Overview

The calculator application is designed to provide users with a fast and efficient way to perform basic mathematical operations, including addition, subtraction, multiplication, division, and exponentiation. The application emphasizes user experience through clear prompts and robust error handling, ensuring that calculations are accurate and user-friendly.

Operation Selection

1. **User Prompt for Operation:**
    - Upon launching the application, users are greeted with a menu where they can select one of the available operations: addition, subtraction, multiplication, division, or exponentiation.
    - The application clearly displays each option, allowing users to make an informed choice.
2. **Error Handling for Invalid Selection:**
    - If a user inputs an invalid operation (not listed in the menu), the application provides a friendly error message. This message prompts the user to try again, enhancing the overall usability of the application.
3. **Input of Numbers:**
    - After selecting an operation, users are prompted to enter two numbers.
    - The application checks that these inputs are numeric, utilizing error handling to catch any non-numeric entries.
4. **Error Handling for Non-Numeric Input:**
    - If a user inputs a non-numeric value (such as letters or special characters), the application notifies them of the error and prompts them to enter valid numbers again. This ensures the calculations can proceed without issues.

Performing Calculations

5. **Executing the Operation:**
    - Once valid numbers are entered, the application performs the selected operation and calculates the result.
    - If the operation is division, the application checks for division by zero, providing an appropriate error message if necessary.
6. **Error Handling for Division by Zero:**
    - If the user attempts to divide by zero, the application alerts them with a specific error message, prompting them to re-enter a valid divisor.

Displaying Results

7. **Showing Results:**
    - After the calculation, the application displays the result in a clear format. This includes the equation (e.g., “5 + 3 = 8”) for clarity.
8. **Continuing Operations:**
    - Following the display of the result, users are prompted with a message asking if they wish to continue with another calculation. They can choose to perform additional operations or exit the application

Repeating Operations

9. **Selecting Another Operation:**
    - If the user decides to continue, they are directed back to the operation selection menu, where they can choose a different operation and repeat the input process.

Bonus Features

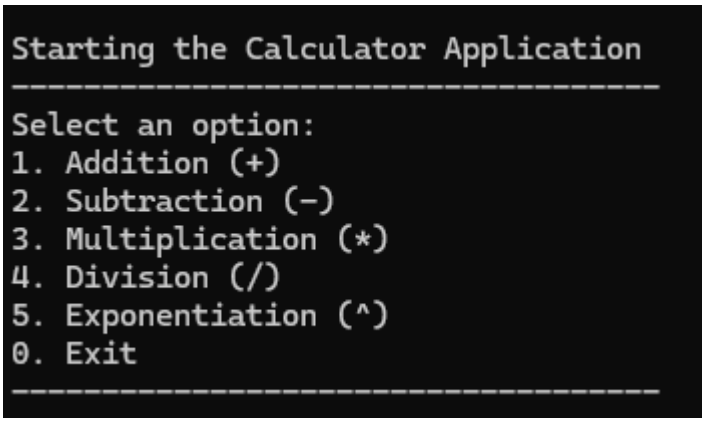
10. **Displaying Calculation History:**
    - At the end of the session, once the user opts not to continue, the application displays a history of all previous calculations performed during that session. This feature allow users who wish to review their past calculation results.
11. **Additional Operations:**
    - The inclusion of exponentiation as a selectable operation enhances the calculator's functionality, catering to users who need to perform more complex calculations.
12. **User-Friendly Design:**
    - The overall interface is designed to be intuitive, making it accessible for users of varying skill levels. Clear instructions and responsive error messages contribute to a positive user experience.

