Politechnika Śląska
Wydział Informatyki, Elektroniki i Informatyki

Fundamentals of Computer Programming

RPN Calculator

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Project’s topic

Write a program that will parse infix notation to RPN notation and calculate the result. Program also needs to parse RPN into infix notation and print the resulting equation. Program should handle all of the basic mathematical operations(+,-,*,/) and brackets, root and power operation as well as sinus and cosinus. Program should correctly report error on division by zero or root of negative number (no need to implement complex numbers). Input to the program can come from command line options and file or in interactive mode (writing into console until user decides to exit).

Analysis of the task

The task focuses on parsing between two notations and calculating the result.

Data structures and algorithms

The program reads given mathematical equations and parses it from one notation to another using stacks of operators and operands and differentiating between them.

External specification

This is a command line program. The program requires names of input and output files. Put input file name after -i switch and output file name after -o switch, eg:

program -i input-file -o output-file
program -o output-file -i input-file

Both files are text files. The switches may be provided in any order. “-c” switch enables interactive mode and “-r” switch determines notation for output file (postfix if present, infix if not).

Internal specification

The RPN Calculator is implemented mainly by using stack and by distinguishing between operands and operators.

Program overview

The main function either gets input from the file or waits for the user to input an expression. Once it gets an input, the parsed equation is shown and its result. The program ends when specified input is used and exports expressions into the output file.

Testing

The program has been tested with various types of inputs. Incorrect ones (with too many or little operands or operators, unknown operators, division by zero, square root of a negative number) are detected and an error message is printed. The program has no memory leaks and prints an error message if the input file doesn’t exist.

Conclusion

The program implements a simple algorithm for parsing between notations and calculating the result. It works not only for basic mathematical operations, but for trigonometric functions (sine, cosine) and for square root. Its interface is clear and readable and the calculator is easy to use.

Github link:
https://github.com/maciekrz/RPN_Calculator/