جامعة لوسيل
Lusail University
QATAR

Group Project

(Computer Programming |)

Fall 2023

Student Information		Assignment Information	
Group Names		Instructor Name	Mohammad Alshraideh
LU IDs		Due date	30 November 2023
CRN		Time	6:00 PM

Project Title: Simple Calculator Application

Project Description:

For this project, you will collaborate in groups of 3-5 to create a basic calculator application in C++. The objective is to assess your skills in designing, coding, and documenting a C++ program that incorporates functions, control structures, and user input/output. This project is worth a total of 10 points and consists of two primary elements: (1) developing the C++ code and (2) preparing a report.

Project Requirements:

Part 1: C++ Code Development

Every group is required to create a basic calculator application that includes the following features:

To choose from various alternative operations using a switch-case statement, declare a char variable named "O." Subsequently, read its value using the "cin" statement as follows (cin >> O;).

1. For the ' + ' (Addition) operation, you should declare two double numbers named "x" and "y." Use the "cin" statement to read both of them (cin >> x >> y). This operation calculates the sum of both numbers. Your program should function as follows:

```
Please enter the operation +
enter the 1st num 7
enter the 2nd num 15
The answer is = 22
```

2. For the ' - ' (Subtraction) operation, declare two double numbers named "a" and "b." Utilize the "cin" statement to read both (cin >> a >> b). This operation calculates the subtraction of the two numbers. Your program should function as follows:

```
Please enter the operation -
enter the 1st num 24
enter the 2nd num 15
The answer is = 9
```

3. For the ' * ' (Multiplication) operation, declare two double numbers named "num1" and "num2." Use "cin" to read both of them. This operation calculates the result of multiplying these two numbers. Your program should operate as follows:

```
Please enter the operation *
enter the 1st num 5
enter the 2nd num 7
The answer is = 35
```

4. For the ' / ' (Division) operation, declare two double numbers named "e" and "d." Utilize the "cin" statement to read both of them. This operation calculates the result of dividing "e" by "d." Your program should function as follows:

```
Please enter the operation /
enter the 1st num 44
enter the 2nd num 13
The answer is = 3.38462
```

5. For the ' % ' (Modulus) operation, declare two **integer** numbers named "f" and "g." Use "cin" to read both of them (cin >> f >> g). This operation calculates the remainder of dividing the first integer value by the second integer value. Your program should operate as follows:

```
Please enter the operation %
enter the 1st num 16
enter the 2nd num 3
The answer is = 1
```

6. For the 'f' (Factorial) operation, it calculates the factorial of a given positive integer 'n' using a user-defined function called **factorial**. Declare an integer number called "num" and read its value using "cin."
example (e.g., factorial (4) = 4! = 4 * 3 * 2 * 1 = 24).
Here's how your program should work:

```
Please enter the operation f
enter the num 4
Factorial is 24
```

7. For the 'w' (Power) operation, you should read two numbers, 'm1' and 'm2,' using "cin" to input their values. This operation calculates 'm1' raised to the power of 'm2.'
For example, if you input 'm1 = 5' and 'm2 = 3,' the program will output 'Result: 125,' which is the result of 5^3.

Your program should work as follows:

```
Please enter the operation : w
enter num1 :  5
enter num2 :  3
The result is : 125
```

8. For the 'r' (Range) operation, you can write a program that reads two integers, 'A' and 'B,' and then prints all the numbers between this range [A, B] using a for loop.
Your program should work as follows:

```
Please enter the operation r
enter the 1st num 10
enter the 2nd num 3
10 9 8 7 6 5 4 3
```

9. For the 's' (Series) operation, you can write a program that calculates the sum of the series 1 + 1/2 + 1/3 + ... + 1/N for a given integer 'N' using a user-defined function called (calculateSeriesSum).
Your program should work as follows:

```
Enter an integer number (N): 4
The summation of the series is: 2.08333
```

10. For the 'P' (Prime) operation, you can write a program that checks whether a given integer 'NUM' is a prime number or not using a user-defined function called **isPrime**

Your program should work as follows:

```
Please enter the operation p
enter the num 7
 prime number
```

```
Please enter the operation p
enter the num 9
Not prime number
```

The application should have a user-friendly interface that allows users to enter two numbers and select an operation. After performing the calculation, the program should display the result to the user.

Additionally, the application should handle the following scenarios:

- Division by zero error.
- Invalid input (e.g., non-numeric input).

Part 2: Documentation and Discussion

The project report and presentation are structured to address the provided evaluation criteria. Here's how each section can be elaborated for the calculator application project:

Report:

1. Introduction:
    - Provide a brief overview of the project and its objectives. Mention the main goal of creating a user-friendly calculator application that handles various scenarios.
2. Problem Statement:
    - Explain the problem the calculator application aims to solve. Discuss the need for a user-friendly calculator that can handle division by zero and invalid input.
3. Design and Implementation:

- Describe the program's structure, including how user input is handled and how different functions are implemented.
- Explain the use of user-defined functions for arithmetic operations, input validation, and error handling.
- Discuss the decision to use a switch-case statement for operation selection.

4. Testing:
    - Explain how the group conducted testing to ensure the application's correctness and reliability.
    - Provide sample test cases, both valid and invalid, and present their results. Discuss any unexpected behavior and how it was addressed.
5. Challenges Faced:
    - Share the challenges or difficulties encountered during the development process.
    - Explain how the group addressed these challenges, whether they were related to design, coding, or testing.
6. Conclusion:
    - Summarize the key points discussed in the report.
    - Highlight the success of the project in meeting its objectives, including providing a user-friendly calculator with error handling.

Presentation:

1. Introduction:
    - Start the presentation by introducing the project and its significance in solving the problem of creating a user-friendly calculator.
2. Demonstration:
    - Provide a live demonstration of the calculator application, showcasing its working and all available functionalities.
    - Ensure that the demonstration is clear, and each step is explained.
3. Design and Code Explanation:
    - Explain the high-level design of the code, including how the different functions work together.
    - Discuss the logic behind implementing user-defined functions and the decision to use a switch-case statement.
    - Highlight code organization, readability, and effective use of functions.

4. Testing and Results:
    - Describe the testing process, including the types of test cases used (valid and invalid).
    - Present the results of the test cases and how the application handled different scenarios.
5. Group Collaboration:
    - Discuss how the group collaborated on the project, how tasks were assigned, and how efforts were coordinated.
    - Highlight teamwork and communication within the group.
6. Q&A:
    - Allow the class to ask questions about the project, code, or any challenges faced during development.

Remember to maintain a clear and engaging presentation style and ensure that all group members actively participate in the presentation. Emphasize the successful completion of the project's objectives, as well as the collaborative effort that went into its development.

Evaluation Criteria:

The evaluation criteria for the project are as follows:

Report (6 Points):

1. **Report (2 points):** The report comprehensively explains the project, including design decisions, challenges faced, and testing results.
2. **Functionality (3 points):** The calculator application correctly performs the required tasks, including handling various scenarios and providing accurate results.
3. **Code Quality (1 point):** The code is well-organized, readable, and properly commented. Functions are effectively used to modularize the code and improve maintainability.

Presentation (4 Points):

1. **Presentation (3 points):** The presentation is clear, engaging, and informative. It effectively conveys the key points of the project, including its significance, design, code explanation, testing, and results.
2. **Group Collaboration (1 point):** The group demonstrates effective collaboration on the project. Tasks were distributed and coordinated efficiently, showcasing teamwork within the group.

To maximize the project's success, ensure that both the report and presentation address these criteria comprehensively and cohesively.