ADSAL-Advanced-Data-Structures-and-Algorithms-Laboratory

GitHub Link: https://github.com/Raghavdps20/ADSAL-Advanced-Data-Structures-and-Algorithms-Laboratory/tree/main/Lab250909

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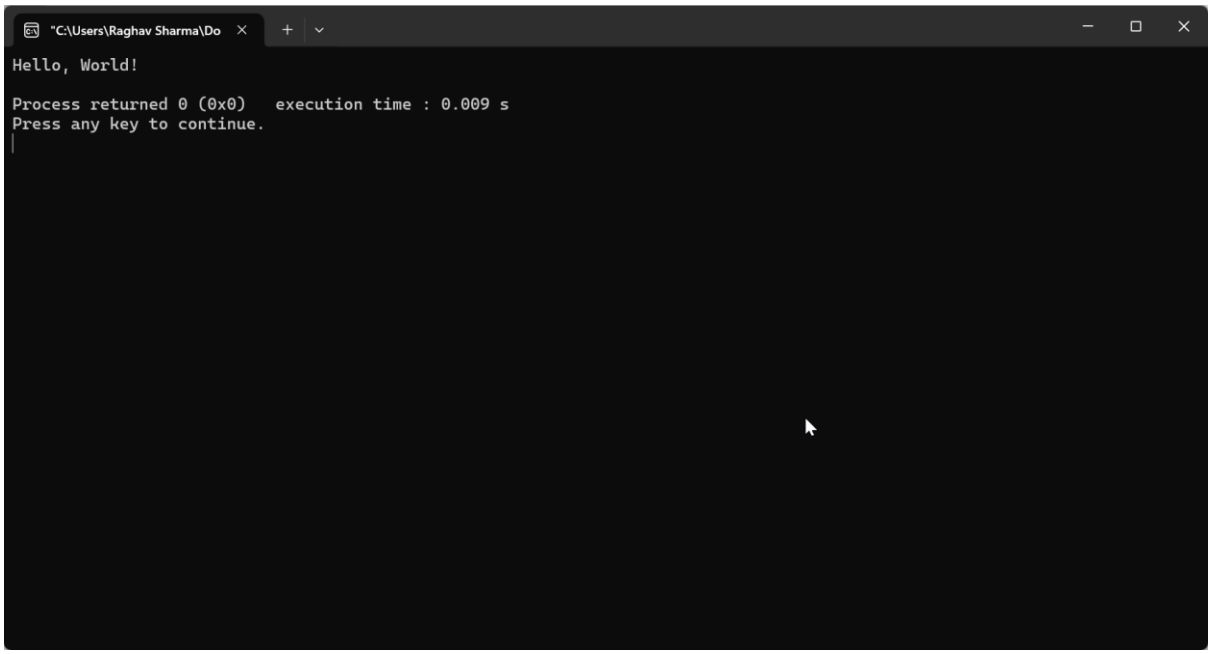
Date: 09 – 09 – 25

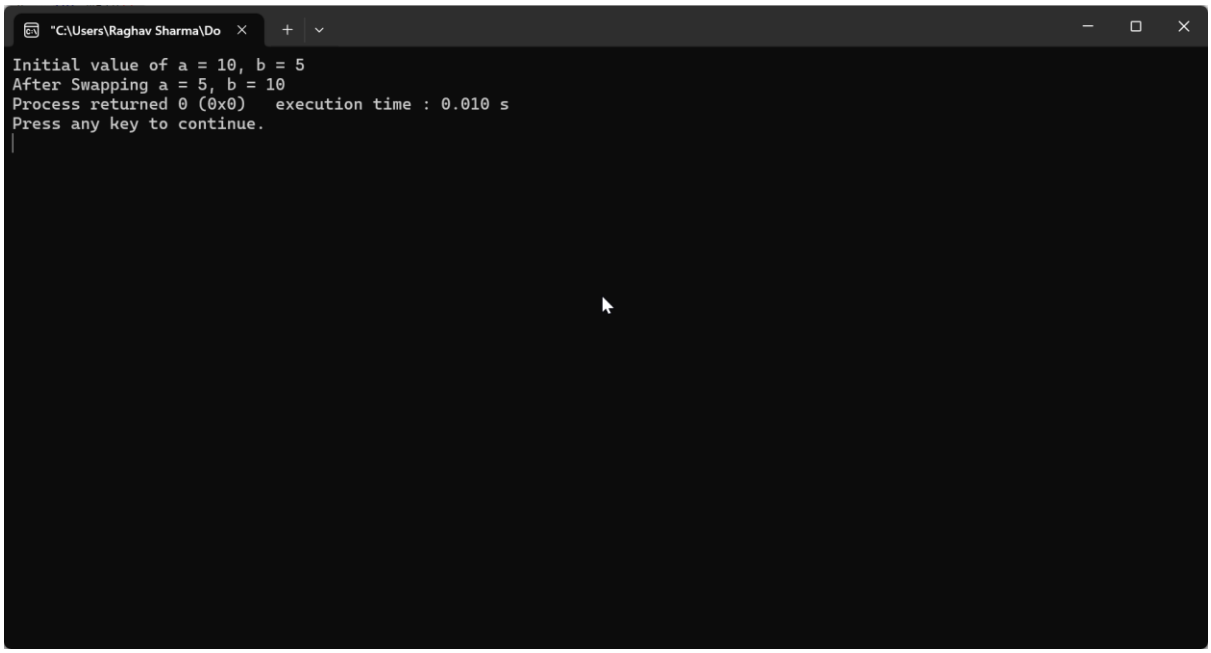
Q1. Print "Hello, World!"

