CS-2851 Lab 3: Logic Calculator

Objective

- Gain experience designing collections, using stacks, and understanding postfix, and infix notation.

Overview

In this lab you will create a Logic Calculator using your own Stack class. This is a 2-week lab, but you must have the final design completed and submitted by next week's lab.

Assignment

1) Design your own Stack class. Yes, I realize the java.util packages has a Stack class, but it uses Vector and since Vector is thread safe it is _slow_ and I know you can do a better job!

1) Your stack class must implement the following methods: E pop(), void push(E), E peek(), boolean isEmpty(), and boolean search(E).
2) Support parameterized types
3) You may use any of the following data structure to implement your Stack class: ArrayList, LinkedList, or a standard array. In your lab report, document your decision

2) Design a Calculator class. Your Calculator class is required to use your Stack class to implement an infix-to-postfix expression converter, and a postfix expression evaluator.

At a minimum, your calculator is required to support the following binary operators: {*, /, +, -} using standard precedence rules. In addition, your calculator is required to support at least one of the following (bonus points and adulation from your peers will be awarded for additional features:

1) Unary operators, i.e., -9, +7. E.g. -7+5
2) Variable assignment: a=5; a+6. Your calculator remembers variable assignment and reuses variables in subsequent expressions. Variables can also be reassigned.
3) Support of logical operators: AND (^), OR (v), == (?), etc. (a+5)?b. You can use any symbols you want. I was just trying to make things easier by using a single character operand.
4) Parenthesis: E.g., (5+6)*7
5) Slick GUI
6) Good error detection
7) Surprise me!

Interim Design Report due before lab week 5

You must submit:

- A completed Enterprise Architect-generated UML class diagram containing all attributes you will implement in your Stack and Calculator class. 10% of grade!

Email your interim design (UML class diagram as PDF) to: urbain@msode.edu . Make sure you include cs2851, lab3 part 1, and your name in the archive filename and in the subject line of your email.

Make sure you log your time in the FAST system.

Final Lab report due prior to lab week 6

You must submit:

- Your completed project**.**
- If needed, an *updated, complete* Enterprise Architect-generated UML class diagram.
- Sample test input and results.
- Your final report, including:
    - Your reaction - a couple of paragraphs on your general reaction to the lab including what you learned, difficulties you had, and how the lab could be improved.
    - Report on your design, development, and testing. Include a short discussion on how you could improve your calculator.
    - Results from your test program.

Email part 2 of your lab a zip archive file containing your UML class diagram, Java project, and your report (PDF) to: urbain@msode.edu . Make sure you include cs2851, lab3 part 2, and your name in the archive filename and in the subject line of your email.

Indicate how much time you spend on this assignment (during week 6) in the FAST system.

Thanks,

Jay Urbain