

Introduction to the Equation Solver

Course: Introduction to Object-Oriented Programming

Group Project Topic: Equation Solver

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The Problem: Equation Solving is Hard

Manual Challenges

Time-consuming and error-prone, with up to 40% calculation mistakes.

Skill Barriers

Requires some knowledge about java to run the program and type a correct equation form.

Current Limitations

Existing tools often lack flexibility and ability to solve faster.

how
it
works

How It Works: The Engine

Equation Solver

This is the main class to run the whole program.

Equation Solver GUI

This is the graphical usage interface which shows the program's appearance.

Equation Parser

This is the very class which helps the program to parse the equation type by the user.

Linear Equation Solver and Quadratic Equation Solver

These two classes are the ones which determine the type of equation and typed by the user. They also need a parent class Equation which is an abstract class and the Result Formatter class to print the final result.

MATHEMATICAL INTERPRETATION

LINEAR SOLVING

Keep them as variables

The diagram shows the linear equation $y = mx + b$ enclosed in a blue rounded rectangle. Above the rectangle, the text "Keep them as variables" has two blue arrows pointing to the m and x terms. Below the rectangle, an orange arrow points from the text "Slope of the line" to the m term, and a red arrow points from the text "y - intercept of the line" to the b term.

$$y = mx + b$$

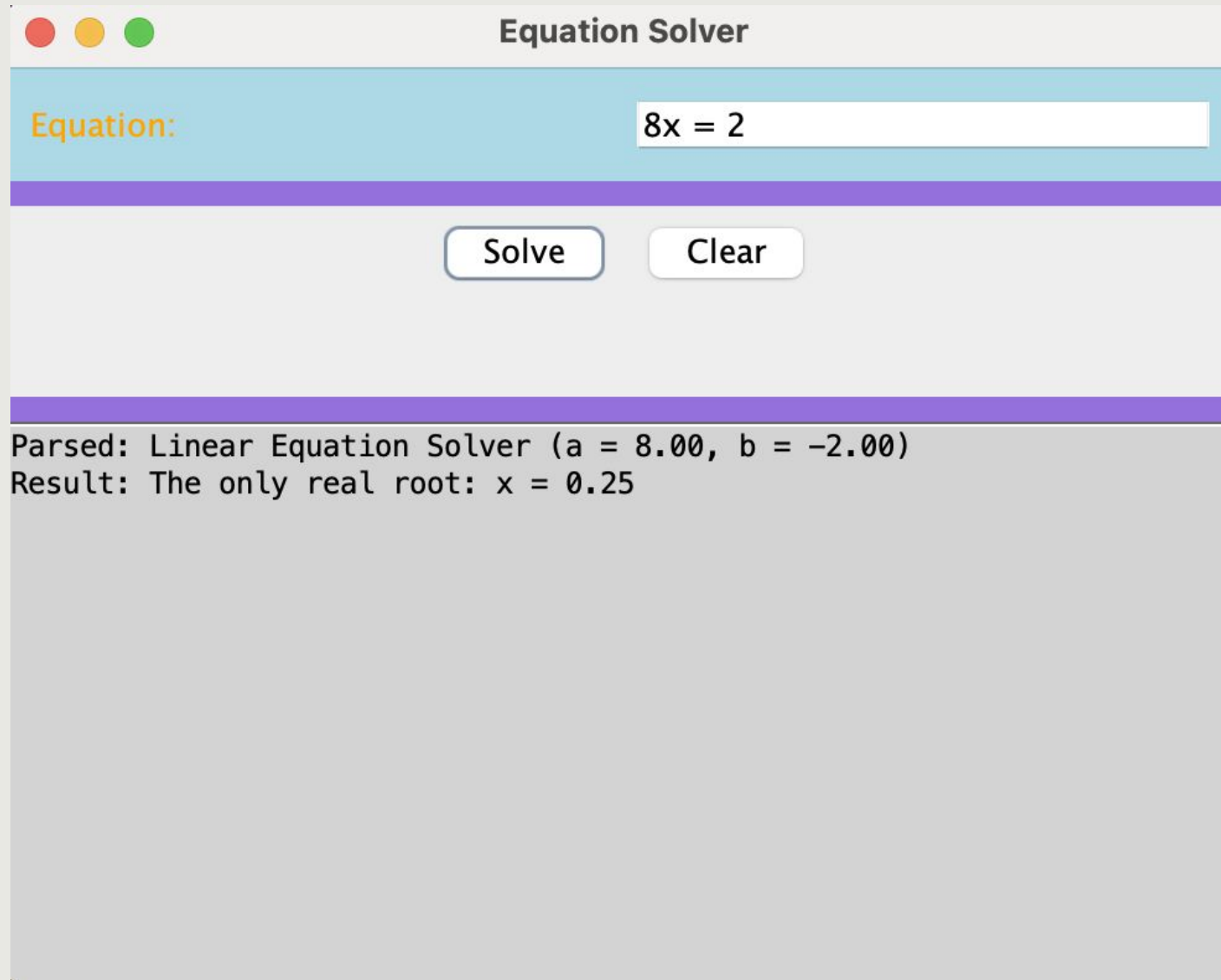
Slope of the line

y - intercept of the line

QUADRATIC SOLVING

$$ax^2 + bx + c = 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

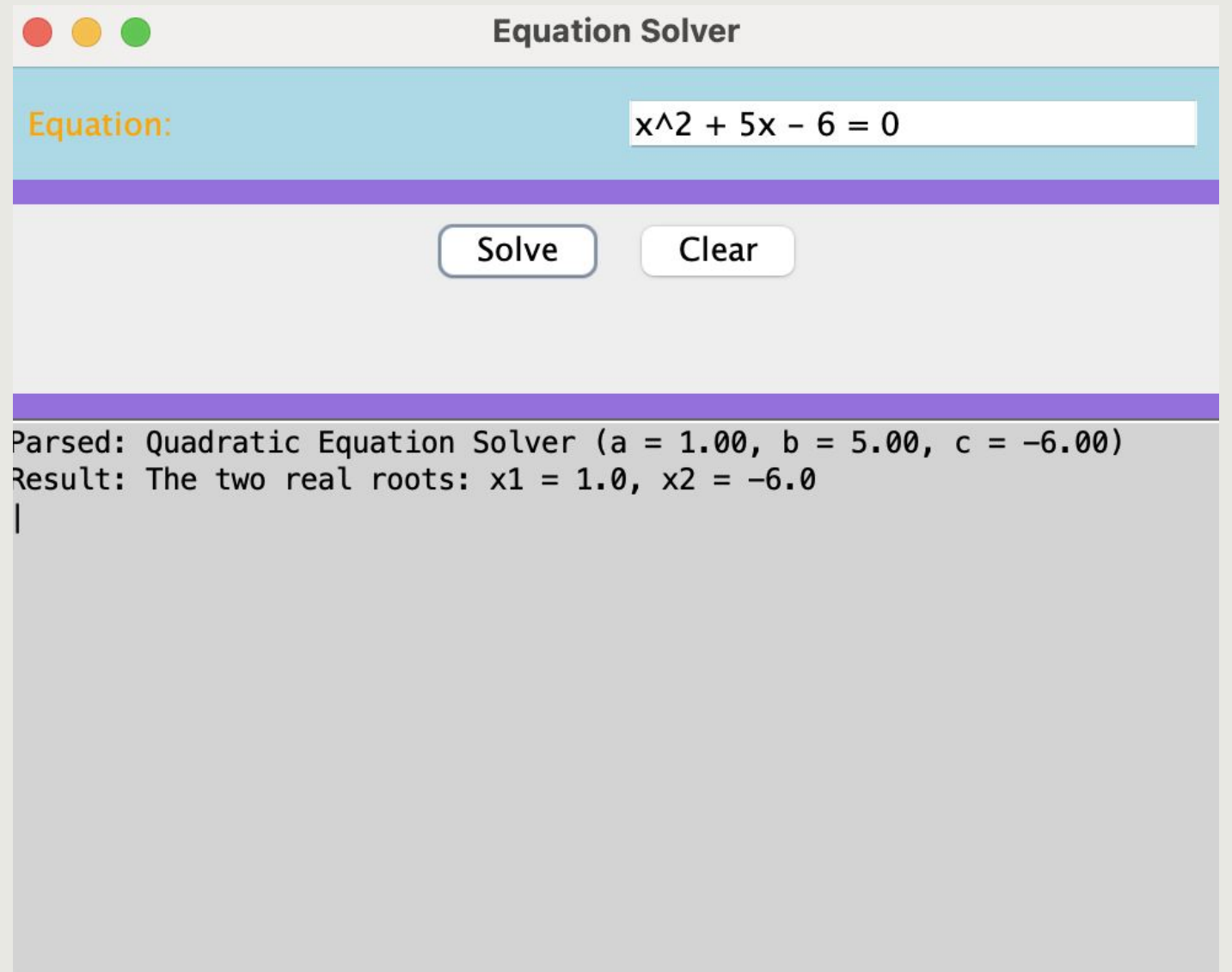
GUI



Equation Solver

Equation:

Parsed: Linear Equation Solver (a = 8.00, b = -2.00)
Result: The only real root: x = 0.25

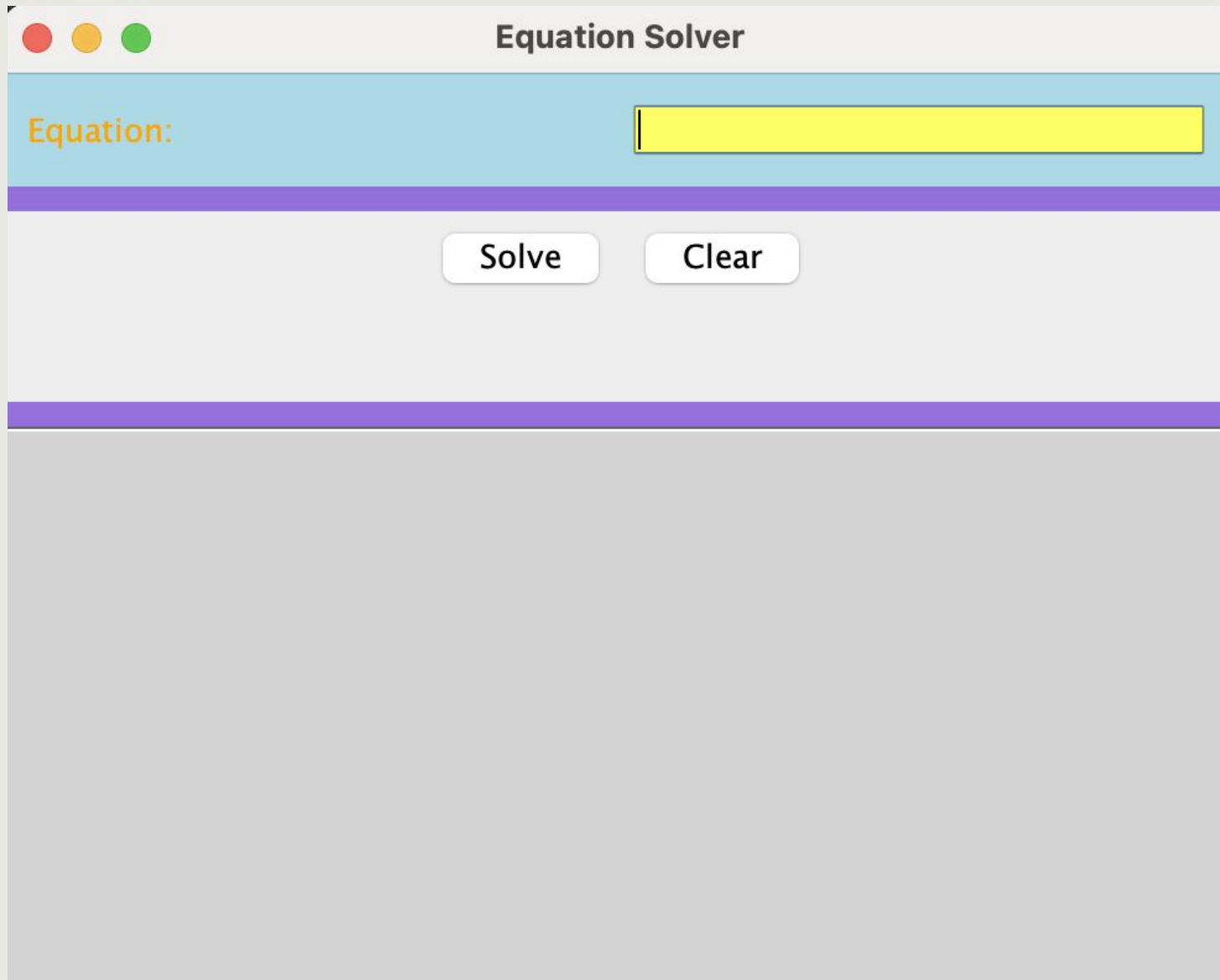


Equation Solver

Equation:

Parsed: Quadratic Equation Solver (a = 1.00, b = 5.00, c = -6.00)
Result: The two real roots: x1 = 1.0, x2 = -6.0
|