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   printf("Hello, World!\n");
   return 0;
}
```



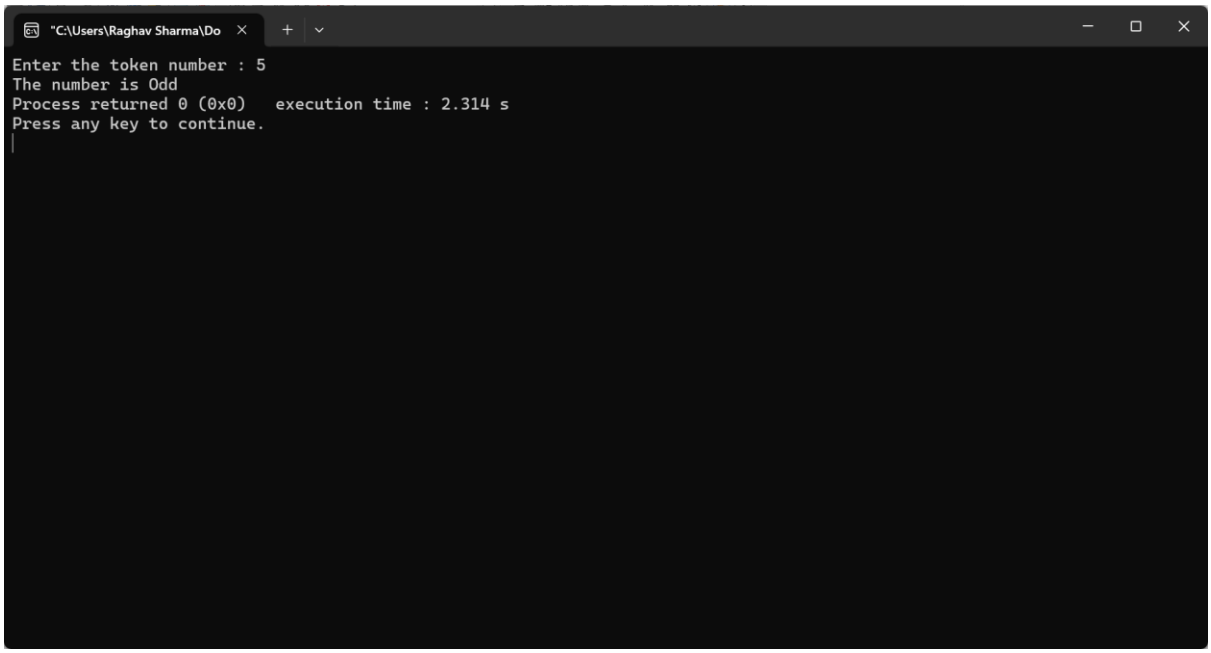
Q2. Swap Two Numbers

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int a=10;
   int b=5;

   printf("Initial value of a = %d, b = %d \n", a,b);

   int temp = a;
   a = b;
   b = temp;

   printf("After Swapping a = %d, b = %d", a,b);

   return 0;
}
```



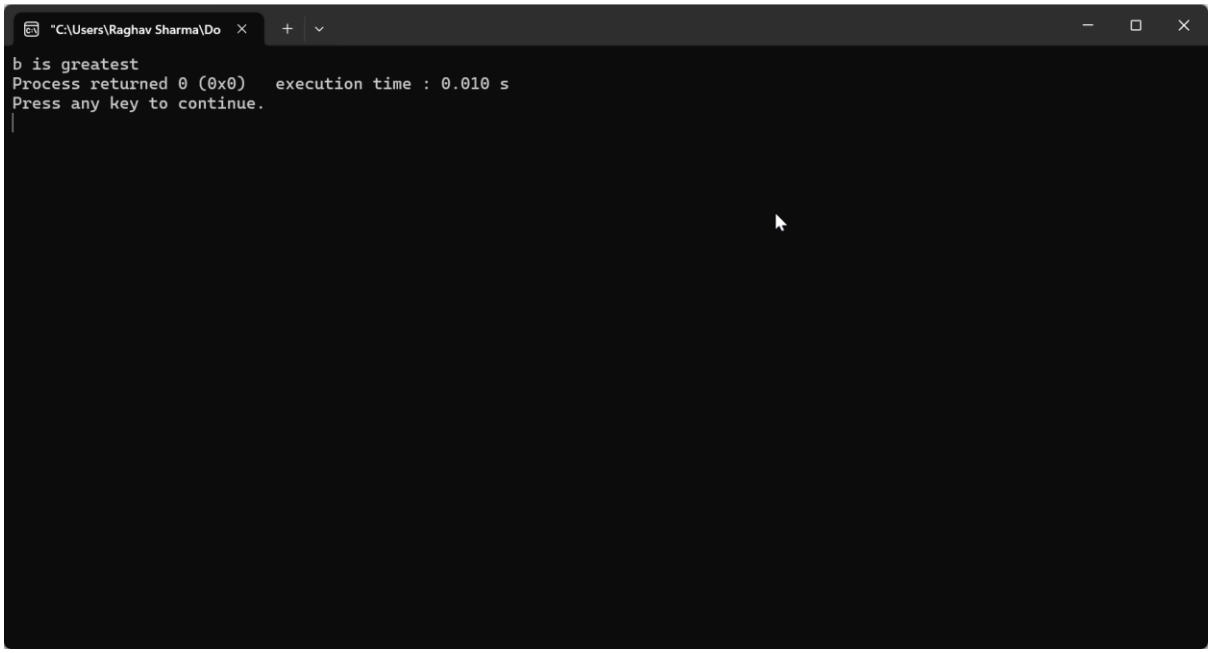
Q3. Check Even or Odd

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int num;
   printf("Enter the token number : ");
   scanf("%d", &num);

   if(num % 2 == 0){
      printf("The Token number is Even");
   }
   else{
      printf("The number is Odd");
   }

   return 0;
}
```



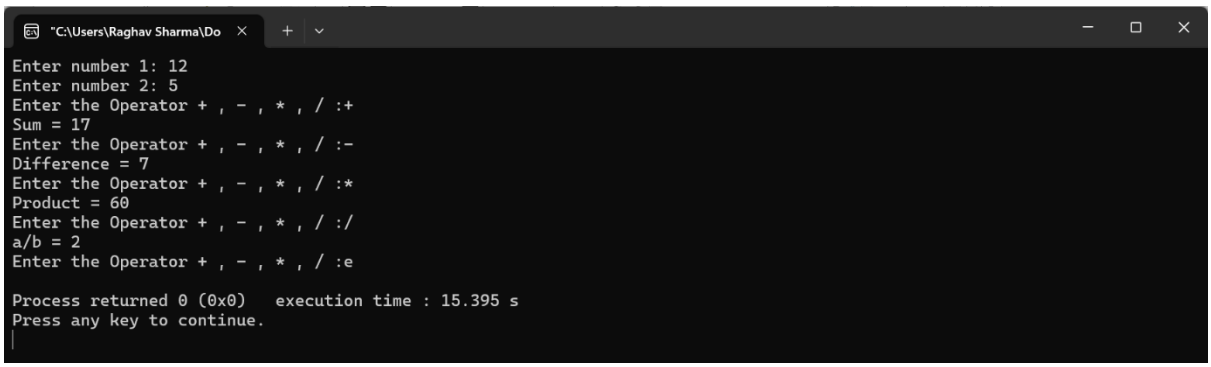
Q4. Find Largest of Three Numbers

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int a=10;
   int b=25;
   int c =15;


   if(a>b && a>c){
      printf("a is greatest");
   }
   else if(b>c){
      printf("b is greatest");
   }
   else{
      printf("c is greatest");
   }
   return 0;
}
```



