Programming with C and C++

CSC-101 (Lecture 32)

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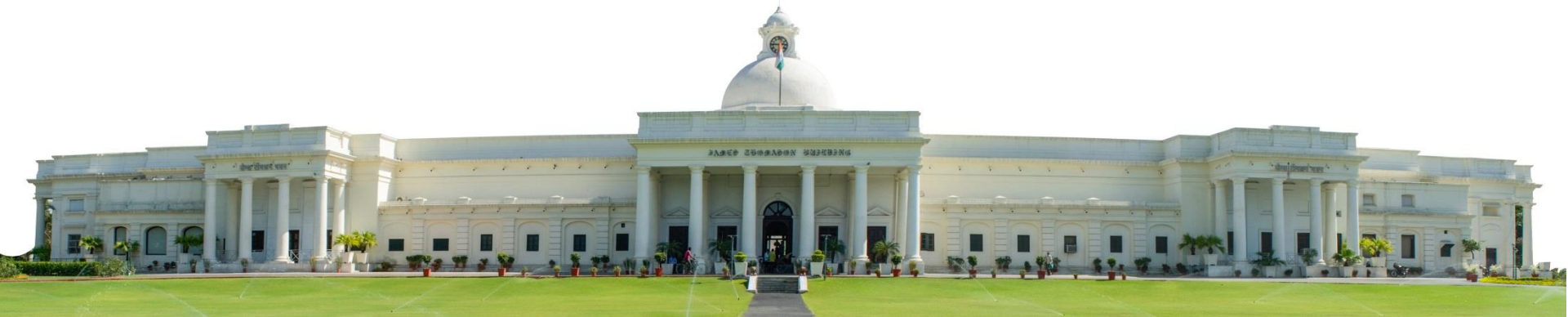

Example 2

- write a C++ program using class and objects to add two distances given in meter and centimeter

```
1   #include <iostream>
2
3   using namespace std;
4
5   class Distance {
6   private:
7       int meters;
8       int centimeters;
9
10  public:
11      void getDistance() {
12          cout << "Enter meters: ";
13          cin >> meters;
14          cout << "Enter centimeters: ";
15          cin >> centimeters;
16      }
17
```

https://ideone.com/ECT4fj

```
18      void displayDistance() {
19          cout << "Distance: " << meters << " meters " << centimeters
20          << " centimeters" << endl;
21      }
22
23      Distance addDistances(const Distance& d1, const Distance& d2) {
24          Distance result;
25          result.meters = d1.meters + d2.meters;
26          result.centimeters = d1.centimeters + d2.centimeters;
27
28          if (result.centimeters >= 100) {
29              result.meters += result.centimeters / 100;
30              result.centimeters = result.centimeters % 100;
31          }
32
33          return result;
34      }
35  };
```

```
36
37  int main() {
38      Distance distance1, distance2, result;
39
40      cout << "Enter the first distance:" << endl;
41      distance1.getDistance();
42      cout << "Enter the second distance:" << endl;
43      distance2.getDistance();
44
45      result = result.addDistances(distance1, distance2);
46
47      cout << "Sum of the distances:" << endl;
48      result.displayDistance();
49
50      return 0;
51  }
52
```

stdin

```
10 95
20 85
```

stdout

```
Enter the first distance:
Enter meters: Enter centimeters: Enter the second distance:
Enter meters: Enter centimeters: Sum of the distances:
Distance: 31 meters 80 centimeters
```

C++ Strings

```
1  #include <iostream>
2  using namespace std;
3  int main( ) {
4      string s1 = "CSC-101, IITR";
5          char ch[] = { 'C', '+', '+'};
6          string s2 = string(ch);
7          cout<<s1<<endl;
8          cout<<s2<<endl;
9  }
10
```

https://ideone.com/dOwwIj

stdout

```
CSC-101, IITR
C++
```

C++ Strings

https://ideone.com/UEt4HY

```
1   #include <iostream>
2   #include <string>
3
4   using namespace std;
5
6   int main () {
7
8       string str1 = "CSC-101, ";
9       string str2 = "IIT Roorkee";
10      string str3;
11      int  len ;
12
```

C++ Strings

```
13      // copy str1 into str3
14      str3 = str1;
15      cout << "str3 : " << str3 << endl;
16
17      // concatenates str1 and str2
18      str3 = str1 + str2;
19      cout << "str1 + str2 : " << str3 << endl;
20
21      // total length of str3 after concatenation
22      len = str3.size();
23      cout << "str3.size() :  " << len << endl;
24
25      return 0;
26  }
```

stdout

```
str3 : CSC-101,
str1 + str2 : CSC-101, IIT Roorkee
str3.size() :  20
```

