C MINI PROJECT

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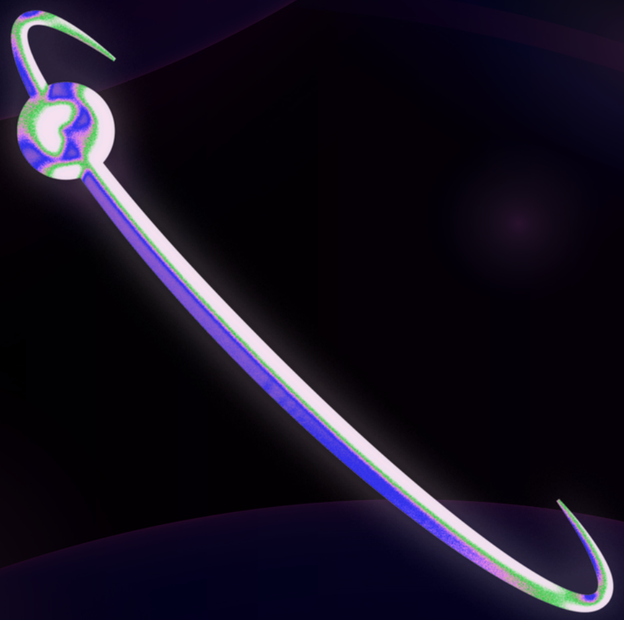
AGENDA

- TO CALCULATE THE FACTORIAL OF A GIVEN NUMBER USING RECURSION
- THE PROGRAM TAKES AN INTEGER INPUT FROM THE USER AND COMPUTES ITS FACTORIAL BY REPEATEDLY MULTIPLYING THE NUMBER WITH THE FACTORIAL OF ITS PREVIOUS VALUE UNTIL THE BASE CONDITION IS REACHED.
- TO CALCULATE THE POWER OF A NUMBER USING RECURSION
- THE PROGRAM ACCEPTS A BASE NUMBER AND AN EXPONENT FROM THE USER AND CALCULATES THE RESULT BY RECURSIVELY MULTIPLYING THE BASE NUMBER UNTIL THE EXPONENT BECOMES ZERO.
- TO GENERATE THE FIBONACCI SERIES USING RECURSION
- THE PROGRAM ASKS THE USER FOR THE NUMBER OF TERMS AND GENERATES THE FIBONACCI SERIES BY DEFINING A RECURSIVE FUNCTION WHERE EACH TERM IS THE SUM OF THE PREVIOUS TWO TERMS.
- TO UNDERSTAND BASE CONDITIONS IN RECURSIVE FUNCTIONS
- THE CODE HIGHLIGHTS THE IMPORTANCE OF BASE CASES TO STOP RECURSIVE CALLS AND AVOID INFINITE RECURSION.

INTRODUCTION:

RECURSION IS ONE OF THE MOST POWERFUL AND ELEGANT CONCEPTS IN COMPUTER SCIENCE, ALLOWING COMPLEX PROBLEMS TO BE SOLVED BY BREAKING THEM DOWN INTO SMALLER, SIMPLER SUBPROBLEMS. IN THE C PROGRAMMING LANGUAGE, RECURSION PROVIDES A NATURAL WAY TO EXPRESS MATHEMATICAL COMPUTATIONS THAT ARE INHERENTLY REPETITIVE IN NATURE. THIS MINI PROJECT, TITLED “RECURSIVE MATH TOOLBOX”, FOCUSES ON BUILDING A COLLECTION OF RECURSIVE FUNCTIONS TO PERFORM FUNDAMENTAL MATHEMATICAL OPERATIONS: FACTORIAL CALCULATION, FIBONACCI SEQUENCE GENERATION, AND POWER FUNCTION EVALUATION.

TOOLS AND TECHNOLOGY



C PROGRAMMING

C PROVIDES DIRECT SUPPORT FOR RECURSIVE FUNCTION CALLS, MAKING IT IDEAL FOR IMPLEMENTING MATHEMATICAL PROBLEMS LIKE FACTORIAL, FIBONACCI, AND POWER.

VS CODE

VS CODE PROVIDES A LIGHTWEIGHT AND POWERFUL EDITOR FOR WRITING C PROGRAMS.FEATURES LIKE SYNTAX HIGHLIGHTING, AUTOINDENTATION, AND BRACKET MATCHING MAKE RECURSIVE FUNCTION IMPLEMENTATION (FACTORIAL, FIBONACCI, POWER) EASIER TO READ AND DEBUG.

