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Lab Manual

Course : CSE 103
Credit Title : Structured Programming
Instructor : Dr. Maheen Islam, Associate Professor, CSE Department

Lab-2: Inputs, Output and Arithmetical expressions

Aims: By the end of the workshop you should be able to understand: -

- Detail of C's scanf and printf functions
- How to take input from keyboard through scanf ?
- How to evaluate an arithmetical expression with C?

In the previous lab we go through the *printf* in detain. So, we can start with *scanf*. As discussed in the class *scanf* is the C library's counterpart to *printf*. Actually, *scanf* requires a format string to specify the appearance of the input data. Example of using scanf to read an int value:

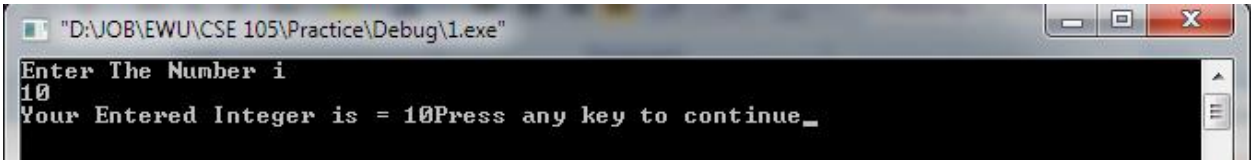
scanf("%d", &i);

The above code will read an integer and stores into variable i. The & symbol is usually (but not always) required when using scanf. Now write the following code:

```
#include <stdio.h>
int main()
{
      int i;
      printf("Enter The Number i\n");
      scanf("%d",&i);
      printf("Your Entered Integer is = %d",i);
      return 0;
}
```

1. Compile and execute the above code.
2. When you execute the code you will certainly see a screen like this.

3. If not then there is obviously something wrong in your code, in that case knock your teacher.
4. If there is nothing wrong enter **10** form your keyboard and press enter.
5. Your output should be as follows, otherwise knock your teacher.



6. Now execute the code again and take **10.50** form your keyboard.
7. The output should be the same as in step 5. In output **.50** is missing, this is because we take the variable *i* as an integer. If we want to print the exact **10.50,** we should declare variable ***i* as float or double.**
8. Reading a float value requires a slightly different call of *scanf*:
   scanf("%f", &i);
   "%f" tells scanf to look for an input value in float format *i.e.* the number may contain a decimal point, but doesn't always have to.
9. If you declare *i* as double your *scanf* should be as follows:
   scanf("%lf", &i);
   "%lf" tells scanf to look for an input value in double format.
10. For the *printf* you have to use %d or %f or %lf respectively. Look at table 1 for more detail. Don't worry about the **char and string** we will discuss more detail in the upcoming labs.

	printf	scanf
int	%d	%d
float	%f	%f
double	%f	%lf
char	%c	%c
string	%s	%s

11. If you want to enter more than one value i.e., serialized the inputs you can do it by the following code.

```
float height, weight;
… … … … … … … … … … … … … … … … … … …
      scanf("%f%f", &height, &weight);
```

Exercise 1: In this initial exercise you are asked to calculate the volume of a room. As you know ***volume* = *width* × *height* × *length.*** In the C this formula will be

volume = ***height * length * width;***

That is operation ***** in C is same as × in mathematics. For more operators in C look at following table

Your job is to declare width, height and length as double. Write the code to take these as input from keyboard. Print the volume.

Sample input	**Sample Output**
Enter height of box: 10 Enter length of box: 10 Enter width of box: 10	Volume (cubic inches): 1000
Enter height of box: 10 Enter length of box: 30.50 Enter width of box: 50.75	Volume (cubic inches): 15478.750000

Exercise 2: The following formula is used to calculate the Celsius equivalent of a Fahrenheit temperature:

C = (5/9) *(F – 32)

Where **F** is the temperature in Fahrenheit and **C** is the Celsius equivalent of that temperature. Write a program in C to convert the temperature in Fahrenheit to the equivalent Celsius temperature.

Sample input	**Sample Output**
Enter Fahrenheit Temperature: 20	Temperature in Fahrenheit: 20 Temperature in Celsius: -6

Exercise 3: Write a program to calculate the area and the perimeter of a circle using the formulas **area = ∏r²** and **perimeter = 2∏r**, where ∏ is a constant whose value is 3.1415926 and **r** is the radius of the circle. Use float type variable for **r**.

Sample input	**Sample Output**
Enter the radius: 4.0	Area = 50.265482 Perimeter = 25.132741

Exercise 4: Compute the straight line distance between two points in a plane. i.e. your job is to take the points as input from keyboard and print the outputs. The coordinates of points should be declared as float and for this you should know how to use ***sqrt()*** with ***#include<math.h>*** as discussed in the class.

Sample input	**Sample Output**
Enter Point X1: 1.0 Enter Point X2: 4.0	The distance is 3.605551

Enter Point Y1: 5.0 Enter Point Y2: 7.0	
Enter Point X1: 11.0 Enter Point X2: 14.0 Enter Point Y1: 5.0 Enter Point Y2: 8.0	The distance is 4.242640

Home Work:

Problem 1: A computer manufacturing company has the following monthly compensation policy to their sales-persons:

Minimum base salary	:	1500.00
Bonus for every computer sold	:	200.00
Commission on the total monthly sales	:	2 percent

Given the base salary, bonus and commission rate, the inputs necessary to calculate the gross salary are, the price of each computer and the number sold during the month.
Calculate the gross salary of a sales-person.

Sample input	**Sample Output**
Enter the number of computers: 5 Price of each computer: 40000	Bonus = 1000.00 Commission = 4000.00

Problem 2: Write a program to convert the distance in miles and yards to kilometer. To convert miles to kilometers, multiply by the conversion factor 1.609. [1 mile = 1760 yards]

Sample input	**Sample Output**
Enter the distance in miles and yards Miles: 26 Yards: 385	The distance in kilometer is: 42.185970 km

Problem 3: Write a program to evaluate the following function for different values of x. [**Hints**: use **math.h** functions, pow(), sin(), sqrt()]

$$f(x) = 3x^5 - 5\sqrt{x} - 6\sin(x)$$

Sample input	**Sample Output**
Enter x : 5	$f(x)$ = 9369.5732