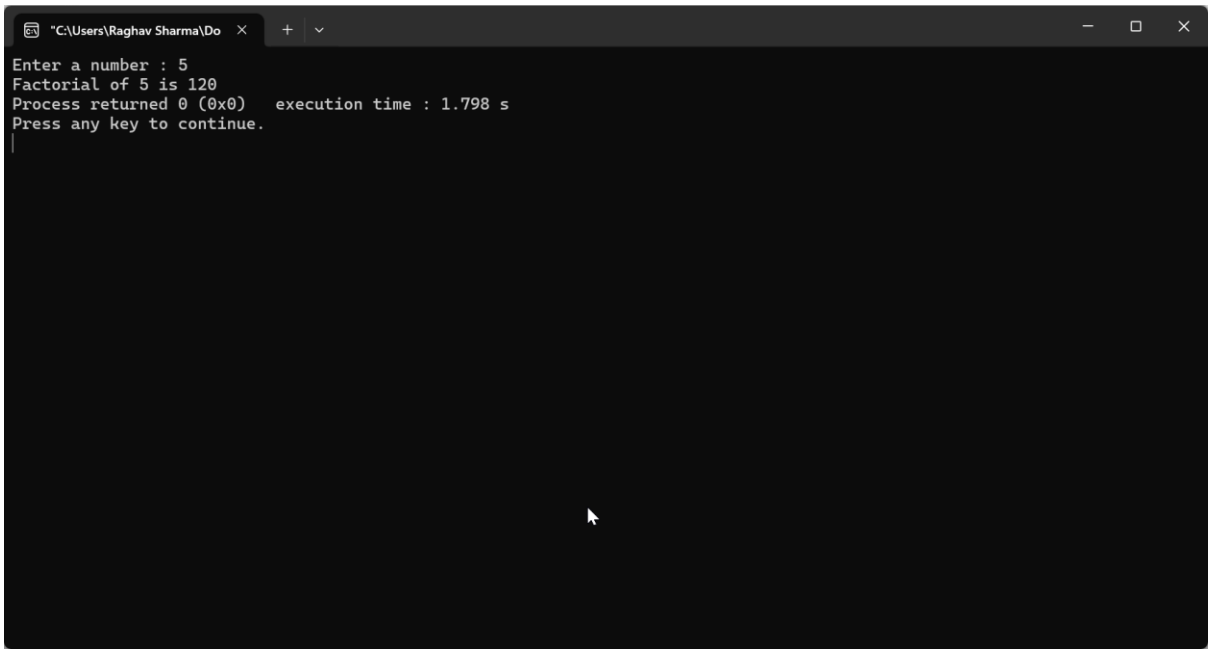
Q5. Simple Calculator (switch case)

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int a,b;
   char c;
   printf("Enter number 1: ");
   scanf("%d", &a);
   printf("Enter number 2: ");
   scanf("%d", &b);


   while(1){
      printf("Enter the Operator + , - , * , / :");
      scanf(" %c", &c);

      switch (c){
      case '+':
         printf("Sum = %d \n", a+b);
         break;
      case '-':
         printf("Difference = %d \n", a-b);
         break;
      case '*':
         printf("Product = %d \n", a*b);
         break;
      case '/':
         printf("a/b = %d \n", a/b);
         break;
      case 'e':
         return 0;;
      default:
         printf("Wrong input \n");
         break;
      }
   }
   return 0;
}
```



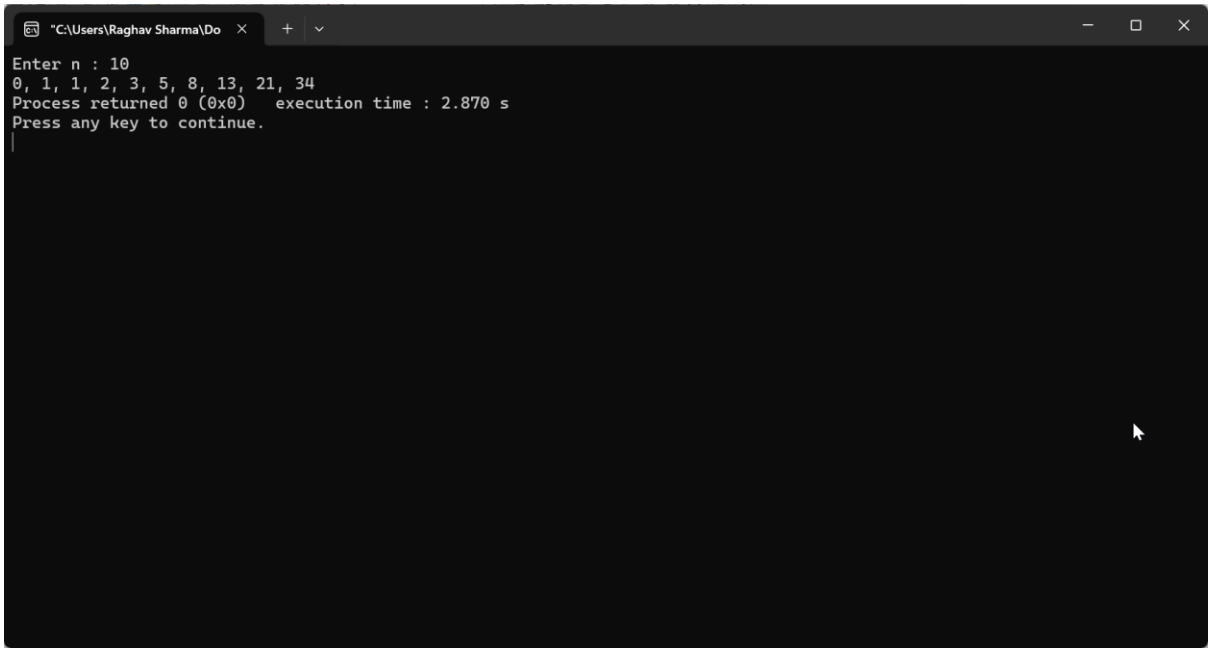
Q6. Factorial of a Number

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int num;
   int fact = 1;
   int i;
   printf("Enter a number : ");
   scanf("%d", &num);

   for(i=1; i<=num; i++){
      fact = fact * i;
   }

   printf("Factorial of %d is %d", num, fact);

   return 0;
}
```



