MNNIT
COMPUTER CODING
CLUB

CLASS–1

Introduction to Programming

Installation And Setups

- For Windows
- https://www.youtube.com/watch?v=fsmVbLMzBoo&ab_channel=ProgrammingKnowledgeII
- For gcc compiler in Linux：
- https://www.youtube.com/watch?v=cotkJrewAz0&ab_channel=ProgrammingKnowledge2
- VS code installation：
- https://code.visualstudio.com/download

Programming Language: C++

- C++ was released in 1985 a modification to C which was developed by Dennis Ritche in 1972.
- It was not named C+ but C++, because of the increment operator.
- C++ introduces the concept of Object Oriented Programming, which is not present in C.
- MySQL, world's most popular database is written in C++.
- C++ is extensively used by NASA.
- C++ has a very rich library support. (what is a library?)
- Initially C++ was called 'The New C'.
- A large chunk of YouTube is written in C++.
- C++ is the core of Unity3D, used for making games.

Should I learn C or C++ ?

- C is a fundamental language, it is used in creating Operating Systems, embedded devices, kernels and drivers.
- C is the root language for C++, so why not first learn C rather than C++?
- C++ can be used in gaming, graphics, web browsers and with help of object oriented programming, it can be used in creating software as well.

REASONS TO USE C++ :

- More applications are written entirely in C++ rather than C, even operating systems that use C at their core are known for having C++ for boosting complexity and functionality.
- One of the biggest reasons to use C++ is the library functions that help us to focous on logic rather than remembering code.

C Code for implementing Stack Data Structure

VS

Stack in C++ STL

```c
#include <stdio.h>
int MAXSIZE = 8;
int stack[8];
int top = -1;

/* Check if the stack is empty */
int isempty(){
   if(top == -1)
      return 1;
   else
      return 0;
}

/* Check if the stack is full */
int isfull(){
   if(top == MAXSIZE)
      return 1;
   else
      return 0;
}

/* Function to return the topmost element in the stack */
int peek(){
   return stack[top];
}

/* Function to delete from the stack */
int pop(){
   int data;
   if(!isempty()) {
      data = stack[top];
      top = top - 1;
      return data;
   } else {
      printf("Could not retrieve data, Stack is empty.\n");
   }
}

/* Function to insert into the stack */
int push(int data){
   if(!isfull()) {
      top = top + 1;
      stack[top] = data;
   } else {
      printf("Could not insert data, Stack is full.\n");
   }
}
```

47 Lines

```c
#include <iostream>
#include <stack>
using namespace std;
int main() {
    stack<int> stack;
}
```

1 Line

Hello World Program

Step 1: Type this code in a code editor. You can use Sublime Text , notepad, VS Code or any other editor of your choice.

Step 2: Create a folder named practice in desktop.

Step 3: Save the file with name helloworld.cpp in this folder.

Step 4: Type command

- g++ helloworld.cpp
- Check for any error

Step 5: To run the program type command

- .\a.exe (for windows)
- ./a.out (for linux)

```cpp
#include <iostream>
using namespace std;
int main()
{
    cout << "Hello World";
    return 0;
}
```

Output:

```
Hello World
```

Points To Notice about structure of a C++ program:

- Preprocessor directives (#)
- Header File
- namespace std
- main Function
- return at the end of program.

Components of C++ Program

1. #include<iostream>

This line is like telling your program, "Hey, I need some basic tools for talking to the screen." It includes a toolkit for input and output, which allows the program to display messages or read user input.

2. Using namespace std;

Think of this as saying, "I'm going to use some common names from a big library of functions and objects, so I don't have to mention the library's full name every time." It's like saying "Just call me Bob" instead of "Call me Robert from the Smith family."

3. int main()

This is where the magic happens! It's the main function, and every C++ program starts running from here. When the program runs, it starts from the first line inside this `main()` block. The word "int" here just means that the function will give a number back when it's done.

4. return 0;

At the end, this line says, "I'm done, and everything went fine." When you see `return 0`, it means the program finished successfully. If there were any issues, a different number might be used.

Components of A C++ Program

#include <iostream>	#include is **a preprocessor directive that tells the preprocessor to include header files in the program**
using namespace std;	using namespace statement just means that in the scope it is present, make all the things under the std namespace available without having to prefix std:: before each of them.
int main()	main() function is **the entry point of any C++ program**. When a C++ program is executed, the execution control goes directly to the main() function. Every C++ program have a main() function.
return 0;	A return 0 means that **the program will execute successfully and did what it was intended to do**.

Tokens in Program

- When the compiler is processing the source code of a C++ program, each group of characters separated by white space is called a **token**

- Tokens are the smallest individual units in a program.

