Chapter-9

INPUT AND OUTPUT OPERATORS

➢ Introduction

• The input output operations are done using library functions cin and cout objects of the class istream.
• Using the standard input and output library, we will able to interact with the user by printing message on the screen and getting the user’s input from the keyboard.
• A stream is an object where a program can either insert/extract characters to/from it.
• The standard C++ library includes the header file iostream, where the standard input and output stream objects are declared.

➢ Input Operator “>>”:

The standard input device is usually the keyboard.
Input in C++ is done by using the “stream extraction” (>>) on the cin stream.
The operator must be followed by the variable that will store the data that is going to be extracted from the stream.
Example:
```cpp
int age;
cin >> age;
```
The first statement declares a variable of the type int called age, and the second one waits for an input from cin (the keyboard) in order to store it in this integer variable.
cin stands for “console input”.
It can only process the input from the keyboard once the RETURN key has been pressed.
We must always consider the type of the variable that we are using as a container with cin extraction. For example, if we request an integer we will get an integer.

➢ Output Operator “<<”:

The standard output device is the screen (Monitor).
Outputting in C++ is done by using the object followed by the “stream insertion” (<<).
cout stands for console output.
• **Example:**
  ```cpp
cout<<”Let us learn C++”;
```
  // prints Let us learn C++ on the screen.
  
  • The `<<` operator inserts the data that follows it into the stream preceding it.
  
  • The sentence in the instruction is enclosed between double quotes (""), because it is constant string of characters.
  
  • Whenever we want to use constant strings of characters we must enclose them between double quotes (""), so that they can be clearly distinguished from the variables name.
  
  • **Example:**
  ```cpp
cout<<”sum”;
```
  // prints sum
  ```cpp
cout<<sum;
```
  // prints the content of the variable sum
  
  • In order to perform a line break on the output we must explicitly insert a new-line character into `cout`.
  
  • In C++ a new-line character can be specified as ‘\n’ (backslash n), the new-line character is an escape sequence character and helps in formatting the output statement.
  
  • **Program: To demonstrate the cout statement:**
  ```cpp
#include<iostream.h>
#include<conio.h>
void main( )
{
    cout<<”C++ is an Object Oriented Programming Language”<<”\n”;
    cout<<”C++ is an case sensitive language\n”;
    getch();
}
```

➢ **Cascading of I/O Operators:**

• C++ supports the use of stream extraction (>>) and stream insertion (<<) operator many times in a single input (cin) and output (cout) statements.

• If a program requires more than one input variable then it is possible to input these variables in a single cin statement using multiple stream extraction operators.
Similarly, when we want to output more than one result then this can be done using a single cout statement with multiple stream insertion operators.

This is called cascading of input output operators.

Example:

```cpp
cout<<"Enter the first number";
cin>>a;
cout<<"Enter the second number";
cin>>b;
```

Instead of using cin statement twice, we can use a single cin statement and input the two numbers using multiple stream extraction operators.

```cpp
cout<<"Enter the two number";
cin>>a>>b;
```

Similarly, we can even output multiple results in a single cout statements using cascading of stream insertion operators.

```cpp
cout<<"The sum of two number is"<<sum<<endl;
```

**Formatted Output (Manipulators):**

Manipulators are the operators used with the insertion operator << to format the data display. The most commonly used manipulators are endl and setw.

1. **The endl manipulator:** The endl manipulator, when used in a output statement, causes a line feed to be inserted. It has same effect as using new line character “\n”.

