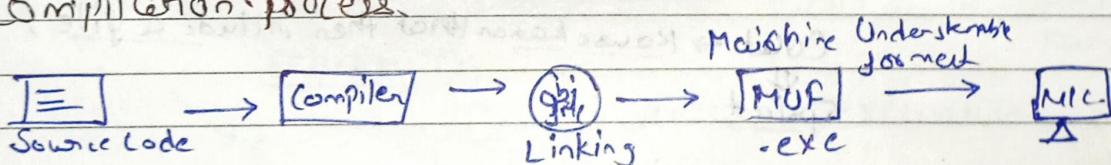


Programming Language

Why do we need it?

- A Language using which, we can instruct the computer to carry out the real life task & computations is called a Programming language. It acts as a language in which we could easily express our thoughts to the machine.
- Like natural language, Programming language has a fixed set of rules according to which programs could be written in it. These programs are then converted into a language which machines can understand. The task is carried out by a special software called Compiler.
- Every language has its own Compiler / Interpreter.
- Once a program is compiled & linked, its executable is created & the computer can run the program now.

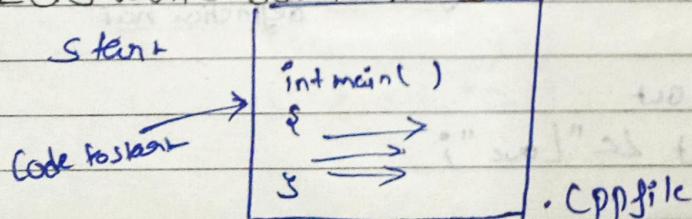
Compilation process

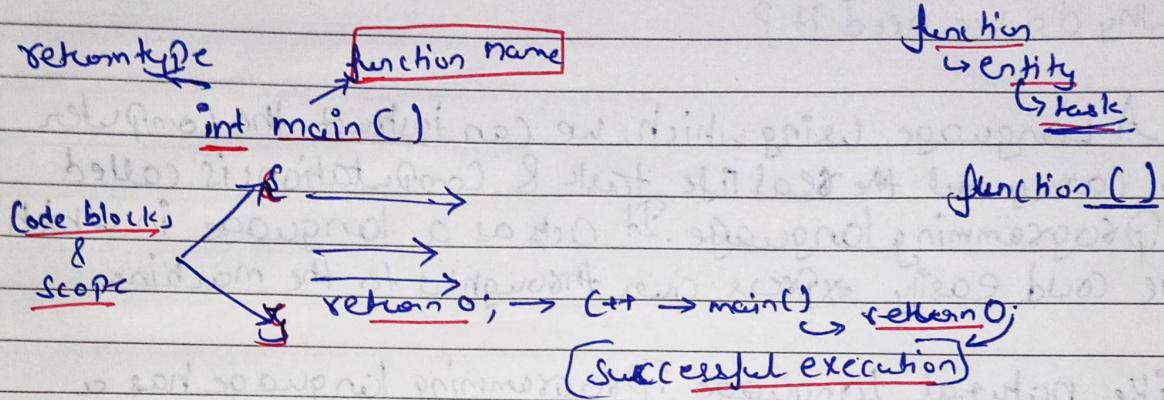
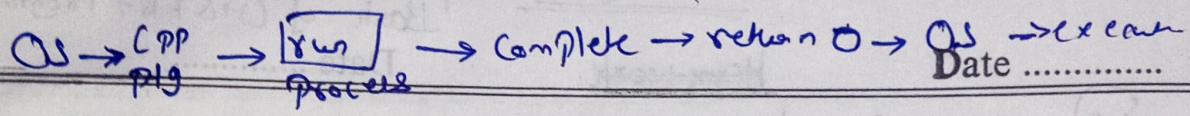


Where to code?