- A C++ program is written using tokens. It has the following tokens:
  - Keywords
  - Identifiers
  - Constants
  - Strings
  - Operators

Keywords in C++

- Keywords(also known as reserved words) have special meanings to the C++ compiler and are always written or typed in short(lower) cases.

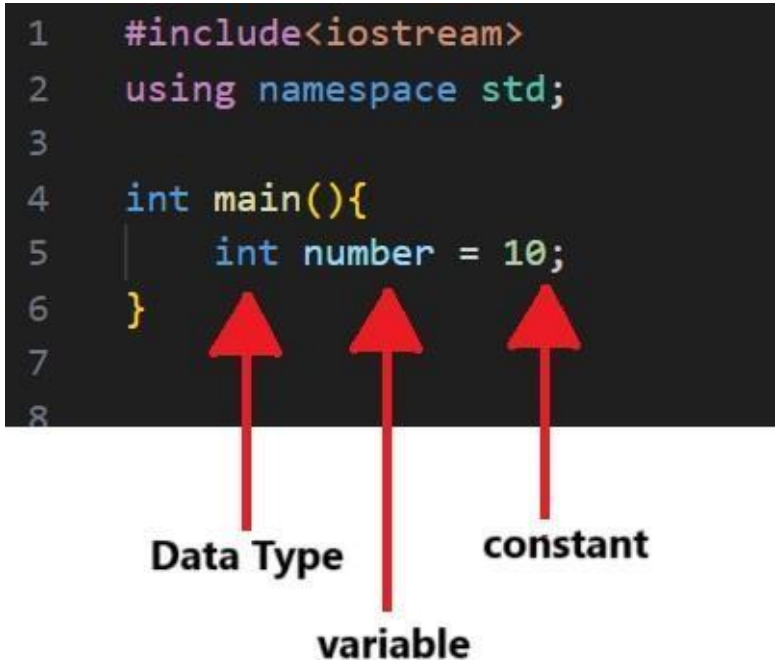
- There are 95 keywords in C++, of which around 30 are unavailable in the C language.

asm	auto	bool	break
case	catch	char	class
const	const_cast	continue	default
delete	do	double	dynamic_cast
else	enum	explicit	export
extern	false	float	for
friend	goto	if	inline
int	long	mutable	namespace
new	operator	private	protected
public	register	reinterpret_cast	return
short	signed	sizeof	static
static_cast	struct	switch	template
this	throw	true	try
typedef	typeid	typename	union
unsigned	using	virtual	void
volatile	wchar_t	while	

Some Commonly used keywords

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
- In C++, all the variables must be declared before use.



IDENTIFIERS

- Identifiers are used as the general terminology for the naming of variables, functions and arrays.
- Rules for naming Identifiers
  - They must begin with a letter or underscore(_).
  - They must consist of only letters, digits, or underscore. No other special character is allowed.
  - It should not be a keyword.
  - It must not contain white space.
  - It should be up to 31 characters long as only the first 31 characters are significant.
  - main: method name.
  - a: variable name.

What Commands do you give to your Computers ?