Conclusion

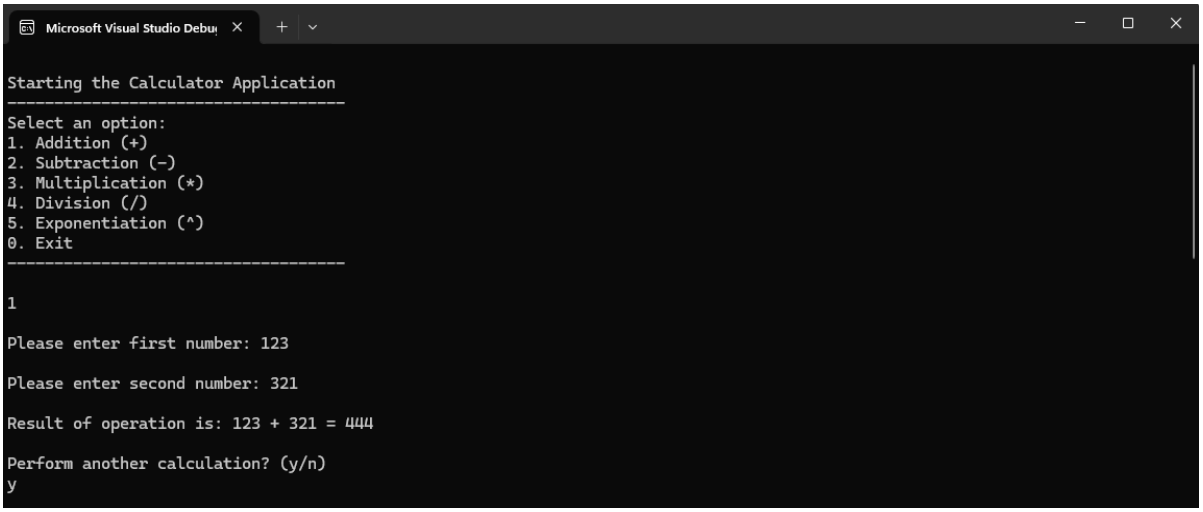
In summary, the calculator application offers a robust platform for performing basic and advanced mathematical operations. Through comprehensive error handling and a history feature, it ensures accuracy and user satisfaction, while meeting user needs effectively.