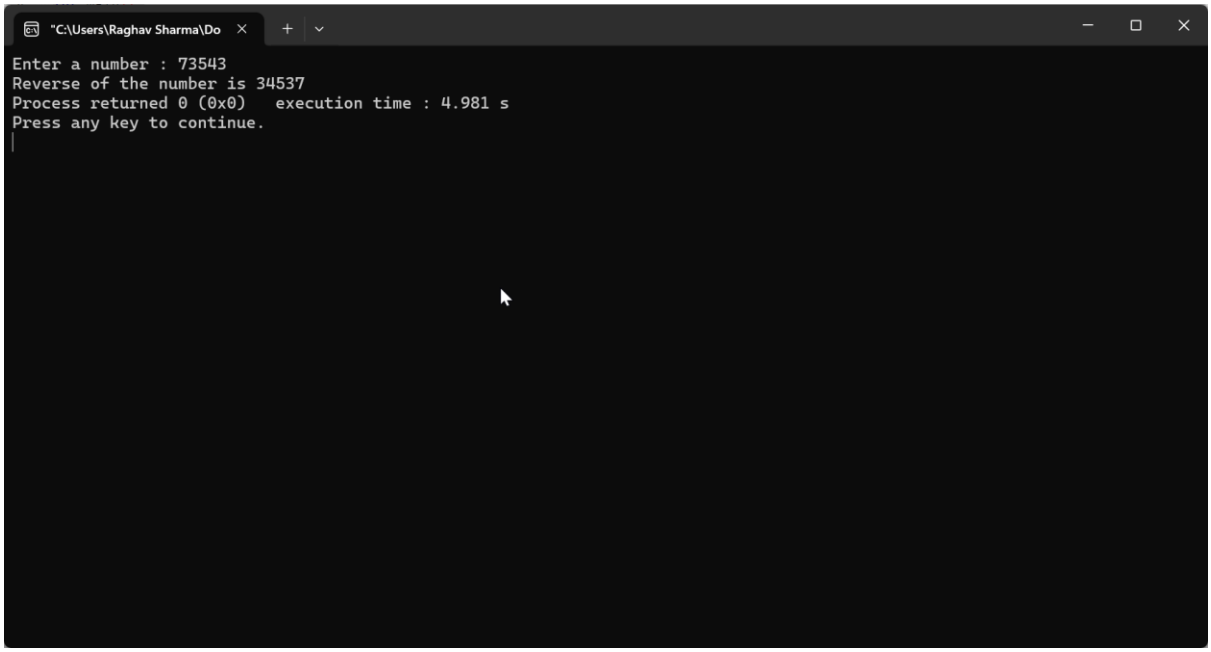
Q7. Fibonacci Series (first n terms)

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int a = 0;
   int b = 1;
   int c = a+b;
   int n;
   int i;

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

   for (i = 0; i<n; i++){
      printf("%d", a);
      if(i<n-1){
         printf(", ");
      }
      a=b;
      b=c;
      c=a+b;
   }

   return 0;
}
```



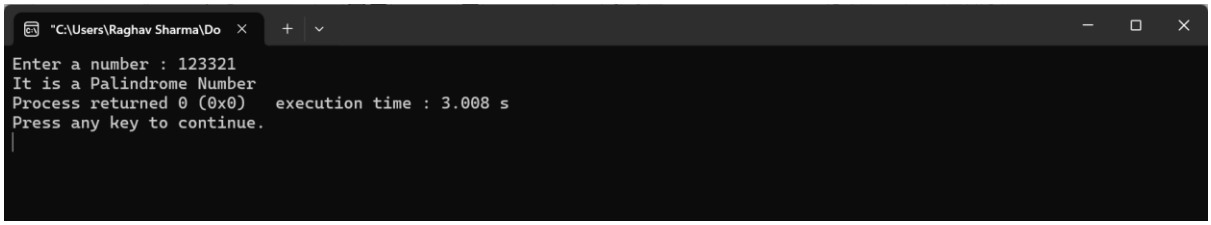
Q8. Reverse a Number

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int num;
   int sum = 0;
   int digit;
   printf("Enter a number : ");
   scanf("%d", &num);

   while(num>0){
      digit = num%10;
      sum = sum * 10 + digit;
      num = num/10;
   }

   printf("Reverse of the number is %d", sum);


   return 0;
}
```



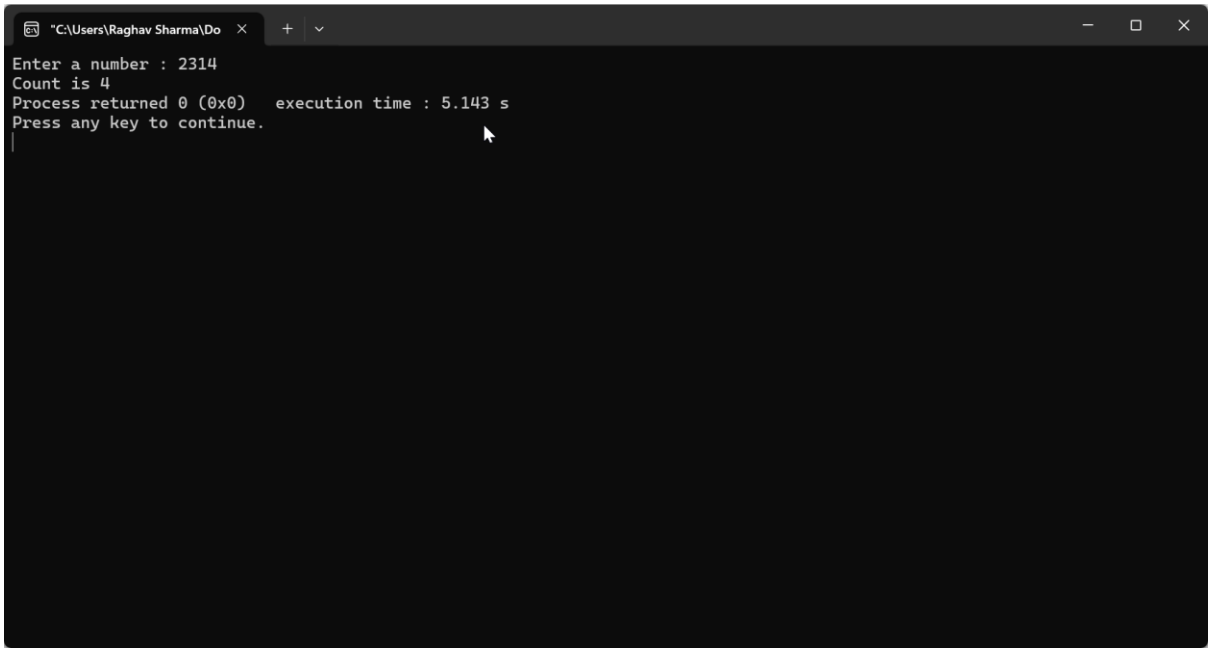
Q9. Palindrome Number Check

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int num;
   int sum = 0;
   int digit;
   int original;
   printf("Enter a number : ");
   scanf("%d", &num);

   original = num;

   while(num>0){
      digit = num%10;
      sum = sum * 10 + digit;
      num = num/10;
   }


   if(original == sum){
      printf("It is a Palindrome Number");
   }
   else{
      printf("Not a Palindrome Number");
   }


