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Basic Calculator Project In C Programming Language

Atish Kumar Sahu (Software Developer)

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About:

Greetings! I am Atish Kumar Sahu, a dynamic and dedicated individual hailing from the enchanting city of Berhampur, Odisha, India. With a relentless passion for technology and innovation, I have made significant strides in the world of software development.

During my tenure as a Junior Application Developer at Pantheon Inc, from June 2022 to October 2022, I immersed myself in the realm of application development, honing my skills and contributing to the creation of cutting-edge solutions.

My pursuit of knowledge led me to acquire a B.Tech degree in Computer Science Engineering (CSE) from Parala Maharaja Engineering College, graduating in the year 2022. Throughout my academic journey, I demonstrated a keen aptitude for learning and consistently showcased an exemplary work ethic.

As a professional, I pride myself on my adeptness in team management, fostering collaboration, and driving projects to successful completion. My unwavering focus and determination enable me to tackle challenges head-on, delivering results that exceed expectations.

In terms of technical expertise, I possess proficiency in an array of programming languages, including C, Java, and MySQL, and my knowledge extends to the realm of web development. Additionally, I am well-versed in utilizing tools such as MS Office and Google Suite to streamline operations and boost productivity.

In summary, I am an enthusiastic and adaptable individual, committed to delivering exceptional outcomes in the realm of software development. With a solid foundation in technology and a penchant for hard work, I eagerly embrace opportunities to contribute meaningfully to projects and organizations.

Thank you for considering my profile, and I look forward to making a valuable impact wherever I embark on my professional journey.

Project Introduction:

The "Basic Calculator" project is developed using C programming language, employing fundamental concepts. This project aims to deliver a user-friendly calculation tool for everyday use. It encompasses essential mathematical operations, such as Arithmetic, Percentage, Power, Root, and Factorial functions. Prior to proceeding with the project documentation, it is assumed that readers have a basic understanding of C programming and are familiar with the mentioned mathematical operations, illustrated with practical examples. The calculator provides an efficient and reliable solution for performing common calculations effortlessly.

Mathematical Operations:

Operation Name	Example	Operand	Operator	Output
Addition	100 + 200 = 300	100 & 200	+	300
Subtraction	800 – 200 = 600	800 & 200	-	600
Multiplication	80 * 30 = 2400	80 & 30	*	2400
Division	280 / 7 = 40	280 & 7	/	40
Modulo	240 (mod) 2 = 0	240 & 2	(mod)	0
Percentage	84% = 0.84	84	%	0.84
	24 % 88 = 21.12	24 & 88	%	21.12
Power Function	(8) ³ = 512	88	() ⁿ or ^	512
Root Function	√144 = 12	144	√	12
Factorial	8! = 40320	8	!	40320

Table 1: Mathematical Operation

C Programming Concepts:

C is a powerful and widely used general-purpose programming language created by Dennis Ritchie in the early 1970s at Bell Labs. Known for its efficiency and portability, C has become the foundation for numerous operating systems, software applications, and embedded systems. It is a procedural language, following a structured approach to programming. Its syntax is minimalistic yet expressive, providing low-level control over the hardware while maintaining a relatively simple and elegant design.

C's popularity stems from its ability to directly interact with the computer's memory, making it suitable for system-level programming tasks and optimizing performance-critical applications. Its standard library offers a rich set of functions to manipulate strings, arrays, and other data structures efficiently.

As a widely taught programming language, C serves as an excellent starting point for learning computer programming concepts and understanding the underlying principles of how computers work. Despite its age, C remains relevant and widely used in various domains, such as operating systems, compilers, embedded systems, and game development, making it a fundamental language for programmers to master.

