Data Structures & Algorithms

User Input / Output

#include <iostream>
For taking inputs in cpp

Skelton
#include<iostream>
 int main(){

return 0;
}

Printing
Std :: cout << “string” ;

use : using namespace as std for printing conviently

Library
For all libraries using together
#include<bits/stdc++.h>

Data types

Committing
// or /* */

Int is a data type
It can only store -2,147,483,648 to 2,147,483,647 or -10pow9 to 10pow9

Beyond this use long
Usage long x = 10; -10pow12 to 10pow12

More bigger use long long
Usage long long x = 100 -10pow18 to 10pow18

Float is a decimal point and can also take int values and print int.
Double bigger storage for a decimal

Strings names or characters;
Usage string s1 = “hello”

Internal function for string
getline(cin,s1)

Char is a storage of a single alphabet or a character
Usage char c = a;

If else statements

Skelton

If else
```
if(cond){

}
else {

}
```

If else if
```
if(cond){

}
else if(cond){

}
else{

}
```

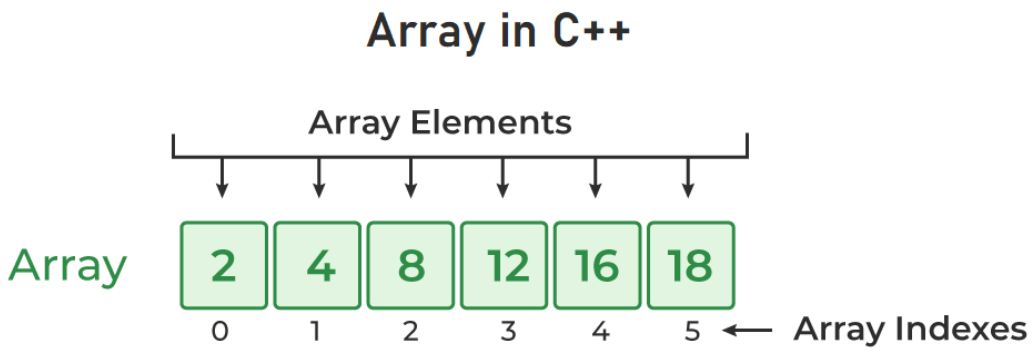
Multiple condition &&, Equals to ==, or ||
Greater than > , lesser than <
Greater that or equal to >= , lesser than or equal to <=

Switch statements
```
switch (cond){
        case 1:
                cout << ;
        case 2:
                cout << ;
        default:
                cout << if no cond satisfies this prints
```

Break statements
Ends the loops or a conditions or the flow

Continue statements
Cont the flow or loops or a conditions

Array



Usage int arr[]
char arr[]
float arr[]

2D Array

int arr[row][col]

If value is not stored in the array then it return a garbage value

String
string s= “vinay”;
access= s[0], s[1]

Length of a string
Len = a.size()

Loops
For loops

for (intizialize;cond;increment/decrement){
body
}

While loops
Intizilaize
while(cond){

Body
increment/decrement

}

Do while
At least run for one time

Initizalize
do{

Body
increment/decrement

}while(cond)

Functions

- Which modularize code
- Increases the readability
- Used for running the same code multiple number of times
- Void , return, parameterized, non parameterized.

Skeleton of function
void func_name(data type parameter){

Body

}

Int main(){

Body
func_name(parameter)

}

If a function is not having return function while using int function and main tries to print it then it returns a garbage value.

Pass by value
The value gets stored by the main and just send a copy to the function.

Pass by reference
Passes the main value and can be edited by the function by using **&** in the functions parameter
With or without **&** the values in main will be effected for the arrays.

Time complexity

It is not the time take for a code to run.
Because the system configuration is the one which tells us how much time the code run,if it a new and powerful cpu it will take less time and old one takes more time.

Def:- rate of which the time taken increases with respect to the input size.

Big O Notation
Calc the worst scenario
Avoid constants
Avoid lower values. (remove the + or adding constants)

sum of n natural numbers (n*(n+1))/2 = n^2/2+n/2

Space complexity
Memory space , big O notation Auxiliary space + Input Space

Auxiliary Space = Space that you take to solve the problem
Input Space = the space that you take to store the input .

Mostly online server takes 1 sec = 10^8
2sec = 2*10^8