   return 0;
}
```



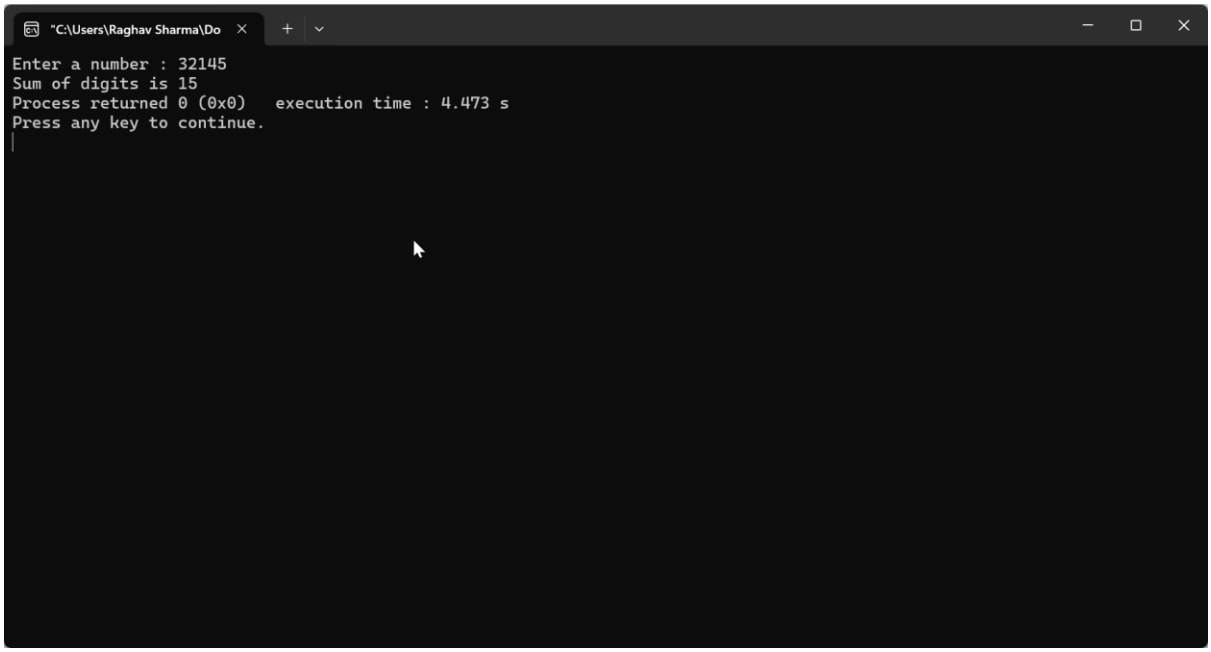
Q10. Count Digits in a Number

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int num;
   int count = 0;
   int digit;

   printf("Enter a number : ");
   scanf("%d", &num);

   while(num>0){
      count++;
      num = num/10;
   }

   printf("Count is %d", count);


   return 0;
}
```



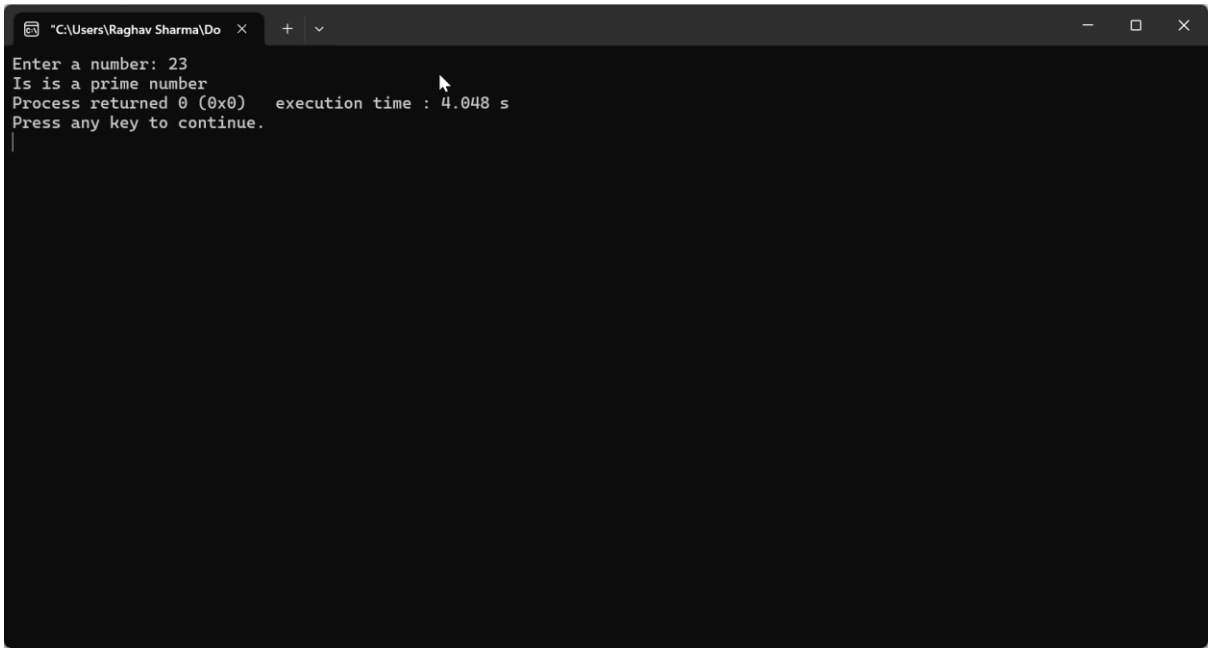
Q11. Sum of Digits

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int num;
   int sum = 0;
   int digit;

   printf("Enter a number : ");
   scanf("%d", &num);

   while(num>0){
      digit = num%10;
      sum = sum + digit;
      num = num/10;
   }

   printf("Sum of digits is %d", sum);


   return 0;
}
```



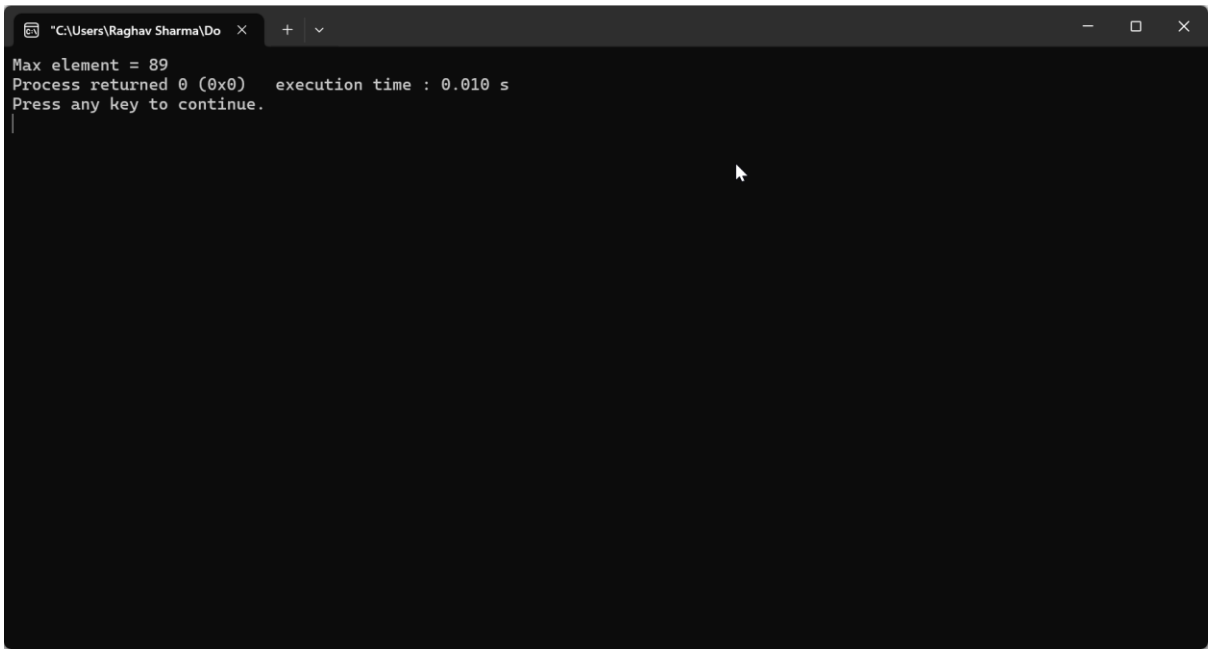
Q12. Check Prime Number

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int num;
   int isPrime = 1;
   printf("Enter a number: ");
   scanf("%d", &num);

   for(int i = 2; i*i<num; i++){
      if(num%i == 0){
         isPrime = 0;
         break;
      }
   }

   if(isPrime){
      printf("Is is a prime number");
   }
   else{
      printf("Not a Prime Number");
   }
   return 0;
}
```