Screenshots of Calculator Application

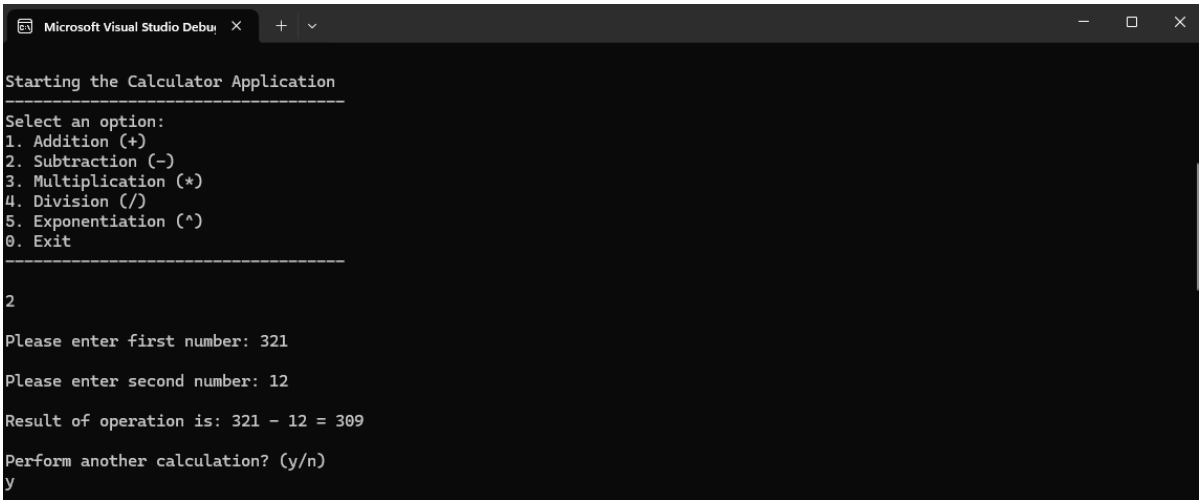
-> Menu for Calculator Application



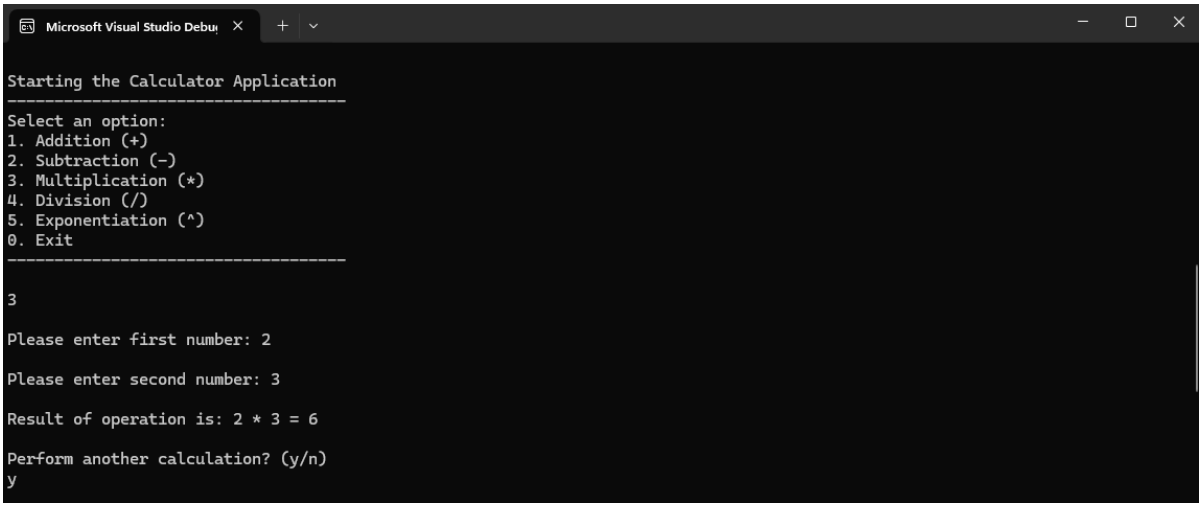
-> User select 1. Addition.
-> User proceed to enter 2 numeric numbers.
-> Result is displayed to user.
-> A prompt message will be shown to ask whether user wish to perform another calculation.
-> If user enters “y”, he/she will be brought back to the calculation menu to perform additional operations or exit the application.



-> User select 2. Subtraction.
-> User proceed to enter 2 numeric numbers.
-> Result is displayed to user.
-> A prompt message will be shown to ask whether user wish to perform another calculation.
-> If user enters “y”, he/she will be brought back to the calculation menu to perform additional operations or exit the application.

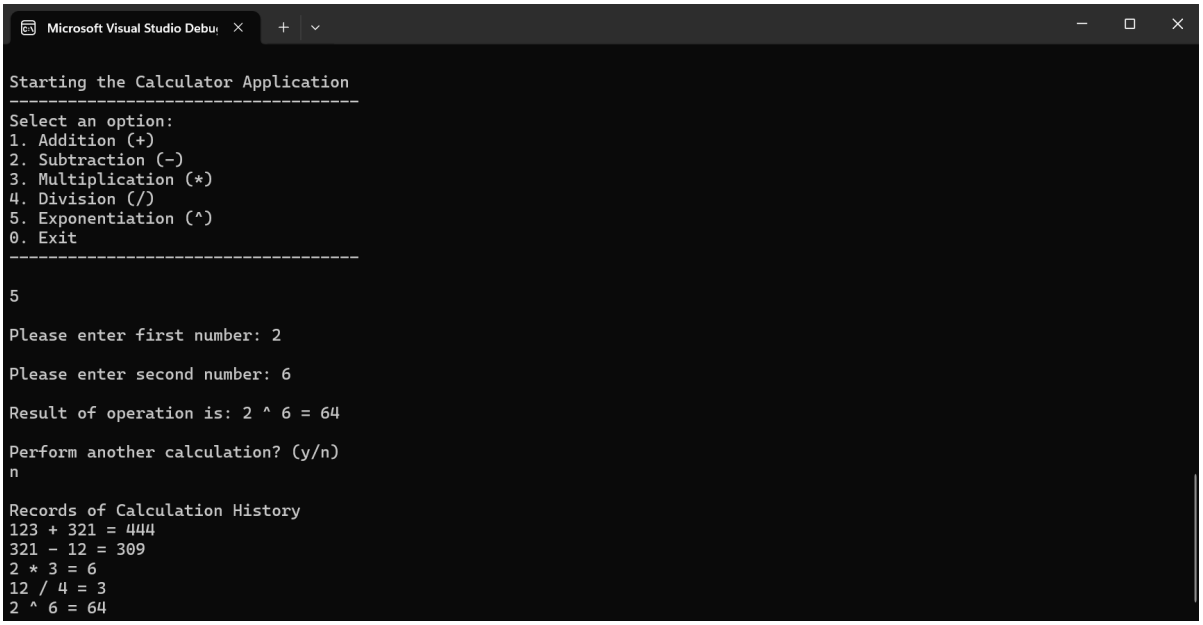


-> User select 3. Multiplication.
-> User proceed to enter 2 numeric numbers.
-> Result is displayed to user.
-> A prompt message will be shown to ask whether user wish to perform another calculation.
-> If user enters “y”, he/she will be brought back to the calculation menu to perform additional operations or exit the application.