Flow Of Entire Project:

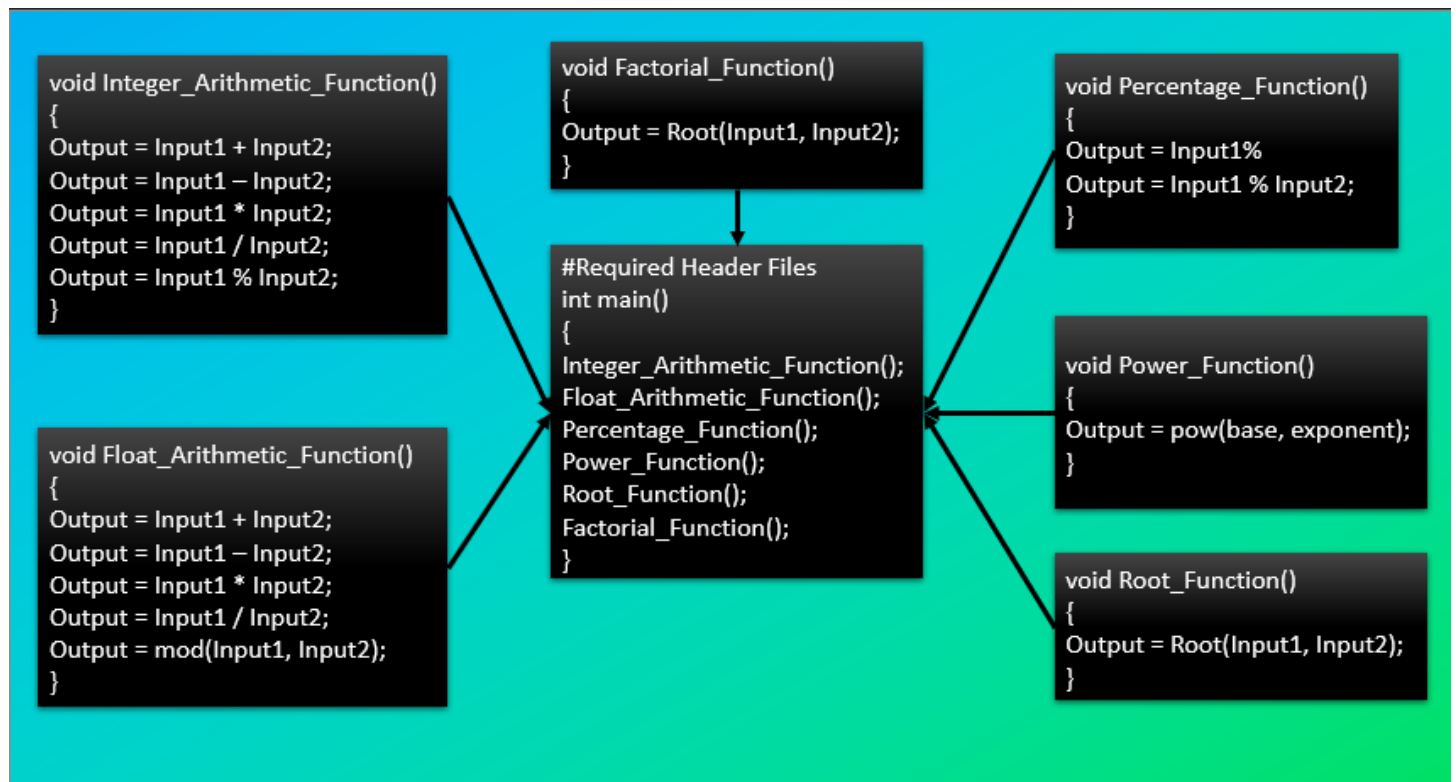


Figure 1: Flow Of Basic Calculator Project

The entire project's flow is like in c programming first the programmer start with the required header file and main() function. inside the main function he calls the other user-defined function that are created by the programmer. In the Figure 1 you can observe the user-defined function that are called inside the main function.

The following user-defined functions are as follows: void Integer_Arithmetic_Function(), void Float_Arithmetic_Function(), void, Percentage_Function(), void Power_Function(), void Root_Function(), void Factorial_Function(). Inside every function including the main function I just show you the prototype design of the code, but in below I will explain each and every function with practical implementation.

