


Write a program that prints the Fibonacci sequence up to a given number.

Q. What is Fibonacci sequence ?

The Fibonacci series is a sequence of numbers in which each number is the sum of the two preceding ones. The sequence starts with 0 and 1, and each subsequent number is obtained by adding the two numbers that came before it.

Program In C



```
#include <stdio.h>

void fibonacci(int num);

int main() {
    int num;

    printf("Enter the number of terms: ");
    scanf("%d", &num);

    printf("Fibonacci Sequence up to %d:\n", num);
    fibonacci(num);

    return 0;
}
```


```
void fibonacci(int num) {  
    int first = 0, second = 1, next;  
  
    printf("%d ", first);  
    printf("%d ", second);  
  
    for (int i = 3; i <= num; i++) {  
        next = first + second;  
        printf("%d ", next);  
  
        first = second;  
        second = next;  
    }  
  
    printf("\n");  
}
```

Explanation:

- In this program, we define a function fibonacci that takes the input number (num) as an argument and prints the Fibonacci sequence up to that number.
- The main function prompts the user to enter the number of terms they want to generate and reads it from the standard input using scanf.
- The program then calls the fibonacci function with the entered number as an argument.
- Inside the fibonacci function, we initialize three variables: first (initialized to 0), second (initialized to 1), and next. We print the first two terms of the sequence (0 and 1).
- Next, we use a for loop starting from 3 (since we already printed the first two terms) up to the entered number (num).
- In each iteration, we calculate the next term by adding first and second, assign it to next, and print it.


- Then, we update first and second to prepare for the next iteration.
- Finally, we print a newline character to move to the next line after printing the entire sequence.

Output:

Output 

```
Enter the number of terms: 8
Fibonacci Sequence up to 8:
0 1 1 2 3 5 8 13
```

Program In Java

Java 

```
import java.util.Scanner;

public class FibonacciJava {
    public static void fibonacci(int num) {
        int first = 0, second = 1, next;

        System.out.print(first + " ");
        System.out.print(second + " ");
```

```
        for (int i = 3; i <= num; i++) {
            next = first + second;
            System.out.print(next + " ");

            first = second;
            second = next;
        }

        System.out.println();
    }

    public static void main(String[] args) {
        int num;

        System.out.print("Enter the number of terms: ");
        Scanner scanner = new Scanner(System.in);
        num = scanner.nextInt();

        System.out.println("Fibonacci Sequence up to " + num + ":");
        fibonacci(num);

        scanner.close();
    }
}
```

Explanation:

- `import java.util.Scanner;`: This line imports the Scanner class from the java.util package, allowing us to read user input from the console.
- `public class FibonacciJava:` This line defines a public class named FibonacciJava.
- `public static void fibonacci(int num):` This line declares a static method fibonacci that takes an integer parameter num. This method calculates and prints the Fibonacci sequence up to the given num.

- `int first = 0, second = 1, next;`: This line declares three integer variables, `first`, `second`, and `next`. `first` and `second` represent the first and second terms of the Fibonacci sequence, respectively. `next` will store the next term in the sequence.
- `System.out.print(first + " ");`: This line prints the value of `first` followed by a space. It represents the first term of the Fibonacci sequence.
- `System.out.print(second + " ");`: This line prints the value of `second` followed by a space. It represents the second term of the Fibonacci sequence.
- The `for` loop calculates and prints the subsequent terms of the Fibonacci sequence.
- `int i = 3;` declares and initializes the loop counter `i` to 3.
 - `i <= num;` specifies the loop condition, which continues until `i` is less than or equal to `num`.
 - `next = first + second;` calculates the next term of the Fibonacci sequence by adding `first` and `second`.
 - `System.out.print(next + " ");` prints the value of `next` followed by a space.
 - `first = second;` assigns the value of `second` to `first` for the next iteration.
 - `second = next;` assigns the value of `next` to `second` for the next iteration.
- `System.out.println();`: This line prints a newline character, indicating the end of the Fibonacci sequence.
- The `main` method serves as the entry point of the program.
 - `int num;` declares an integer variable `num` to store the user input.
 - `System.out.print("Enter the number of terms: ");` prompts the user to enter the number of terms.
 - `Scanner scanner = new Scanner(System.in);` creates a `Scanner` object named `scanner` to read user input from the console.
 - `num = scanner.nextInt();` reads an integer from the user and assigns it to the variable `num`.

- `System.out.println("Fibonacci Sequence up to " + num + ":");` prints the message indicating the Fibonacci sequence calculation is starting.
- `fibonacci(num);` calls the fibonacci method to calculate and print the Fibonacci sequence up to the specified number of terms.
- `scanner.close();` closes the Scanner object to release system resources.

Output

```
Enter the number of terms: 8
Fibonacci Sequence up to 8:
0 1 1 2 3 5 8 13
```

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