   ```cpp
cout<< " Morarji Deasi Residential PU Science College"<<endl;
cout<< " Guddenahalli, Hassan";
```

   The output of the above code will be:

   **Morarji Deasi Residential PU Science College**
   **Guddenahalli, Hassan**

2. **The setw( ) Manipulator:** The setw( ) manipulator sets the width of the field assign for the output. It takes the size of the field (in number of character) as a parameter. The output will be right justified. Example the code :

   ```cpp
cout<<setw(6)<<"R";
```

   Generates the following output on the screen (each underscore represent a blank space)

   `_ _ _ _ _ R`

   In order to use this manipulator, it is must to include header file iomanip.h
Program 1: To find the sum of two numbers:
#include<iostream.h>
#include<conio.h>
void main()
{
    int a, b, add;
    clrscr();
    cout<<"Enter the two numbers";
    cin>>a>>b;
    add = a + b;
    cout<<"The sum of two numbers is"<<sum<<endl;
    getch();
}

Program: Convert the temperature in Fahrenheit into Celsius:
#include<iostream.h>
#include<conio.h>
void main()
{
    float fah, cel;
    clrscr();
    cout<<"Enter the value of Fahrenheit";
    cin>>fah;
    cel = ((5.0/9.0) * fah – 32.0);
    cout<<fah<<"F = "<<cel<<"C"<<endl;
    getch();
}

Program: To interchange the values of two variables using third variable.
#include<iostream.h>
#include<conio.h>
void main()
{
    int a, b, temp;
    clrscr();
    cout<<"Enter the two numbers";
    cin>>a>>b;
    cout<<"Before Interchanging : a = "<<a<<" and b = "<<b<<endl;
    temp = a;
    a = b;
    b = temp;
    cout<<"After Interchanging : a = "<<a<<" and b = "<<b<<endl;
    getch();
}

Program: To interchange the values of two variables without using third variable.
#include<iostream.h>
#include<conio.h>
void main()
{
    int a, b;
    clrscr();
    cout<<"Enter the two numbers";
    cin>>a>>b;
    cout<<"Before Interchanging : a = "<<a<<" and b = "<<b<<endl;
    a = a + b ;
    b = a – b ;
    a = a – b ;
    cout<<"After Interchanging : a = "<<a<<" and b = "<<b<<endl;
    getch();
}
Program: To find the area and circumference of a circle.
#include<iostream.h>
#include<conio.h>
void main( )
{
    float rad, area, circum;
    clrscr( );
    cout<<"Enter the radius";
    cin>>rad;
    area = 3.142 * rad * rad;
    circum = 2 * 3.142 * rad;
    cout<<"Area of circle = "<<area<<endl;
    cout<<"Circumference of circle = "<<circum<<endl;
    getch();
}

Program: To find the area of triangle given three sides.
#include<iostream.h>
#include<conio.h>
#include<math.h>
void main( )
{
    float s1, s2, s3, s, area;
    clrscr( );
    cout<<"Enter the length of three sides";
    cin>>s1>>s2>>s3;
    s = (s1 + s2 + s3)/2;
    area = sqrt( s* (s-s1) * (s-s2) * (s-s3));
    cout<<"Area of triangle = "<<area<<endl;
    getch();
}

Program: To convert days into years, months and days.
#include<iostream.h>
#include<conio.h>
void main( )
{
    int totaldays, days, year, month;
    clrscr( );
    cout<<"Enter the total days";
    cin>>totaldays;
    year = totaldays/365;
    totaldays = totaldays % 365;
    month = totaldays/30;
    days = totaldays % 30;
    cout<<"Years = "<<year<<endl;
    cout<<"Months = "<<month<<endl;
    cout<<"Days = "<<days<<endl;
    getch();
}

Program: To convert seconds into hours, minutes and seconds.
#include<iostream.h>
#include<conio.h>
void main( )
{
    int toalsec, min, hrs, secs;
    clrscr( );
    cout<<"Enter the total seconds";
    cin>>toalsec;
    hrs = toalsec / 3600;
    toalsec = toalsec % 3600;
    min = toalsec/60;
    secs = toalsec % 60;
    cout<<"Hours = "<<hrs<<endl;
    cout<<"Minutes = "<<min<<endl;
    cout<<"Seconds = "<<secs<<endl;
    getch();
}

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