1. The function void Integer_Arithmetic_Function() you can see the arithmetic operation between Integer values.
2. The function void Float_Arithmetic_Function() you can see the arithmetic Operation between Float values.
3. The function void Factorial_Function() you can see the operation of how to find factorial of a number.
4. The function void Percentage_Function() you can see the operation of how to find percentage of a number.
5. The function void Power_Function() you can see the operation of how to find power of a number.
6. The function void Root_Function() you can see the operation of how to find root of a number.

Header File:

A header file is a file with extension (.h). a general practice in C or C++ program is that we keep all the constants, macros, system wide global variable, and function prototypes in header files and include that header file whatever it is required.

Both user and system header files are included using the preprocessing directive `#include`. It has following two forms. If a header file happens to be twice, the compiler will process its content twice and may result in an error. The standard way to prevent this is to enclose the entire real contents of the header file in a conditional as follows.

Required Header Files In This Project:

The required header files in this project are as follows:

#include<stdio.h>

In C programming, `"#include<stdio.h>"` is a preprocessor directive that tells the compiler to include the standard input-output library in the program. The library is essential for input and output operations like reading from the keyboard and displaying on the screen.

It provides functions like `"printf()"` for formatted output and `"scanf()"` for formatted input. Including `"stdio.h"` at the beginning of a C program allows you to utilize these input-output functions and perform essential I/O operations within your code.

#include<conio.h>

This header file provides functions like `"getch()"` and `"clrscr()"`, which facilitate character input without displaying it on the screen and clearing the screen, respectively.

However, it's essential to note that the `"conio.h"` library is not portable and may not work on all systems or modern compilers. As a result, it is generally advised to use standard input-output functions from `"stdio.h"` for portability and compatibility across different platforms.

#include<windows.h>

The `"windows.h"` library provides functions for creating and managing windows, handling messages, working with resources, and interacting with the Windows environment. It also includes constants and data types necessary for Windows programming.

#include<math.h>

In C programming, `"#include<math.h>"` is a preprocessor directive that enables the inclusion of the `"math.h"` header file in the program. The `"math.h"` library provides various mathematical functions for performing common mathematical operations and calculations.

Some of the commonly used functions from `"math.h"` include trigonometric functions like `"sin()"`, `"cos()"`, and `"tan()"`, exponential and logarithmic functions like `"exp()"`, `"log()"`, and `"pow()"`, and rounding functions like `"ceil()"` and `"floor()"`.

Function:

In every programming language, a function plays an important role. Basically, a function is a block of code which has some name of identification.

Even in the C language, the smallest program has at least one function. All function names must be unique. In C language, the `main()` function is the mandatory function, because the compiler will start its execution from `main()` function.

So, that there is one function name, just be `main()` `function()`. You can define function is any sequence, No keyword is a function. Operating System calls `main()` function to begin the execution of every C programming source code.

Types Of Function:

Generally there are two types of functions are there in every programming language. In C programming language also there are two types of function is there.

1. Pre-Defined Function:

These are the types of function which is already created for C programming language to simplify the source code. Basically these functions actual code was stored in library files or you can say the header files, which are the (.h) extension files. Because of that in every source code we need to add the header file to simplify our source code. Example: `printf()`, `scanf()`, `getch()`, `exit()`, `pow()`, etc.

2. User-Defined Function:

These are the types of function which are created by user/programmer who wants to simplify the code according to its requirement. Function helps a user from so many ends. User defined function must be declared by programmer or user. The programmer has to write the code for such function and test them properly before using them. Example: `Arithmetic()`, `Multiplication()`, etc.

Return Type Function:

A return type function is a function that explicitly returns a value after performing its operations. It uses a data type to specify the type of value it will return, and the "return" keyword is used to send the result back to the calling code.

Non-Return(void) Type Function:

This type of function does not return any value. Instead, it performs a set of operations or tasks without providing a result to the caller. It is declared using the "void" keyword, indicating that no value will be returned from the function.