VS Code

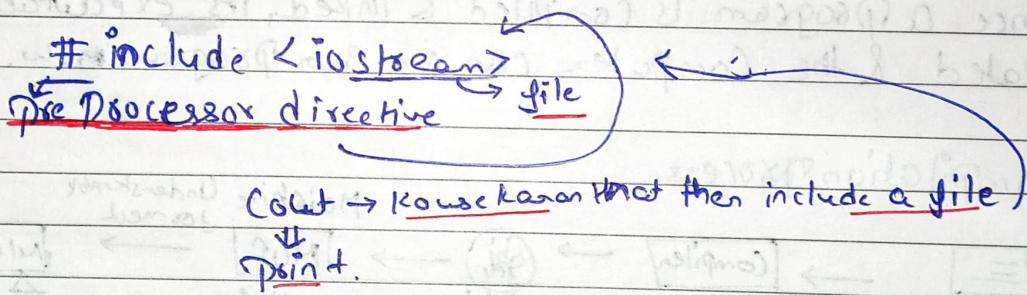
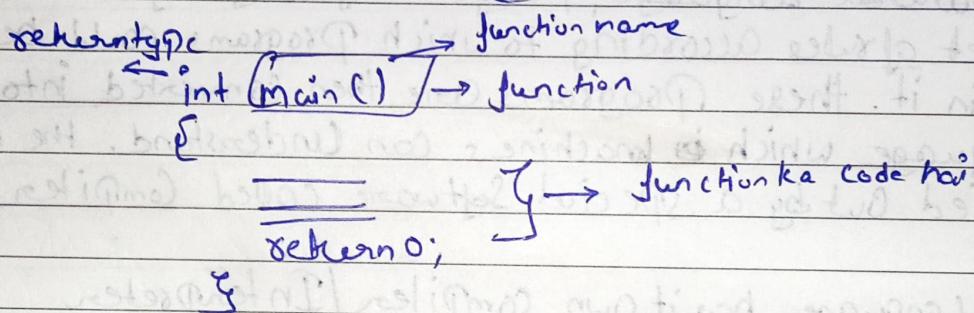
Let's write down the 1st code.





function
entity
task

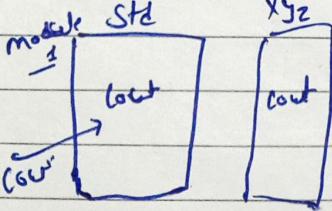
function()



#include <iostream> is the library file.
Pre Processor directive

iostream → $\begin{cases} \text{I} \rightarrow \text{input} \\ \text{O} \rightarrow \text{output} \end{cases}$
Stream related definition
function definition hai

using namespace std;



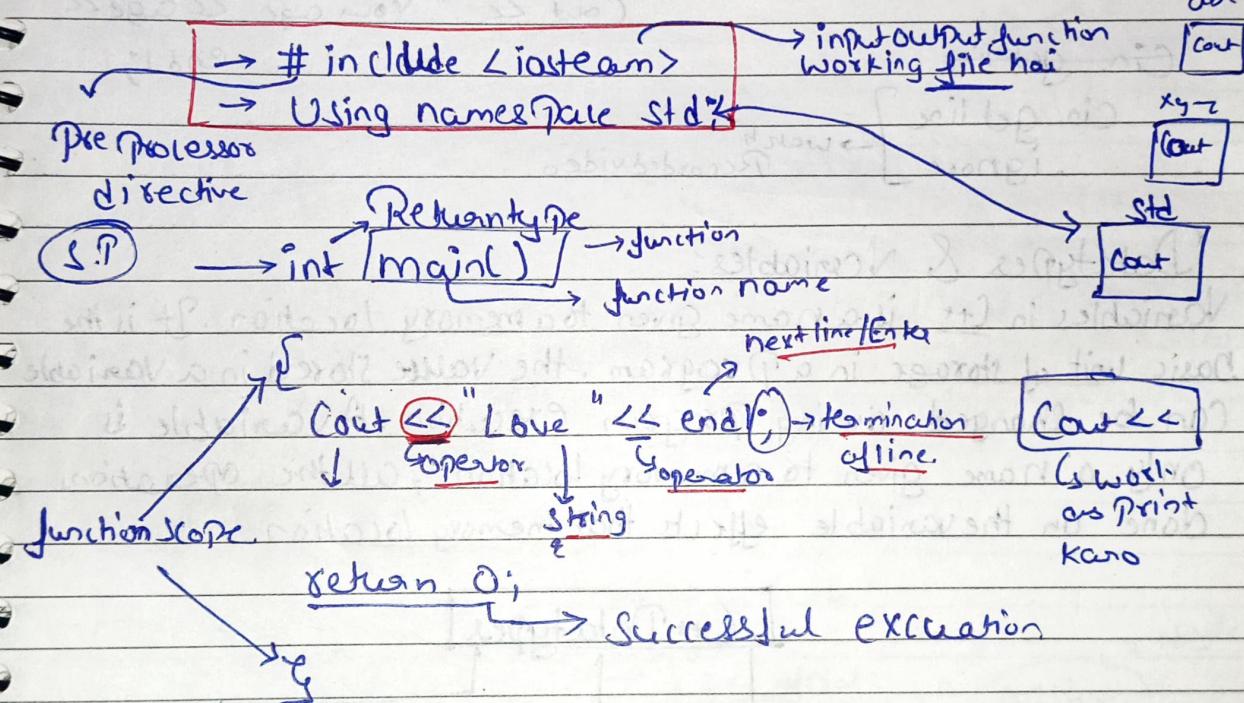
Std::cout
cout << "Loc";