-> User select 4. Division.
-> User proceed to enter 2 numeric numbers.
-> Result is displayed to user.
-> A prompt message will be shown to ask whether user wish to perform another calculation.
-> If user enters “y”, he/she will be brought back to the calculation menu to perform additional operations or exit the application.

-> User select 5. Exponentiation.
-> User proceed to enter 2 numeric numbers.
-> Result is displayed to user.
-> A prompt message will be shown to ask whether user wish to perform another calculation.
-> If user enters “n”, he/she will be shown with a history of the calculation records he/she did previously.



Test Cases

1. Handling of invalid user input for operation selection
-> Only allow valid operation selection between 0 - 5.
-> Error message will be shown if invalid user input for operation selection.

```
Starting the Calculator Application
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Select an option:
1. Addition (+)
2. Subtraction (-)
3. Multiplication (*)
4. Division (/)
5. Exponentiation (^)
0. Exit
-----------------------------------

9

Invalid input, pls select a option from below(0 - 5).

1

Please enter first number: 12

Please enter second number: 3

Result of operation is: 12 + 3 = 15
```
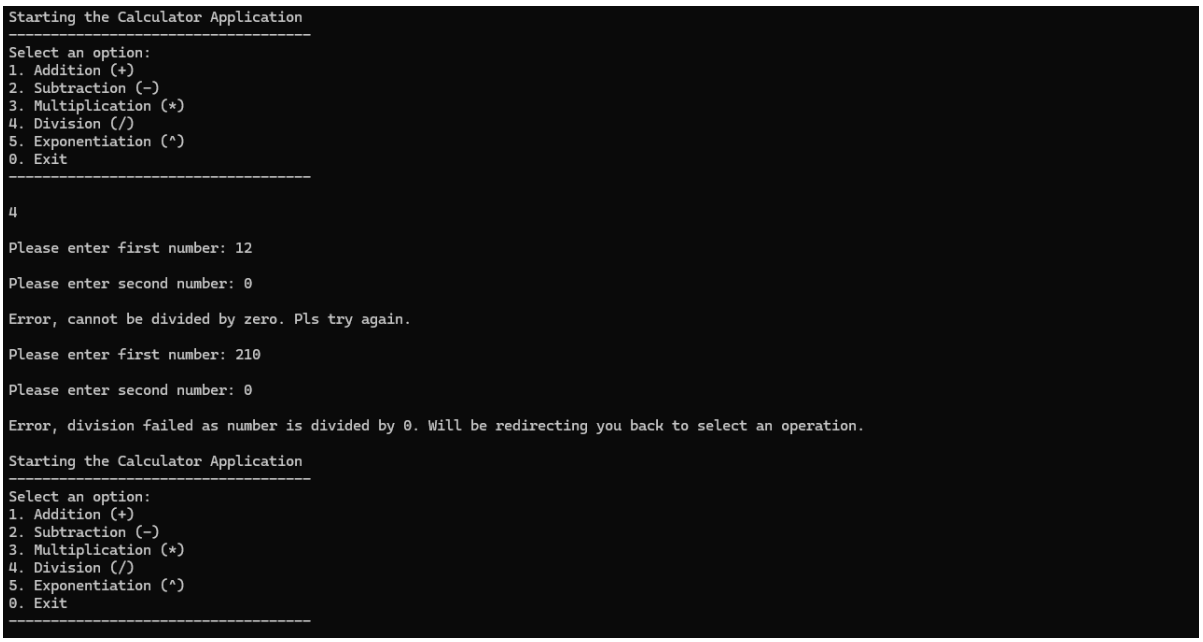

2. Handling of invalid user input for entering non-numeric values
-> Only allow numeric values to be entered.
-> Error message will be shown if user input non-numeric values such as special characters or alphabetical letters.

```
Starting the Calculator Application
-----------------------------------
Select an option:
1. Addition (+)
2. Subtraction (-)
3. Multiplication (*)
4. Division (/)
5. Exponentiation (^)
0. Exit
-----------------------------------

4

Please enter first number: d

Invalid input, pls enter a numeric value.
q

Invalid input, pls enter a numeric value.
12

Please enter second number: w

Invalid input, pls enter a numeric value.
3

Result of operation is: 12 / 3 = 4
```

3. Handling of invalid calculation such as dividing by zero

-> Error message will be shown if user attempt to divide by zero.

-> Only allow user to attempt 2 times before redirecting user back to the menu selection.



4. Handling of invalid user input of not typing “y”/”n”

-> Error message will be shown if user attempt to type other letters other than “y”/”n”.