
- float - Decimal integer variable (4 bytes)
- long long int (or long long) - Bigger sized integer variable (8 bytes)
- double - Bigger sized float variable (8 bytes)
- bool - Binary variable (Either true or false i.e. 0 or 1) - (1 byte)
- void - No data, generally used as return type of a function which returns nothing

Input in C++

- Done using the **cin** keyword
- Using the extraction operator: **>>**

Syntax :

cin >> var;

- Variable needs to be declared **before** using it.
- The extraction operator can be cascaded.
  - cin >> a >> b >> c;
- Input ends at a whitespace (" " or newline)

Output in C++

- Done using the **cout** keyword
- Using the insertion operator: **<<**

Syntax :

- cout << *expression*;
  - Values of variables : cout << var;
  - Strings : cout << "Hello, World!";
  - Statements : cout << 4+5;

- The extraction operator can also be cascaded.
  - cout << "The value of variable a is: " << a << endl;
- Outputs are always in continuation, unless explicitly done

Using UBUNTU terminal to run codes

To compile :

- g++ file.cpp -o outputfile.out

To run the .out file :

- ./outputfile.out

Competitive Programming

What is Competitive Programming ?

- *Competitive Coding* is a mind-sport, involving Logical and Thinking skills
- Given a problem statement, we have to code it using our Logic and implement the code with some constraints :
  - Time Limit
  - Memory Limit

What is Competitive Programming ?

- **Competitive Coding is FUN !**

A Typical Question in CP

- Problem Statements

- Input Format

- Output Format

- Constraints

- Sample Input / Output

Popular Online Websites

- CodeChef
  - www.codechef.com
- HackerRank
  - www.hackerrank.com
- SPOJ (Sphere Online Judge)
  - www.spoj.com
- CodeForces
  - www.codeforces.com

HackerRank

Tracks :

- C++ Language
- Algorithms
- Data Structures (Advanced)

Contests :

- Locally organised
- Week of Code (Long Contest)
- HourRank (Short contest)

Problems :

- One of the largest set of Problems
- Practice Section
    - Beginner, Easy, Medium, Hard, Peer
- Past Contests

Contests :

- Monthly Challenge - 10 Days Long Challenge
- Cook-Off
- Lunchtime

Practice Problems :

- https://www.hackerrank.com/challenges/cpp-hello-world/problem

- https://www.hackerrank.com/challenges/solve-me-first/problem

- https://www.hackerrank.com/contests/algomaniax-inductions/challenges/thor-on-mount-asgard

Thank You !

Next Lecture :

Conditional Statements, Arrays and Loops