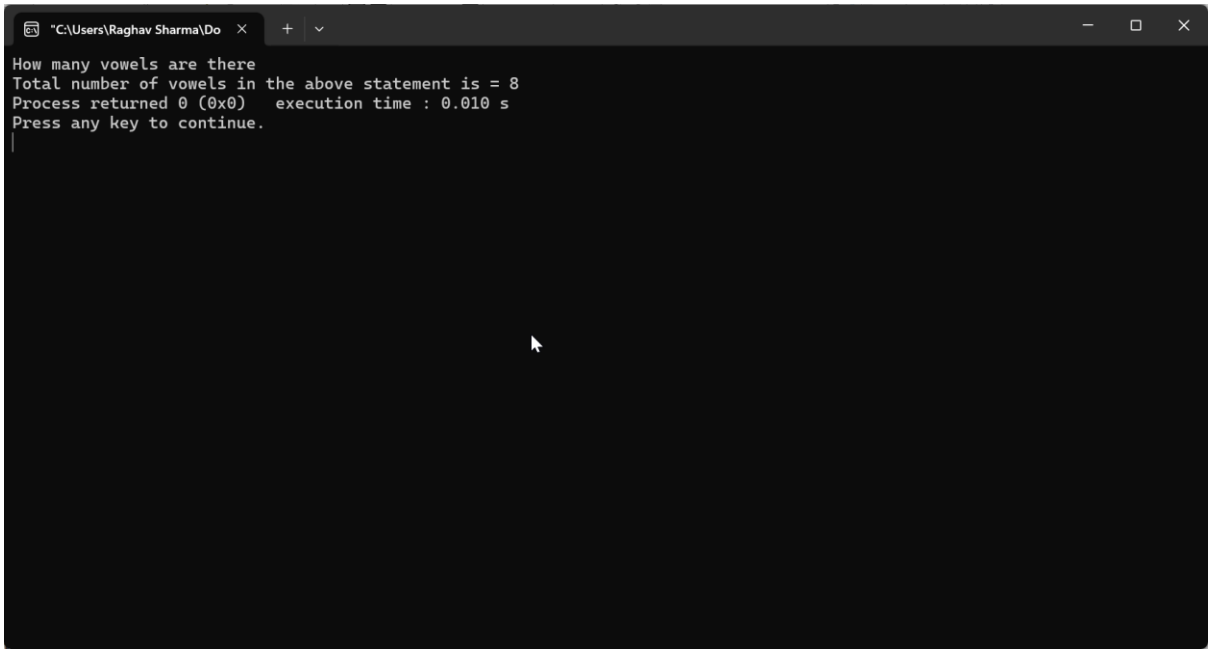
Q13. Array – Find Maximum Element

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int a[8] = {1,3,43,12,54,89,56,79};
   int max = a[0];
   int i;
   int size = sizeof(a)/sizeof(a[0]);

   for(i=0;i<size;i++){
      if(a[i]>max){
         max = a[i];
      }
   }

   printf("Max element = %d", max);
   return 0;
}
```



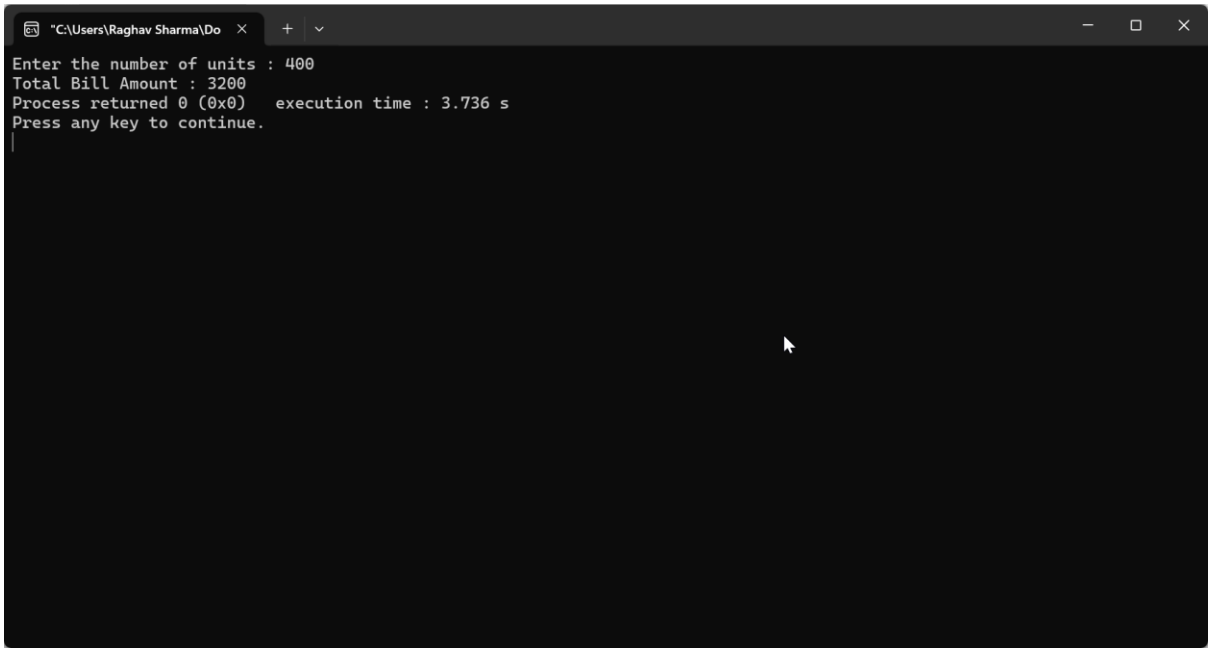
Q14. String – Count Vowels

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   char s[50] = "How many vowels are there";
   int count = 0;
   int i = 0;

   while(s[i] != '\0'){
      if (s[i] == 'A' || s[i] == 'E' || s[i] == 'I' || s[i] == 'O' || s[i] == 'U' || s[i] == 'a' || s[i] == 'e' || s[i] == 'i' ||
s[i] == 'o' || s[i] == 'u')
      {
         count++;
      }
      i++;
   }
   printf(s);
   printf("\nTotal number of vowels in the above statement is = %d", count);
   return 0;
}
```