Range-based for loop in C++

```
1  #include <iostream>
2  using namespace std;
3  int main ()
4  {
5  int IntArr [5] = { 100, 200, 300, 400, 500};
6  double DoubleArr [5] = { 1.5, 2.5, 3.5, 4.5, 5.5 };
7   // use range based for loop
8  for ( auto &var : IntArr )  //auto keyword
9  {
10 cout << var << " ";
11 }
12 cout <<endl;
13 for ( auto &var : DoubleArr )
14 {
15 cout << var << " " ;
16 }
17 return 0;
18 }
19
```

https://ideone.com/bwnqcP

stdout

```
100 200 300 400 500
1.5 2.5 3.5 4.5 5.5
```

auto in C++

https://ideone.com/Ux2ZTi

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

    auto a=45;
    auto b='z';
    auto c=10.3;

    cout<<"data type of the variable a is: "<<a<<endl;
    cout<<"data type of the variable b is: "<<b<<endl;
    cout<<"data type of the variable c is: "<<c<<endl<<endl;

    cout<<"data type of the variable a is: "<<sizeof(a)<<endl;
    cout<<"data type of the variable b is: "<<sizeof(b)<<endl;
    cout<<"data type of the variable c is: "<<sizeof(c)<<endl;
    return 0;
}
```

stdout

```
data type of the variable a is: 45
data type of the variable b is: z
data type of the variable c is: 10.3

data type of the variable a is: 4
data type of the variable b is: 1
data type of the variable c is: 8
```

C++ Constructor

- Constructor is a special method which is invoked automatically at the time of object creation.
- It is used to initialize the data members of new object generally.
- The constructor in C++ has the same name as class or structure.

```
1. <class-name> (list-of-parameters);

2. <class-name> (list-of-parameters)
  { // constructor definition }
```

- The following syntax is used to define a constructor outside of a class:

```
<class-name>: :<class-name> (list-of-parameters){ // constructor definition}
```

- **T**wo types of constructors in C++
  - Default constructor
  - Parameterized constructor

Default Constructor

https://ideone.com/3vupMw

```
1  #include <iostream>
2  using namespace std;
3  class Employee
4   {
5     public:
6          Employee()
7          {
8              cout<<"Testing Default Constructor"<<endl;
9          }
10 };
11 int main(void)
12 {
13     Employee e1; //creating an object of Employee
14     Employee e2;
15     return 0;
16 }
17
```

stdout

```
Testing Default Constructor
Testing Default Constructor
```

Default Constructor

- Design a class called Book with attributes for the title (string), author (string), and price (double). Implement a default constructor that sets the title and author to "Unknown" and the price to 0. Write a program to create an instance of the Book class using the default constructor and display its attributes.

```
1   #include <iostream>
2   #include <string>
3
4   using namespace std;
5
6   class Book {
7   private:
8       string title;
9       string author;
10      double price;
11
```

https://ideone.com/U0tLKk

```
12  public:
13      // Default constructor
14      Book() : title("Unknown"), author("Unknown"), price(0.0) {}
15
16      // Member function to display book details
17      void displayBookDetails() {
18          cout << "Title: " << title << endl;
19          cout << "Author: " << author << endl;
20          cout << "Price: Rs." << price << endl;
21      }
22  };
23
```

```
23
24  int main() {
25      // Create an instance of the Book class using the default constructor
26      Book myBook;
27
28      // Display the book details
29      cout << "Book Details:" << endl;
30      myBook.displayBookDetails();
31
32      return 0;
33  }
34
```

stdout

```
Book Details:
Title: Unknown
Author: Unknown
Price: Rs.0
```

Parameterized Constructor

https://ideone.com/p6kzuK

```
1  #include <iostream>
2  using namespace std;
3  class Employee {
4     public:
5         int id;//data member
6         string name;//data member
7         float salary;
8         Employee(int i, string n, float s)
9          {
10             id = i;
11             name = n;
12             salary = s;
13         }
14        void display()
15         {
16             cout<<id<<"  "<<name<<"  "<<salary<<endl;
17         }
18 };
```

Parameterized Constructor

```
19  int main(void) {
20      Employee e1 =Employee(18, "Virat", 100000);
21      Employee e2=Employee(45, "Rohit", 90000);
22      e1.display();
23      e2.display();
24      return 0;
25  }
```

stdout

```
18  Virat  100000
45  Rohit  90000
```

Parameterized Constructor

- Design a class Circle with a parameterized constructor that takes the radius as an argument and calculates the area of the circle in C++.

Thank You!