Lib

Code 1

Date

```
#include <iostream>
using namespace std;
int main() {
    cout << "Namaste Duria" << endl;
    return 0;
}
```

Understand CodeFirst CodeInput/Output in C++Output

Print → `Cout << 4;`
`Cout << "4";`
`Cout << "0.1";`

Doubt

- ↓ Workflow
- RHDU
 - Google
 - Group 4
 - TA
 - Laksyathaiya

Raju age stored / var name
Date

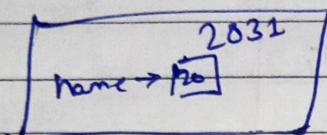
named memory location

↳ variable

input Variable

* Output → Cout <<

input → Cin >>



Age = [22] → garbage value

Cin.getline

Cin.getline
• ignore] → work Recorded video.

int age;

Cout << "Enter your age"

Raju;

Cin >> age;

Cout << "Your age" << age <<

endl;

Datatypes & Variables:

Variables in C++ is a name given to a memory location. It is the basic unit of storage in a program. the value stored in a variable can be changed during program execution. A variable is only a name given to a memory location , all the operations done on the variable effects that memory location.

C++ Datatypes

Build-in/Primitive

- Integer
- Floating
- Void
- int, char float double

Derived
Arrays
Pointers
References

User-Defined
Structure
Union
Classes
Enumeration

Date

boolean \rightarrow true $\rightarrow 1$ False $\rightarrow 0$ 1 byte \rightarrow 8 bits

$1 \text{ byte} \Rightarrow 8 \text{ bits}$

Char \rightarrow A - Z

A $\rightarrow 65$

@ $\rightarrow 64$

ASCII \rightarrow table

a $\rightarrow 97$

b $\rightarrow 98$

c $\rightarrow 99$

d $\rightarrow 100$

Data type.

\hookrightarrow Integer \rightarrow +ve $\rightarrow 1, 2, 3, 4, 5, \dots$

0 $\rightarrow 0$

-ve $\rightarrow -1, -2, -3, -4, \dots$

int \rightarrow 4 bytes \Rightarrow 32 bits

1 byte \Rightarrow 8 bits

4 bytes \Rightarrow 32 bits

0.1, 1.1, 11.2, 13.4

13.422 float \rightarrow 4 bytes

Double \rightarrow 8 bytes

13.43328789 double

Type of Data

Data type \rightarrow Size of Data.

0, 1, 2, 3 \rightarrow 4 bytes

4 bytes

0, 1, 0, 1
1, 0 \rightarrow 8 bits

8 bits

1, 1, 1, 1
1, 1, 1, 1 \rightarrow 16 bits

16 bits

xyz \rightarrow size $\rightarrow m$ bytes

8xm bits.

$\boxed{\text{total bits} = 8m \rightarrow n}$

$P_C \Rightarrow 2^n$

Date

$$4 - 2^4$$

$$4 - 1 - 2^4 - 1$$

$$0 - 2^4 - 1$$

* Signed

$$-2^{n-1} \rightarrow 2^{n-1} - 1$$

* Unsigned

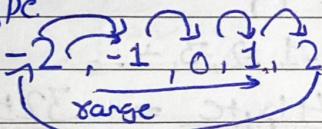
$$0 \rightarrow 2^n - 1$$

Short

$$\begin{array}{ccccccc} .32768 & -32767 & -32766 & \downarrow & \downarrow & 32767 & 32468 \\ & & & & & 32469 & \\ & & & & & & 32770 \end{array}$$

xyz

datatype



1	$\rightarrow 1$
2	$\rightarrow 2$
3	$\rightarrow -2$
4	$\rightarrow -1$
5	$\rightarrow 0$
6	$\rightarrow 1$
7	$\rightarrow 2$
8	$\rightarrow -2$
9	$\rightarrow -1$

Char \rightarrow Size \rightarrow 1 byte \rightarrow 8 bits

$$\boxed{\begin{matrix} 0/1 & 0/1 & 0/1 & 0/1 & 0/1 & 0/1 & 0/1 & 0/1 \\ 2 \times 2 & \times 2 \end{matrix}}$$

$\Rightarrow 2^8$
 $\Rightarrow 256$

$$0 \text{ to } 2^8 - 1 \Rightarrow 0 \text{ to } 255$$

Char \rightarrow 1 byte \rightarrow 8 bits.

