Lab – Reverse Polish Notation

Learning Goals

1. Develop your ability to use stacks, exceptions, and tokens in Java.
2. Develop your understanding of polymorphism.

The Task

Implement a Reverse Polish Notation calculator (also called a Postfix Notation Calculator).

The basic algorithm follows.

- While there are input tokens remaining
  - Read the next token from input.
  - If the token is a value
    - Push it onto the stack.
  - Otherwise, the token is an operator
    - If there are fewer than 2 values on the stack:
      - Error
    - Else
      - Pop the top 2 values from the stack.
    - Evaluate the operator, with the values as arguments.
    - Push the returned results back onto the stack.
- Once there are no more input tokens,
  - If there is exactly one value on the stack that value is the result.
  - Otherwise, if the stack has more than 1 value, report "Error: Not enough operators."

Test Cases

Case 1: 7 2 - 4 2 + *
Result: 30.00

Case 2: 3 5 6 4 / - 4 - 17 * +
Result: -5.50

Case 3: 6 3 + 2 * 16 18 8 / - +
Result: 31.75

Case 4: 5 6 + 14 19 - 5 25 * *
Result: Error: Not enough operators

Case 5: 19 21 49 * * -
Result: Stack Empty Exception

Case 6: 18 5 & 2 14 * -
Result: Runtime Exception: Found & expecting an operator at position 6.