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# **Addition Program Technical Document**

## **Introduction**

## **Overview**

This document provides a detailed explanation of the AdditionProgram.java code, a simple console-based application designed to perform addition of two numbers. The program ensures robustness by handling invalid user inputs.

## **Problem Statement**

* **User Input Validation**: Ensure that users enter valid numeric inputs.
* **Error Handling**: Gracefully manage and communicate errors to the user.
* **Simple Arithmetic Operation**: Perform addition of two numbers.
* **User Experience**: Provide a clear and intuitive interaction flow.

## **Solution Approach**

* **Modular Design**: Break down the program into smaller, manageable methods (e.g., input handling, arithmetic operation, result display).
* **Exception Handling**: Utilize Java's try-catch blocks to catch and handle InputMismatchException for invalid inputs.
* **Scanner Class**: Leverage java.util.Scanner for user input collection and validation.
* **Clear Messaging**: Display informative prompts and error messages to enhance user experience.

## **Functionality of Code**

### 1. **Program Initialization**

* The main method initializes the AdditionProgram class and invokes runProgram(), wrapped in a try-catch block for global error handling.

### 2. **User Input Collection**

* **getNumberInput(scanner, prompt)**:
* Prompts the user with a specified message.
* Attempts to parse the input as a double using scanner.nextDouble().
* Catches InputMismatchException, displays an error message, and recursively prompts for input until a valid number is entered.

### 3. **Arithmetic Operation**

* **addNumbers(num1, num2)**:
* Simply returns the sum of the two input numbers.

### 4. **Result Display**

* **displayResult(result, message)**:
* Prints the result to the console, prefixed with a provided message.

## **Input and Output Format**

* **Input Format**:
* **First Number**: User enters a numeric value in response to "Enter the first number: ".
* **Second Number**: User enters another numeric value in response to "Enter the second number: ".
* **Output Format**:
* **Successful Operation**: "The sum is: **[result]**"
* **Error Scenario**: "An error occurred. Please try again." followed by "Error Details: **[error message]**"

## **Conclusion**

The AdditionProgram.java code effectively demonstrates a structured approach to handling simple arithmetic operations with robust user input validation and clear error messaging, providing a solid foundation for more complex applications.

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