Assignment No. :- 01

Q] Write a program non-recursive and recursive program to calculate Fibonacci numbers and analyze their time and space complexity.

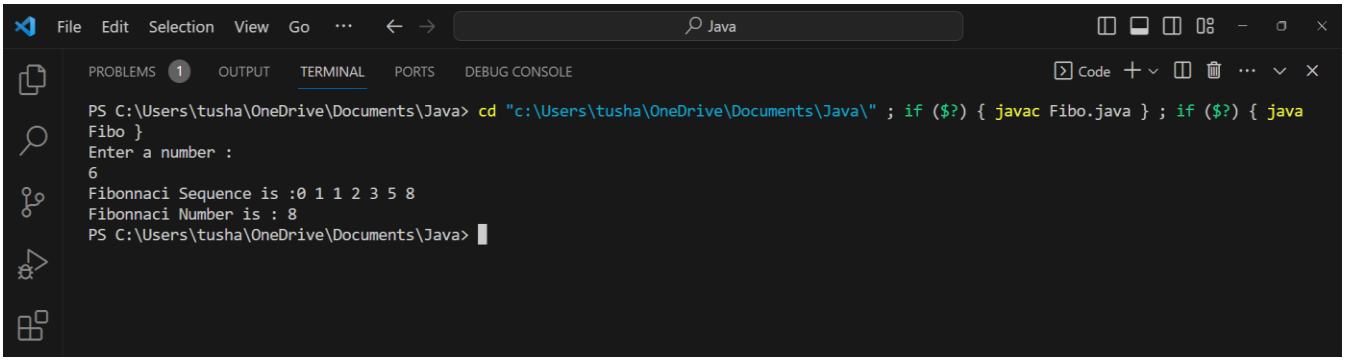
Code

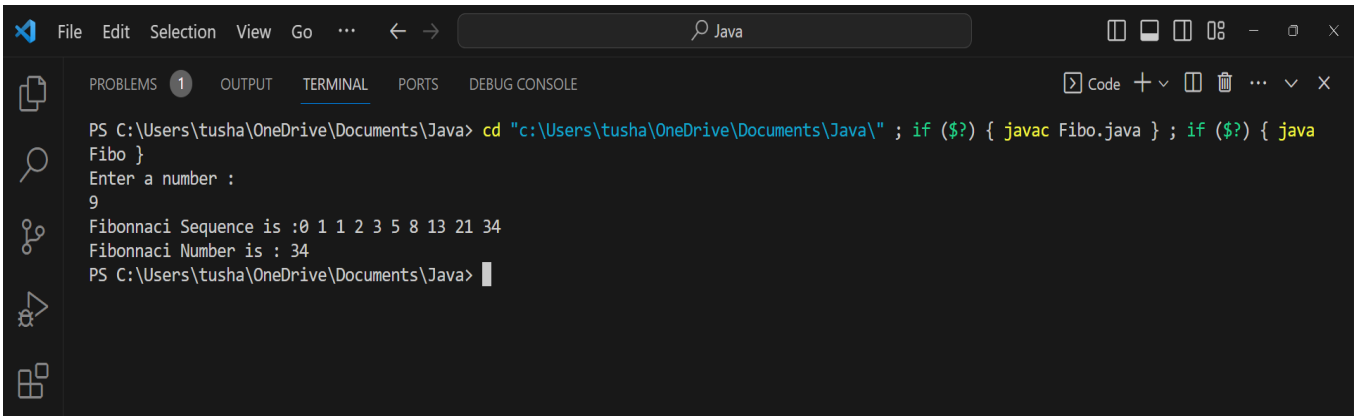
I] Non- Recursive Approach

```java
import java.util.*;
public class Fibo{
    static Scanner sc = new Scanner(System.in);
    public static int Fibonacci(int n){
        if(n==0){
            System.out.println("Fibonnaci Sequence is : "+" 0");
            return 0;
        }
        if(n==1){
            System.out.println("Fibonnaci Sequence is : "+"0 1");
            return 1 ;
        }
        int a = 0 ;
        int b = 1 ;
        int c = 0 ;
        System.out.print("Fibonnaci Sequence is :"+ a+" "+b);
        for(int i=2;i<=n;i++){
            c = a+b;
            System.out.print(" "+c);
            a = b ;
            b = c ;
        }
        System.out.println();
        return c ;
    }
    public static void main(String args[]){
        System.out.println("Enter a number : ");
        int n = sc.nextInt();
        int x = Fibonacci(n);
        System.out.println("Fibonnaci Number is : "+x);
    }
}
```

Time Complexity : - O(n)
Space Complexity :- O(1)

Output





II] Recursive Approach

```java
import java.util.*;
public class RecFibo{
    public static int fibonacci(int n){
        if(n<=1){
            return n ;
        }
        else{
        return fibonacci(n-1)+fibonacci(n-2);
        }
    }
    public static void displayFiboSeq(int n){
        for(int i=0;i<=n;i++){
            System.out.print(fibonacci(i)+" ");
        }
        System.out.println();
    }
    public static void main(String args[]){
        Scanner sc = new Scanner(System.in);
```

```
        System.out.println("Enter a number :");
        int n = sc.nextInt();
        System.out.println("Fibonacci Sequence is :");
        displayFiboSeq(n);
        System.out.println("Fibonacci number is : ");
        int x = fibonacci(n);
        System.out.println(x);
    }
}
```

Time Complexity :- O(2^n)
Space Complexity :- O(n)

Output