GIT HUB

GITHUB PROVIDES GIT-BASED VERSION CONTROL, ALLOWING YOU TO TRACK CHANGES IN YOUR C SOURCE CODE. EACH UPDATE TO YOUR RECURSIVE FUNCTIONS (FACTORIAL, FIBONACCI, POWER) CAN BE COMMITTED WITH A MESSAGE, MAKING IT EASY TO REVIEW PROGRESS AND REVERT IF NEEDED.

WORKING:-

```c
int factorial(int num)
{
    if(num == 1)
    {
        return 1;
    }
    else{
      return(num* factorial(num -1));
    }
}
int power (int num, int p){
    if (p == 0)
    return 1;
    else
    return (num* power(num,p-1));
}
int fibo(int n)
{
    if(n == 0)
    return 0;
    if(n == 1)
    return 1;
    else
    return(fibo(n-1)+fibo(n-2));
}
int main()
{
    int num1,fact,num2,p,res,terms;
```

```c
int main()
{
    int num1,fact,num2,p,res,terms;
    printf("\nEnter a number:");
    scanf("%d",&num1);
    fact = factorial(num1);
    printf("Factorial of a number is : %d",fact);
    printf("\nEnter a number :");
    scanf("%d",&num2);
    printf("\nEnter the power : ");
    scanf("%d",&p);
     res = power(num2,p);
    printf("\nNumber to its power=:%d",res);
    printf("\nEnter number of terms of fibonnaci series :");
    scanf("%d",&terms);

    printf("\nFibonacci Series:\n");
    for( int i =0 ; i<=terms ; i++)
    {
        printf("%d\t",fibo(i));
    }
    return 0;
}
```

```
FACTORIAL!!!


Enter a number:5
Factorial of a number is : 120

POWER!!!


Enter a number :2

Enter the power : 3

Number to its power=:8

FIBONACCI SERIES!!!


Enter number of terms of fibonnaci series :10

Fibonacci Series:
0       1       1       2       3       5       8       13      21      34
PS C:\Users\adhik\OneDrive\Documents\Practical_Programs_Of_C\Mini-Project>
```

APPLICATION:-

- MATHEMATICS: USEFUL FOR FACTORIAL (COMBINATORICS), FIBONACCI (PATTERNS, MODELING), AND POWER (EXPONENTIAL CALCULATIONS).
SOFTWARE DEVELOPMENT: CAN BE REUSED AS A MATH LIBRARY OR INTEGRATED INTO LARGER PROJECTS.
- RESEARCH: ENABLES PERFORMANCE ANALYSIS OF RECURSION VS. ITERATION, AND EXPLORATION OF OPTIMIZATION TECHNIQUES.
- REAL-WORLD USE: SUPPORTS APPLICATIONS IN GRAPHICS (FRACTALS), DATA STRUCTURES (TREE/GRAPH TRAVERSAL), AND SCIENTIFIC SIMULATIONS.
- CAREER VALUE: SHOWCASES CODING ABILITY ON GITHUB, ADDS TO PORTFOLIO, AND PREPARES FOR TECHNICAL INTERVIEWS. YOUR PARAGRAPH TEXT

ADVANTAGES:-

- SIMPLIFIES COMPLEX PROBLEMS BY BREAKING THEM INTO SMALLER SUBPROBLEMS.
- ENHANCES UNDERSTANDING OF RECURSION THROUGH PRACTICAL EXAMPLES.
- MODULAR DESIGN WITH SEPARATE FUNCTIONS FOR FACTORIAL, FIBONACCI, AND POWER.
- FIBONACCI SEQUENCES AND THE GOLDEN RATIO ARE APPLIED IN MODELING NATURAL PHENOMENA, DESIGNING AESTHETICALLY PLEASING STRUCTURES, AND EVEN MUSIC THEORY.

FUTURE SCOPE :-

- EXPAND TOOLBOX INTO A REUSABLE MATH LIBRARY FOR LARGER C PROJECTS.
- GRAPHICAL INTERFACE INTEGRATION TO MAKE THE TOOLBOX MORE INTERACTIVE.
- REAL-WORLD APPLICATIONS IN DATA STRUCTURES (TREE/GRAPH TRAVERSAL) AND COMPUTER GRAPHICS (FRACTALS).

GIT HUB LINK:

https://github.com/shubhamadhikari-sys/Practical_Programs_Of_C-Shubham_Adhikari_Ru-25-11406_1B_IBM.git

THANK YOU!