

Assignment 1

30/09/2024

Title: **To explore basic concepts of OOP through C++**

Objectives- To Study and basic fundamental concepts like variables, data types, control structures, and functions in C++.

Problem Statement-

1. Write a program for Adding two numbers in C++.
2. C++ program to check if a number is even or odd.
3. Write a C++ program to find the largest number among three numbers.
4. Write a C++ Program to find the sum of all the natural numbers from 1 to n.
5. Write a C++ program to compute the power a given number to a given power.
6. Write a C++ program to calculate the average of all the elements present in an array.
7. Write a function to find the length of a string in C++.

Software & Hardware requirements- any Text editor and Terminal in Linux/ Turbo C++ Compiler installed on PC.

Theory-

C++ is one the most popular language in the programming world. C++ is a powerful general-purpose programming language that was developed in the early 1980s as an extension of the C programming language. It is widely used for developing a wide range of applications, including system software, game development, embedded systems, high-performance applications, and more. C++ combines both high-level and low-level programming features, offering a balance between performance and abstraction. It supports procedural, object-oriented, and generic programming paradigms, giving developer's flexibility in designing and implementing their solutions.

- **#include <iostream>** is a **header file library** that lets us work with input and output objects, such as **cout** "<<" and **cin** ">>" .
- **using namespace std** means that we can use names for objects and variables from the standard library.
- **int main()**. This is called a **function**. Any code inside its curly brackets **{ }** will be executed.
- Every C++ statement ends with a semicolon **;**.
- **return 0;** ends the main function.

● Basic Data Types

- The data type specifies the size and type of information the variable will store:

Data Type	Size	Description
boolean	1 byte	Stores true or false values
char	1 byte	Stores a single character/letter/number, or ASCII values
int	2 or 4 bytes	Stores whole numbers, without decimals
float	4 bytes	Stores fractional numbers, containing one or more decimals. Sufficient for storing 6-7 decimal digits
double	8 bytes	Stores fractional numbers, containing one or more decimals. Sufficient for storing 15 decimal digits

Statements- IF -- Else

```
if (condition) {
    // block of code to be executed if the condition is true
} else {
    // block of code to be executed if the condition is false
}
```

C++ For Loop

When you know exactly how many times you want to loop through a block of code, use the **for** loop instead of a **while** loop:

Syntax

```
for (statement 1; statement 2; statement 3) {
    // code block to be executed
}
```

Statement 1 is executed (one time) before the execution of the code block.

Statement 2 defines the condition for executing the code block.

Statement 3 is executed (every time) after the code block has been executed.

C++ Arrays

Arrays are used to store multiple values in a single variable, instead of declaring separate variables for each value.

To declare an array, define the variable type, specify the name of the array followed by **square brackets** and specify the number of elements it should store:

```
int myNum[3] = {10, 20, 30};
```

1. Write a program for Adding two numbers in C++.

To Add two numbers in C++ we will read two numbers a and b from the user then perform add operation to add a and b together to print the addition of two numbers in C++.

```
#include <iostream>

using namespace std;

int main() {

int a ;

int b ;

cin>>a>>b;

cout<<a+b;

return 0;

}
```

Input: 2 5

Output: 7

2. C++ program to check if a number is even or odd.

TO check if a given number is even or odd in C++, we simply divide the given number by 2, if the remainder is 0 then it is even otherwise odd.

```
#include <iostream>

using namespace std;

int main() {

    int a ;

    cin>>a;

    if(a%2 == 0) // if remainder is zero then even number

        cout<<"even";

    else

        cout<<"odd";

    return 0;
```

```
}
```

Input: 8

Output: even

3. Write a C++ program to find the largest number among three numbers.
A number will be largest if number is greater than both the other numbers.

```
#include <iostream>
```

```
using namespace std;
```

```
int main() {
```

```
float a, b, c;
```

```
cin >> a >> b >> c;
```

```
if(a >= b && a >= c)
```

```
    cout << "Largest number: " << a;
```

```
if(b >= a && b >= c)
```

```
    cout << "Largest number: " << b;
```

```
if(c >= a && c >= b)
```

```
    cout << "Largest number: " << c;
```

```
return 0;
```

```
}
```

Input: 1 2 3

Largest number: 3

4. Write a C++ Program to find the sum of all the natural numbers from 1 to n.

To find the sum of all the natural number from 1 to n in C++, We have two methods, one is by iterating from 1 to n and adding them up while the other way is using the summation formula –

```
#include <iostream>

using namespace std;

int main()

{

int n, sum = 0;

cin >> n;

for (int i = 1; i <= n; ++i)

{

    sum += i;

}

// or sum = n*(n+1)/2;

cout << sum;

return 0;

}
```

Input: 5

Output: 15

5. Write a C++ program to compute the power a given number to a given power.

To compute the power of a given number in C++, We initialize a variable result to 1. Then, we'll use a while loop to multiply the result by base for power number of times.

$3^3 = 3 * 3 * 3 = 27$

```
#include <iostream>

using namespace std;

int main()
{
    int power;

    float base, result = 1;

    cin >> base >> power;

    while (power != 0) {

        result *= base;

        power--;

    }

    cout << result;

    return 0;
```

```
}
```

Input: 3 3

Output: 27

6. Write a C++ program to calculate the average of all the elements present in an array.

We iterate over each element of the array and calculate the sum of all the elements. Then, we divide the sum by the size of the array to get the average. The average is stored in a variable of type float and returned.

```
average= summation[arr[i]]/n
```

```
#include <iostream>
```

```
using namespace std;
```

```
int main()
```

```
{
```

```
int n;
```

```
cin>>n;
```

```
int arr[n];
```

```
float sum = 0.0;
```

```
for(int i = 0;i<n;i++)
```

```
    cin>>arr[i];
```

```
for(int i = 0;i<n;i++)
```

```
    sum += arr[i];
```



```
cout<<(float)(sum/(float)n);
```

```
return 0;
```

```
}
```

Input: 3

1 4 5

Output: 3.33333

7. Write a function to find the length of a string in C++.

To find the length of a string in C++, we will Iterate through the string and increase count by 1 till we reach the end of the string.

```
#include <iostream>
```

```
using namespace std;
```

```
int main()
```

```
{
```

```
string str;
```

```
cin>>str;
```

```
int count = 0;
```

```
for(int i = 0;str[i];i++) // till the string character is null
```

```
    count++;
```

```
cout<<count;
```

```
}
```

Input: abcde

Output: 5

Conclusion-

While building Basic C++ programs is a great way to learn the basics of the language and gain confidence in programming. After performing this assignment we can practice fundamental concepts like variables, data types, control structures, and functions as well arithmetic operations, input/output, conditionals, loops, and arrays. Working through these programs allows beginners to apply their knowledge and develop problem-solving skills.