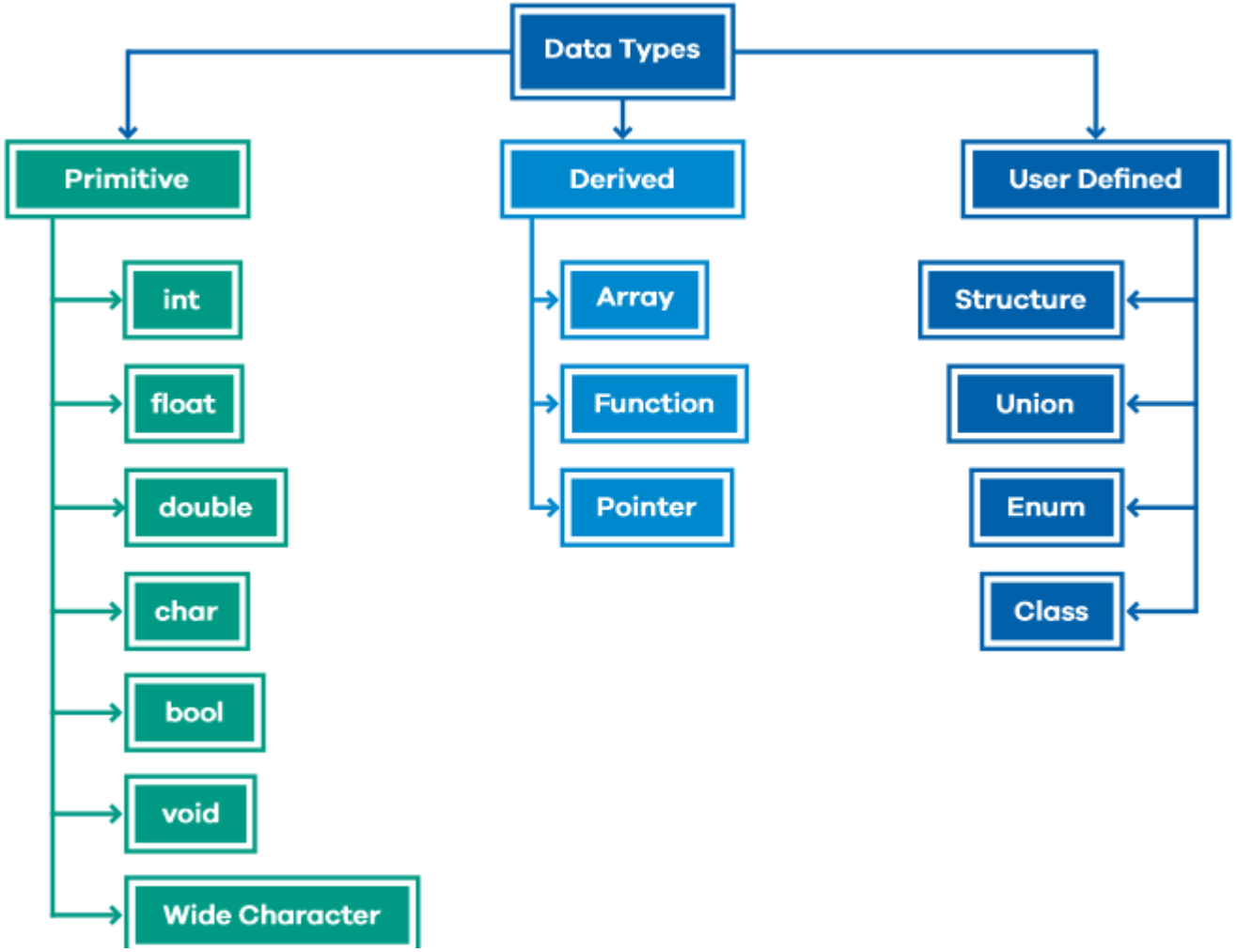
1. Take data as input from some input device/ file.
2. Give data as output to some output device/ file.
3. Store data in Memory.
4. Take data from Memory.
5. Perform operations on data.

Basically, programming means playing with data.

Data: Raw facts and figures are known data.

Compiler categorizes different data based on their data types.

DATA TYPES in C++



Data Types in C++

- All variables use data type during declaration to restrict the type of data to be stored. Therefore, we can say that data types are used to tell the variables the type of data they can store.
- Whenever a variable is defined in C++, the compiler allocates some memory for that variable based on the data type with which it is declared.
- Every data type requires a different amount of memory.
- C++ supports the following data types:
  - Primary or Built-in or Fundamental data type
  - Derived data types
  - User-defined data types

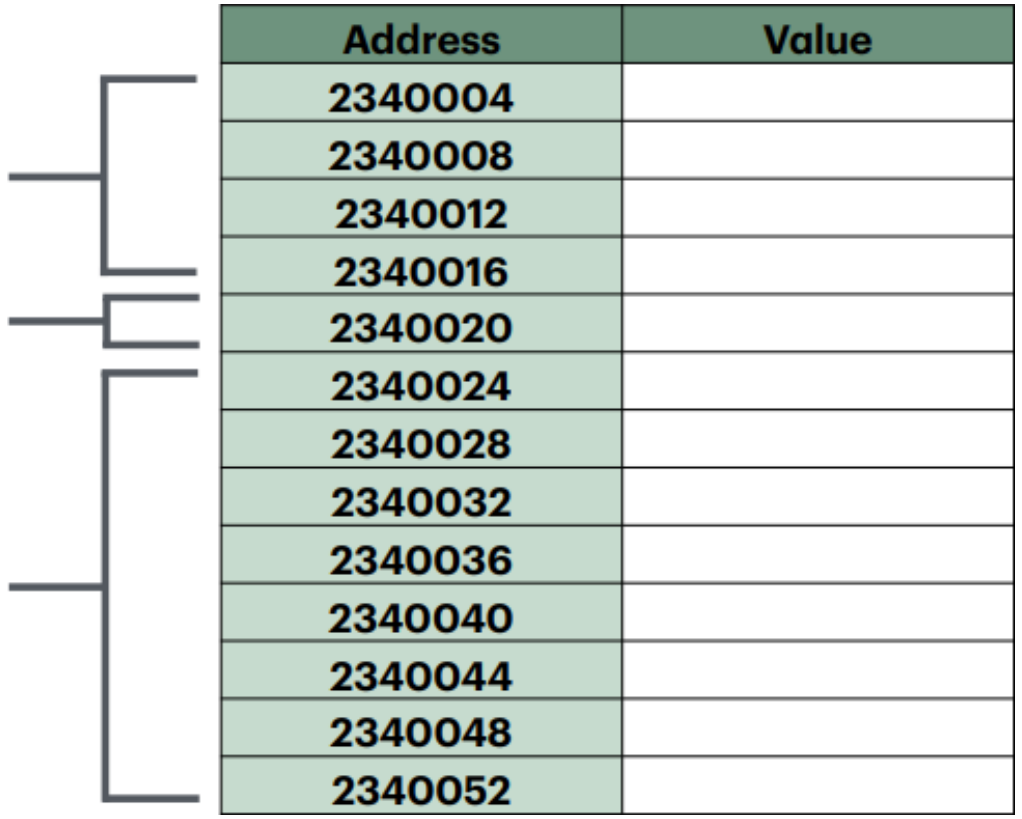
S.No	Type	Description
1	bool	Stores either value true or false.
2	char	Typically a single octet (one byte). This is an integer type.
3	int	The most natural size of an integer for the machine.
4	float	A single-precision floating point value.
5	double	A double-precision floating point value.
6	void	Represents the absence of type.