$$\begin{array}{ll} \text{Signed} & \rightarrow \boxed{0 \rightarrow 2^8 - 1} \rightarrow 0 - 2^8 - 1 \\ \text{Signed} & \rightarrow 2^{n-1} \rightarrow 2^{n-1} - 1 \rightarrow 0 - 256 - 1 \\ & \cdot - 2^{8-1} \rightarrow 2^{8-1} - 1 \rightarrow 0 - 255 \end{array}$$

$$\hookrightarrow -2^7 \rightarrow 2^7 - 1$$

$$\underline{-128 \rightarrow 127}$$

$$\begin{array}{r} 128 \\ + 127 \\ \hline 255 \end{array}$$

int

$$4 \text{ byte} \rightarrow 32 \text{ bits}$$

1 integer show

Date

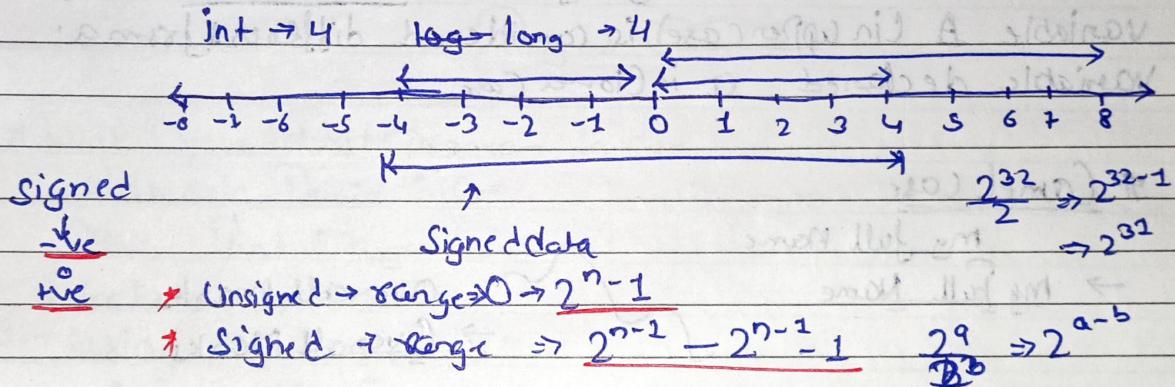
00000000 10000000 10000000 00000001] ← ③

1st byte 2nd byte 3rd byte 4th byte

Total Combination (T.C.) → 2^{32} Combination

(Unsigned) data → $0 \rightarrow 2^{32}-1$

Signed Unsigned

Long → 8 byte → 64 bitstotal Combination → 2^{64} n=64Unsigned → $0 - 2^n - 1 \rightarrow 0 \rightarrow 2^{64} - 1$ Short → 2 byte → 16 bitsT.C. → 2^{16} [n=16] $1 \rightarrow 2^{16}-1$ $2^{16} \rightarrow 2^{16-1} \Rightarrow 2^{15}$ Unsigned → $0 \rightarrow 2^{16}-1$ Signed → $-2^{15} \rightarrow 2^{15}-1 \Rightarrow -2^{n-1} \rightarrow 2^{n-1}-1$

float/double

int → Signed → $2^{32}-1$ $2^{32}-1$

Char

 $\hookrightarrow -128 \rightarrow 127$
 $\hookrightarrow 130$ Out of Range 2^{100}

* Variable Naming Convention.

Naming Convention & rules for variables are:-

- 1) It should begin with an Alphabet
- 2) There may be more than one alphabet but with out any space between them.
- 3) Digits may be used but only after Alphabet.
- 4) No Special symbol can be used except the underline score (-) symbol. When multiple words are needed, an underline should separate them.
- 5) No keyword or Command can be used as a variable name. (Reversed Key word)
- 6) All statements in C language are case sensitive, thus a variable A (in uppercase) is considered different from a variable declared a in lower case.

Camel Case

my full Name
 → my Full Name



→ Overall Marks
 → Overall Marks

Brain Teaser #1:

65 → 4 byte
 (65) → 'A' → 1 byte
 Compiler 20 Kaise Data

00000000	00000000	00000000	00110101
----------	----------	----------	----------

datatype → int → 4 byte.
 → Char → 1 byte

How Data is stored?

+ve or -ve integers?

Date

Signed vs Unsigned Data

`int age = 5;` Unsigned int age = 5;

↙
Signed +ve, 0, -ve

Operators:

- Arithmetic
- Relational
- Assignment
- Logical
- Bitwise

Homework

Recorded lecture watch Karan hai

→ Binary → 0/1 → Decimal → 0 →

- 32 bits vs 64 bit Architecture.
- Type Casting : Implicit vs Explicit
- Number System : Binary & Decimal.