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Write a program that calculates the factorial of a given number.

Program In C

C

```c
#include <stdio.h>

int main() {
    int n, fact = 1;

    printf("Enter a positive integer: ");
    scanf("%d", &n);

    printf("Factorial of %d:\n", n);

    for (int i = 1; i <= n; i++) {
        fact *= i;
        printf("%d! = %d\n", i, fact);
    }

    return 0;
}
```

Explanation:

- The code starts by including the necessary header file stdio.h, which provides input

and output functions. Then, the main() function is defined, which is the entry point of the program.

- Inside main(), two variables are declared: n and fact. n is used to store the user-entered positive integer, and fact is initialized to 1, which will be used to calculate the factorial.
- The program then prompts the user to enter a positive integer using printf(), and reads the input value using scanf(), storing it in n.
- Next, a for loop is used to calculate the factorial. The loop iterates from i = 1 to i <= n, incrementing i by 1 in each iteration.
- Inside the loop, fact is updated by multiplying it with i, and the current factorial value is printed using printf().
- Finally, the program reaches the end, and the main() function returns 0, indicating successful program execution.

Output:

Output

```
Enter a positive integer: 4
Factorial of 4:
1! = 1
2! = 2
3! = 6
4! = 24
```

Program In Java

Java

```java
import java.util.Scanner;

public class FactorialJava {
    public static void main(String[] args) {
        int n, fact = 1;

        System.out.print("Enter a positive integer: ");
        Scanner scanner = new Scanner(System.in);
        n = scanner.nextInt();

        System.out.println("Factorial of " + n + ":");

        for (int i = 1; i <= n; i++) {
            fact *= i;
            System.out.println(i + "! = " + fact);
        }

        scanner.close();
    }
}
```

Explanation:

1. import java.util.Scanner;: This line imports the Scanner class from the java.util package, allowing us to read user input from the console.

2. public class FactorialJava: This line defines a public class named FactorialJava.
3. public static void main(String[] args): This line is the entry point of the program. It declares the main method, which is where the execution of the program begins.
4. int n, fact = 1;: This line declares two integer variables, n and fact. n will store the user input, and fact will store the factorial value. fact is initialized to 1 since it will be multiplied with numbers during the factorial calculation.
5. System.out.print("Enter a positive integer: ");: This line displays the message to the console, prompting the user to enter a positive integer.
6. Scanner scanner = new Scanner(System.in);: This line creates a Scanner object named scanner, which allows us to read input from the console.
7. n = scanner.nextInt();: This line reads an integer from the user and assigns it to the variable n.
8. System.out.println("Factorial of " + n + ":");: This line prints the message indicating that the factorial calculation is starting.
9. for (int i = 1; i <= n; i++) {: This line begins a for loop that iterates from 1 up to the value of n. The loop counter is initialized as int i = 1, and the loop continues as long as i is less than or equal to n.
10. fact *= i;: This line multiplies the current value of fact by the value of i and assigns the result back to fact. This calculation effectively computes the factorial.
11. System.out.println(i + "! = " + fact);: This line prints the factorial value for the current value of i. It concatenates the values of i, "! =", and fact to form the output string.
12. scanner.close();: This line closes the Scanner object to release system resources associated with it.

Output

```
Enter a positive integer: 4
Factorial of 4:
```

```
1! = 1
2! = 2
3! = 6
4! = 24
```

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