COMPUTER SCIENCE C++

Fibonacci Series in C++

Fibonacci Series in C++: In case of fibonacci series, next number is the sum of previous two numbers for example 0, 1, 1, 2, 3, 5, 8, 13, 21 etc. The first two numbers of fibonacci series are 0 and 1.

There are two ways to write the fibonacci series program:

- Fibonacci Series without recursion
- Fibonacci Series using recursion

Fibonaccci Series in C++ without Recursion

Let's see the fibonacci series program in C++ without recursion.

```
1.  #include <iostream.h>
2.  using namespace std;
3.  void main() {
4.    int n1=0,n2=1,n3,i,number;
5.   cout<<"Enter the number of elements: ";
6.   cin>>number;
7.   cout<<n1<<" "<<n2<<" "; //printing 0 and 1
8.   for(i=2;i<number;++i) //loop starts from 2 because 0 and 1 are already printed
9.   {
10.   n3=n1+n2;
11.   cout<<n3<<" ";
12.   n1=n2;
13.   n2=n3;
}
```

Prime Number Program in C++

Prime number is a number that is greater than 1 and divided by 1 or itself. In other words, prime numbers can't be divided by other numbers than itself or 1. For example 2, 3, 5, 7, 11, 13, 17, 19, 23.... are the prime numbers.

Let's see the prime number program in C++. In this C++ program, we will take an input from the user and check whether the number is prime or not.

```
1.  #include <iostream.h>
2.  using namespace std;
3.  void main()
4.  {
5.    int n, i, m=0, flag=0;
6.    cout << "Enter the Number to check Prime: ";
7.    cin >> n;
8.    m=n/2;
9.    for(i = 2; i <= m; i++)
10.   {
11.     if(n % i == 0)
12.     {
13.       cout<<"Number is not Prime."<<endl;
14.       flag=1;
15.       break;
16.     }
17.   }
18.   if (flag==0)
19.     cout << "Number is Prime."<<endl;
20.   return 0;
21. }
```

Output:

```
Enter the Number to check Prime: 17
 Number is Prime.
Enter the Number to check Prime: 57
Number is not Prime.
```

Fibonnaci series using recursion in C++

Let's see the fibonacci series program in C++ using recursion.

```
1.      #include<iostream.h>
2.      using namespace std;
3.      void printFibonacci(int n){
4.         static int n1=0, n2=1, n3;
5.         if(n>0){
6.             n3 = n1 + n2;
7.             n1 = n2;
8.             n2 = n3;
9.       cout<<n3<<" ";
10.            printFibonacci(n-1);
11.        }
12.     }
13.     int main(){
14.        int n;
15.        cout<<"Enter the number of elements: ";
16.        cin>>n;
17.        cout<<"Fibonacci Series: ";
18.        cout<<"0 "<<"1 ";
19.        printFibonacci(n-2);  //n-2 because 2 numbers are already printed

20.         return 0;
21.     }
```

Output:

```
Enter the number of elements: 15
 Fibonacci Series: 0 1 1 2 3 5 8 13 21 34 55
89 144 233 377
```

Palindrome program in C++

A **palindrome number** is a number that is same after reverse. For example 121, 34543, 343, 131, 48984 are the palindrome numbers.

Palindrome number algorithm

- Get the number from user
- Hold the number in temporary variable
- Reverse the number
- Compare the temporary number with reversed number
- If both numbers are same, print palindrome number
- Else print not palindrome number

```
1.  #include <iostream.h>
2.  using namespace std;
3.  void main()
4.  {
5.    int n,r,sum=0,temp;
6.    cout<<"Enter the Number=";
7.    cin>>n;
8.   temp=n;
9.    while(n>0)
10.  {
11.   r=n%10;
12.   sum=(sum*10)+r;
13.   n=n/10;
14.  }
15.  if(temp==sum)
16.  cout<<"Number is Palindrome.";
17.  else
18.  cout<<"Number is not Palindrome.";
19.
20.  }
```

Output:

```
Enter the Number=121
 Number is Palindrome.
Enter the number=113
Number is not Palindrome.
```

Factorial program in C++

Factorial Program in C++: Factorial of n is the product of all positive descending integers. Factorial of n is denoted by n!. For example:

1. 4! = 4*3*2*1 = 24
2. 6! = 6*5*4*3*2*1 = 720

Here, 4! is pronounced as "4 factorial", it is also called "4 bang" or "4 shriek".

The factorial is normally used in Combinations and Permutations (mathematics).

There are many ways to write the factorial program in C++ language. Let's see the 2 ways to write the factorial program.

- Factorial Program using loop
- Factorial Program using recursion

Factorial Program using Loop

Let's see the factorial Program in C++ using loop.

```
#include <iostream>
using namespace std;
int main()
{
  int i,fact=1,number;
  cout<<"Enter any Number: ";
 cin>>number;
  for(i=1;i<=number;i++){
     fact=fact*i;
  }
  cout<<"Factorial of " <<number<<" is: "<<fact<<endl;
  return 0;
}
```

Output:

```
Enter any Number: 5
 Factorial of 5 is: 120
```

Factorial Program using Recursion

Let's see the factorial program in C++ using recursion.

```
1.  #include<iostream.h>
2.  using namespace std;
3.  void main()
4.  {
5.  int factorial(int);
6.  int fact,value;
7.  cout<<"Enter any number: ";
8.  cin>>value;
9.  fact=factorial(value);
10. cout<<"Factorial of a number is: "<<fact<<endl;
11. return 0;
12. }
13. int factorial(int n)
14. {
15. if(n<0)
16. return(-1); /*Wrong value*/
17. if(n==0)
18. return(1);  /*Terminating condition*/
19. else
20. {
21. return(n*factorial(n-1));
22. }
23. }
```

Output:

```
Enter any number: 6
Factorial of a number is: 720
```