GUI

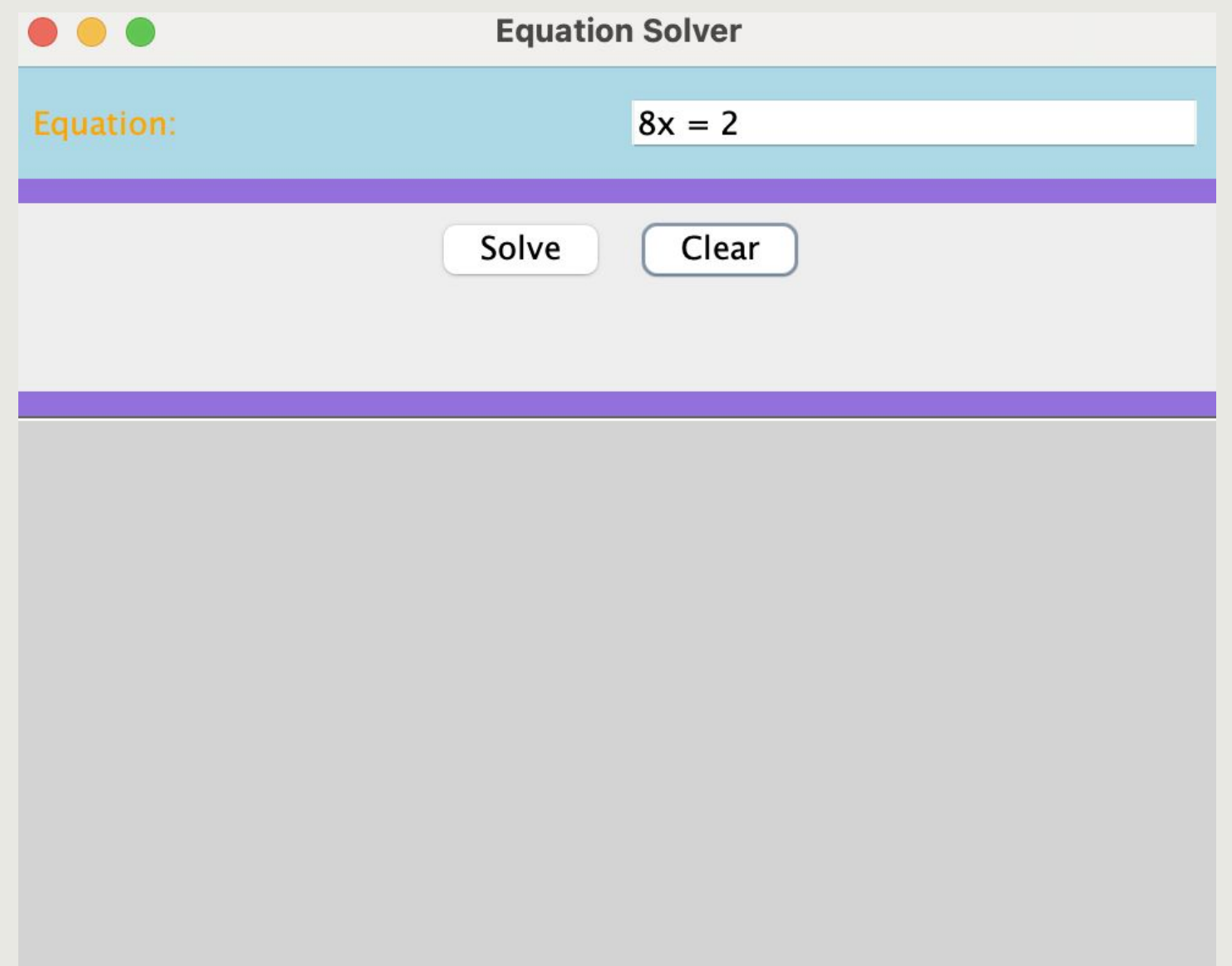


A screenshot of a GUI window titled "Equation Solver". The window has a light gray title bar with three colored window control buttons (red, yellow, green) on the left. The main content area has a light blue header bar with the text "Equation:" in orange. Below the header is a yellow rectangular input field. At the bottom of the window, there are two white buttons with black text: "Solve" and "Clear". The bottom half of the window is a large gray rectangular area.

Equation Solver

Equation:

Solve Clear



A screenshot of the same "Equation Solver" GUI window, but with the equation "8x = 2" entered in the input field. The "Solve" and "Clear" buttons are still present at the bottom. The layout and styling are identical to the first window.

Equation Solver

Equation:

8x = 2

Solve Clear



THANK YOU!