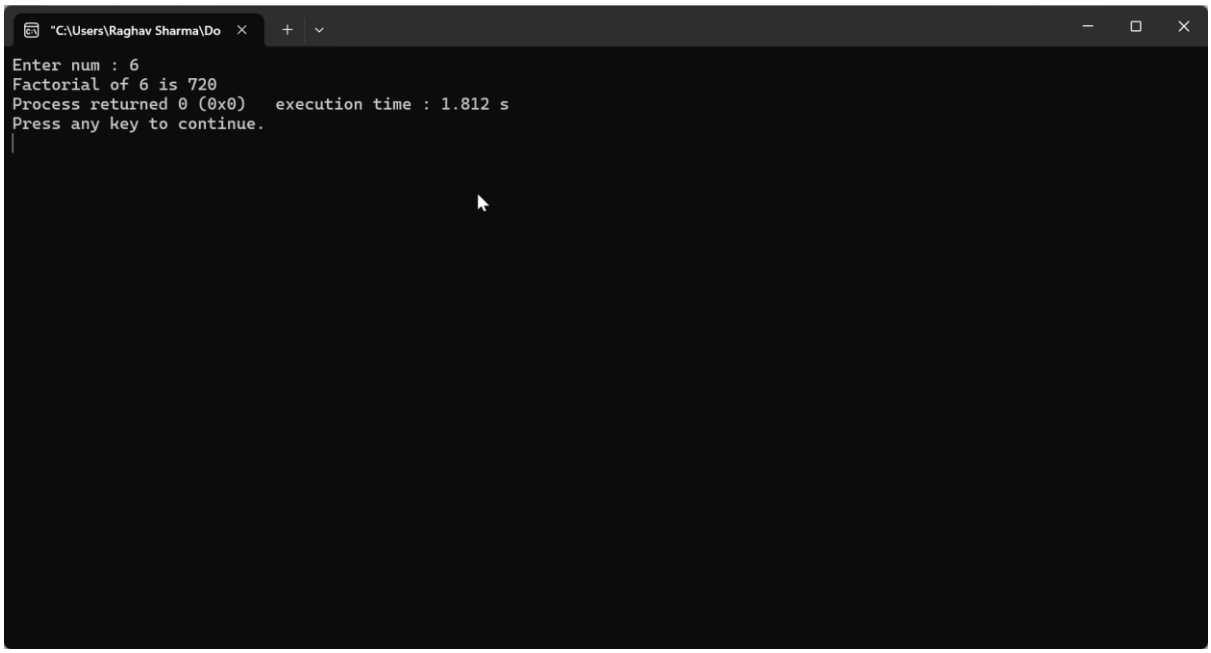
Q15. Scenario – Electricity Bill Calculation

```
#include <stdio.h>
#include <stdlib.h>

int main()
{
   int units;
   int bill = 0;
   printf("Enter the number of units : ");
   scanf("%d",&units);

   if(units <= 100){
      bill = units * 5;
   }
   else if(units <= 200){
      bill = 100*5 + (units-100)*7;
   }
   else{
      bill = 100*5 + 100*7 + (units-200)*10;
   }

   printf("Total Bill Amount : %d", bill);
   return 0;
}
```



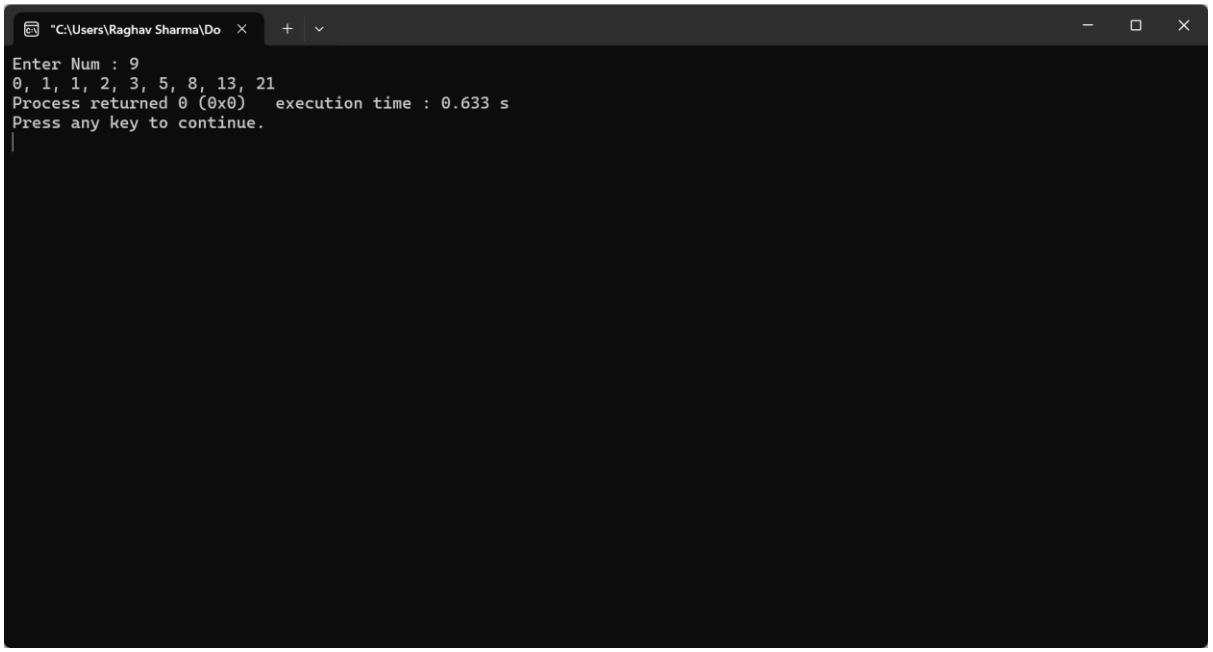
Q16. Factorial using Recursion

```
#include <stdio.h>
#include <stdlib.h>

int fact(n){
   if(n==0 || n==1){
      return 1;
   }
   return n*fact(n-1);
}
int main()
{
   int num;
   printf("Enter num : ");
   scanf("%d", &num);

   printf("Factorial of %d is %d", num, fact(num));
   return 0;
}
```



