Assignment 1

Sayak Ghorai || BT21GCS004 || B2 || Design and Analysis of Algorithm

Q: Write a code to find out the factorial of a number using both ‘loop’ and ‘recursion’ method and find out which one is better and why?

Answer:
Factorial using for loop:

Factorial_For.java | Factorial_recurr.java

```java
import java.util.Scanner;

public class Factorial_For {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the number: ");
        long num=sc.nextInt();
        long fact=1;
        int steps=0;
        for(long i=num;i>0;i--){
            fact*=i;
            steps++;
        }
        System.out.println("Fact is: "+fact+"\ncompleated in: "+steps+" steps");
    }
}
```

Reassigned local variable

long i = num

Factorial.java

Output:

```
/Users/sayakghorai/Desktop/Factorial.java/out/production/Factorial.java Factorial_For
Enter the number:
20
Fact is: 2432902008176640000
compleated in: 20 steps

Process finished with exit code 0
```

Factorial_For.java | Factorial_recurr.java

```java
import java.util.Scanner;

1 usage
public class Factorial_recurr {
    2 usages
    static int steps;
    2 usages
    public long factorial(long num){
        if(num>1) {
            steps++;
            return num * factorial( num: num - 1);
        }
        else return 1;
    }
    public static void main(String[] args) {
        System.out.println("Enter Number: ");
        long num=new Scanner(System.in).nextInt();
        long res=new Factorial_recurr().factorial(num);
        System.out.println("Factorial is: "+res+" steps:"+steps);
    }
}
```

Factorial using Recursion:

Output:

```
/Users/sayakghorai/Desktop/Factorial.java/out/production/Factorial.java Factorial_recurr
Enter Number:
20
Factorial is: 2432902008176640000 steps:19

Process finished with exit code 0
```

Ans: the recursion mechanism is better as it takes lesser steps than loop method.