Why we need Data-Types?

int
compiler knows that it needs to allocate 4 bytes for the data

Char
compiler knows that it needs to allocate 1 bytes for the data

Long long
compiler knows that it needs to allocate 8 bytes for the data



Address	Value
2340004	
2340008	
2340012	
2340016	
2340020	
2340024	
2340028	
2340032	
2340036	
2340040	
2340044	
2340048	
2340052	

DataType	Size(in Bytes)	Range
int or signed int	4 Bytes	-2,147,483,648 to 2,147,483,647
unsigned int	4 Bytes	0 to 4,294,967,295
short int	2 Bytes	-32,768 to 32,767
long int	4 Bytes	-2,147,483,648 to 2,147,483,647
unsigned short int	2 Bytes	0 to 65,535
unsigned long int	8 Bytes	0 to 4,294,967,295
long long int	8 Bytes	-(2^63) to (2^63)-1
unsigned long long int	8 Bytes	0 to 18,446,744,073,709,551,615
signed char	1 Bytes	-128 to 127
unsigned char	1 Bytes	0 to 255
wchar_t	2 or 4 Bytes	1 wide character
float	4 Bytes	
double	8 Bytes	
long double	12 Bytes	

Input-Output in C++

- **Input**–data given by user to program in execution
  - Can be given in the form of file or from command line.
  - Set of built-in functionsto read input.
  - ***cin>>x;***
  - **x**is any variable that you might be using.

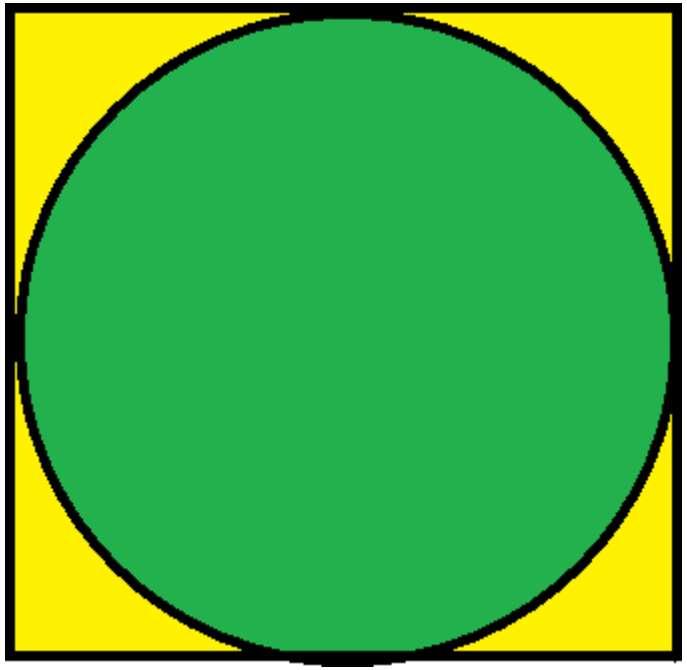
```
#include <iostream>
using namespace std;
int main()
{
    int x;
    cin>>x;
    return 0;
}
```

Input-Output in C++

- **Output**– It means to display some data on screen or file.
  - Can be given in the form of file or from command line.
  - Set of built-in functionsto display output.
  - ***cout<<x;***
  - **x** is any variable that you want to print

```
#include <iostream>
using namespace std;
int main()
{
    int x=20;
    cout<<x;
    return 0;
}
```

PRACTICE PROBLEM



Q. Find the area of the region shaded with yellow color, assume pi=3.14, and side length of square = 20 units.