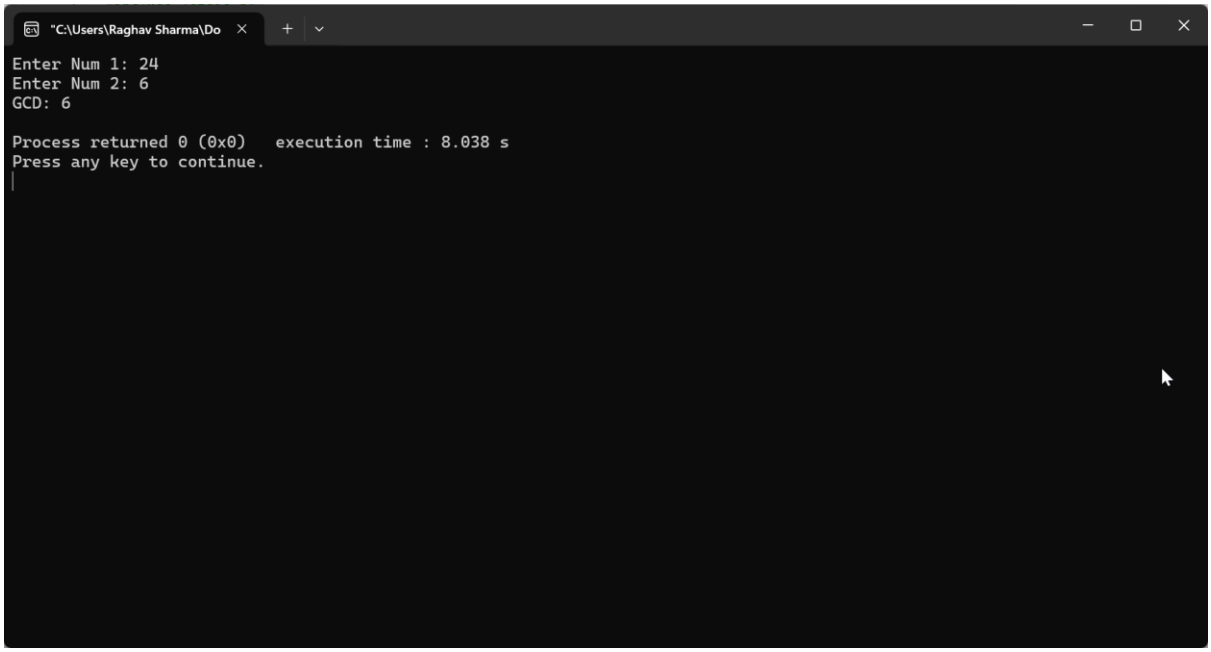
Q17. Fibonacci Series using Recursion

```
#include <stdio.h>
#include <stdlib.h>

int fib(int n){
   if(n==0){
      return 0;
   }
   if(n==1){
      return 1;
   }
   return fib(n-1) + fib (n-2);

}

int main()
{
   int num;
   int i;
   printf("Enter Num : ");
   scanf("%d", &num);
   for(i=0; i<num; i++){
      printf("%d", fib(i));
      if(i<num-1){
         printf(", ");
      }
   }


   return 0;
}
```



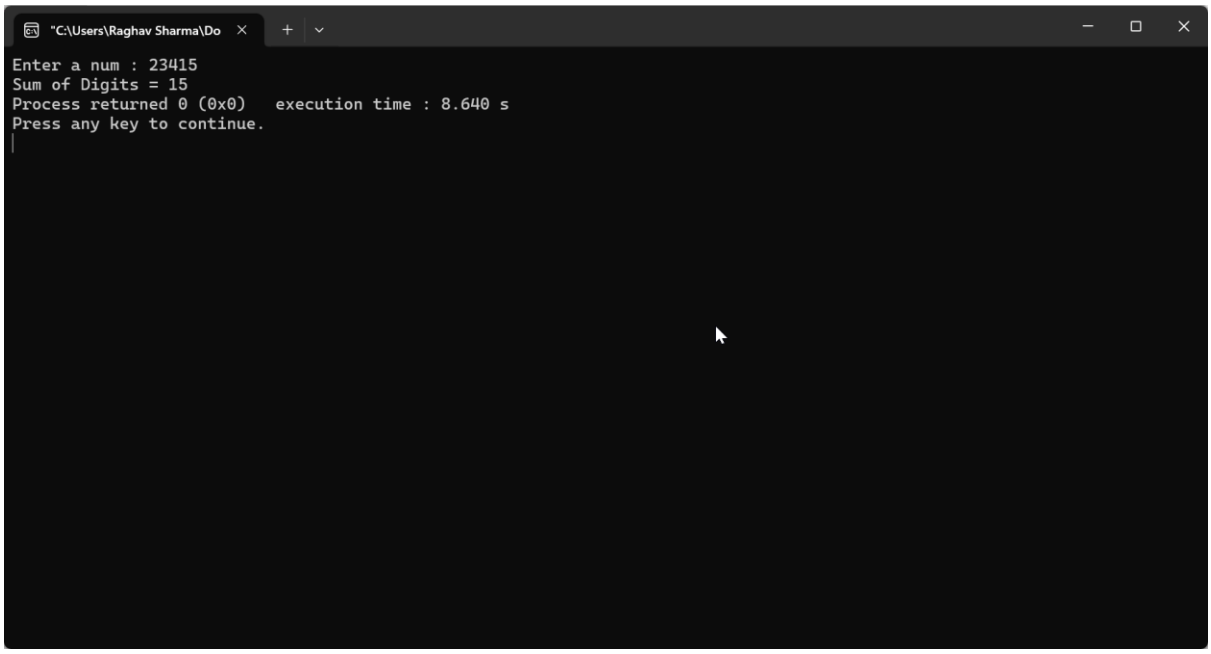
Q18. GCD (Greatest Common Divisor) using Recursion

```
#include <stdio.h>
#include <stdlib.h>

int gcd(int a, int b) {
   if (b == 0)
      return a;
   else
      return gcd(b, a % b);
}

int main() {
   int num1, num2;

   printf("Enter Num 1: ");
   scanf("%d", &num1);
   printf("Enter Num 2: " );
   scanf("%d", &num2);

   printf("GCD: %d\n", gcd(num1, num2));

   return 0;
}
```



Q19. Sum of Digits using Recursion

```
#include <stdio.h>
#include <stdlib.h>

int sumofnum(int n){
   if(n==0){
      return 0;
   }
   return n%10 + sumofnum(n/10);
}
int main()
{
   int num;
   printf("Enter a num : ");
   scanf("%d", &num);

   printf("Sum of Digits = %d", sumofnum(num));


   return 0;
}
```



Q20. Recursive Binary Search

```
#include <stdio.h>
#include <stdlib.h>


int rbs(int arr[], int l, int h, int key) {

   if (l > h) {
      return -1;
   }

   int mid = (l + h) / 2;

   if (arr[mid] == key) {
      return mid;
   }

   else if (arr[mid] > key) {
      return rbs(arr, l, mid - 1, key);
   }
   else {
      return rbs(arr, mid + 1, h, key);
   }
}

int main() {

   int n = 10, key;
   int result;

   int arr[10] = {101,102,103,104,105,106,107,108,109,110};

   printf("Enter book ID: ");
   scanf("%d", &key);

   result = rbs(arr, 0, n - 1, key);

   if (result == -1) {
      printf("Book not found", key);
   } else {
      printf("Book found at index : %d", result);
   }

   return 0;
}
```