

## 1c. Write a C program to calculate and display the factorial of a number entered by the user.

### Description:

This program calculates the factorial of a number entered by the user. The factorial of a non-negative integer  $n$  is the product of all positive integers from 1 to  $n$ , represented as:

$$n! = n * (n-1) * (n-2) * \dots * 1$$

For example:

- $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$
- $0!$  is defined as 1

### Algorithm:

Step 1: Start

Step 2: Declare an integer variable  $n$  to store the user input and another variable factorial initialized to 1

Step 3: Prompt the user to enter a number

Step 4: Read and store the number in  $n$

Step 5: If  $n$  is 0 or 1, set factorial = 1 (since  $0! = 1! = 1$ ) and go to Step 8

Step 6: Use a loop to multiply numbers from 1 to  $n$  and update factorial

- For  $i = 1$  to  $n$ , multiply factorial = factorial \*  $i$

Step 7: After the loop ends, factorial contains the result

Step 8: Display the factorial of  $n$

Step 9: Stop

### Source Code:

```
#include <stdio.h>
int main()
{
    int n, i;
    long fact = 1;
    printf("Enter an integer: ");
    scanf("%d", &n);
    /* shows error if the user enters a negative integer
    */ if (n < 0) {
        printf("Error: Factorial of a negative number does not exist\n");
    }
}
```

```
else if(n==0 || n==1)
    printf("Factorial of %d = %ld\n", n,
fact); else {
    for (i = 1; i <= n; i++)
        { fact = fact * i;
        }
    printf("Factorial of %d = %ld\n", n, fact);
}
return 0;
}
```

### Sample Output:

```
Enter an integer: 10
Factorial of 10 = 3628800
```