Required Functions In This Project:

main()

In C programming, "`main()`" is the entry point function for any C program. It is the starting point of program execution, and the program's execution begins with the first statement inside the main function. The main function returns an integer value, typically 0, to the operating system upon successful execution, indicating that the program terminated without errors.

getch()

In C programming, "`getch()`" is a function defined in the "`conio.h`" header file (non-standard, primarily used in DOS and Windows environments). It is used to read a single character from the keyboard without displaying it on the screen.

system("Cls")

In C programming, "system("Cls")" is a command used to clear the screen or console. It executes the "Cls" command in the system shell (command prompt or terminal), clearing the display and providing a clean screen for the user interface.

pow(value1, value2)

In C programming, pow(base, exponent) is a function defined in the <math.h> header file. It is used to calculate the value of the given 'base' raised to the power of 'exponent', returning the result as a double data type.

void Integer_ArithMetic_Function()

The defined function is an user-defined function to perform arithmetic operation with two integer value. in Integer Arithmetic Operation these are the following operations and their results. Suppose Value1 & Value2 are the Integer Variable then the following arithmetic operations are

Addition:	Value1 + Value2	Subtract:	Value1 – Value2		
Multiply:	Value1 * Value2	Division:	Value1 / Value2	Modulo:	Value1 % Value2

Example:

10 + 20 = 30 60 – 40 = 20 30 * 80 = 2400 12 / 6 = 2 12 % 6 = 0

void Float_Arithmetic_Function():

The defined function is an user-defined function to perform arithmetic operation with two floating type value. the following Arithmetic Operation and their examples are, suppose Value1 & Value2 are the float type value then,

Addition:	Value1 + Value2	Subtract:	Value1 – Value2		
Multiply:	Value1 * Value2	Division:	Value1 / Value2	Modulo:	Value1 % Value2

Example:

10.5 + 2.5 = 13.0 15.7 – 7.8 = 7.90 2.8 * 3.1 = 8.679 12.3 / 4.3 = 2.8604

fmod(12.3, 4.3) = 3.7000

void Percentage_Calculation():

The defined function is an user-defined function where you can find percentage of a single value or between 2 value. suppose Value1 is a integer variable then the percentage value is ((float)Value1 / 100). Suppose Value2 and Value3 are the integer Variable then the percentage is ((float) value2 / 100 * Value3);

Example:

70% = 0.70000 15 % 175 = 26.250002

void Power_Function():

The defined function is an user-defined function to calculate power of a value. in mathematics to find a power of a value we need two things base and exponent. 'base' refers to the numerical value that will be raised to a certain power. 'exponent' refers to the power to which the 'base' value will be raised. **Example:** 2⁴ = 16

void Root Function():

The defined function is an user-defined function to calculate and find specific root of a value. To find the root of a value the formula is $[r = 1 / \text{pow}(\text{base}, \text{root})]$;

Example: $\text{root}(8, 3) = 2$

void Factorial Function():

The defined function is an user-defined function to calculate and find factorial of a value. To find factorial of a value the formula is, suppose Value1 = 7 then the factorial of 5 is $7 * 6 * 5 * 4 * 3 * 2 * 1 = 5040$

void first_page():

The defined function is an User-Defined function to which is used for to select any one calculating operation to experience that particular operation.

Switch Statement:

In C, the switch statement is a control flow construct that allows you to choose one of several possible execution paths based on the value of a single expression. It evaluates the expression once and compares it with multiple case labels, executing the corresponding block of code associated with the matching case label. The switch statement is commonly used as a cleaner alternative to multiple nested if-else statements for multiple conditional checks.

Type Casting:

Type casting in C is the process of converting a value from one data type to another. It is done explicitly using the syntax (data_type) before the variable or expression to be converted. Type casting enables the programmer to ensure correct data interpretation during operations or assignments, allowing compatibility between different data types.

Conclusion:

In conclusion, the basic calculator project in C programming provides a fundamental tool for performing arithmetic operations, percentage calculation, power calculation root calculation and factorial of a number. By implementing functions for these operations, the calculator becomes a versatile utility. With proper error handling and user input validation, the calculator offers a reliable and user-friendly experience. By building this project, programmers can enhance their understanding of C programming concepts, including functions, control flow, and data types, while creating a practical application with real-world utility.

----- The End -----