PostFix Calculator

Software Requirements Specification

Version 1.0

Team 2

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PostFix Calculator

1. Introduction

This section of the document gives a description of the scope and an overview of the project. Also, the purpose and the functionality of the project is provided.

1.1 Purpose

The purpose of this document is to give a detailed description of the project "PostFix Calculator". This documentation is meant for Prof Gunnar Gotshalks and addresses purpose, constraints and development of the system.

1.2 Scope

"PostFix Calculator" is a Java based application that performs arithmetic, and trigonometric functions in postfix format. As a result of the calculator being postfix, the program implements a stack.
The software implements all the specifications.
The "PostFix Calculator" is scaled to a mobile device but is only deployed on a pc environment. The software is deployed in Java Archive(jar) format, available for download from the GitHub-based project website. This program can be deployed through Eclipse or terminal.

1.3 References

This document was adapted from a sample document, available at the following link

http://www.cse.chalmers.se/~feldt/courses/reqeng/examples/srs_example_2010_group2.pdf

Specific requirements in the document are taken from the project requirements on the course web page.

1.4 Overview

The remainder of the document contains three chapters. First one talking about the overall description, functions, constraints, assumptions. The second one talks about the required features in detail from the customer and the third one has acceptance test cases.

2. General Description

This section provides a brief overview of the system. This section covers the functionality of the system and shows the interface of the system. As well as an explanation of how the user interacts with the system.

2.1 Product Perspective

The “PostFix Calculator”, as previously mentioned, works in a postfix format. This means that the system expects the operands before expecting the operator.
Therefore, the system accepts input from the user through the keys on the calculator. After each numeric input, the enter key needs to pressed to mark the ending of the operand and move on the the next operator/operand or calculate.

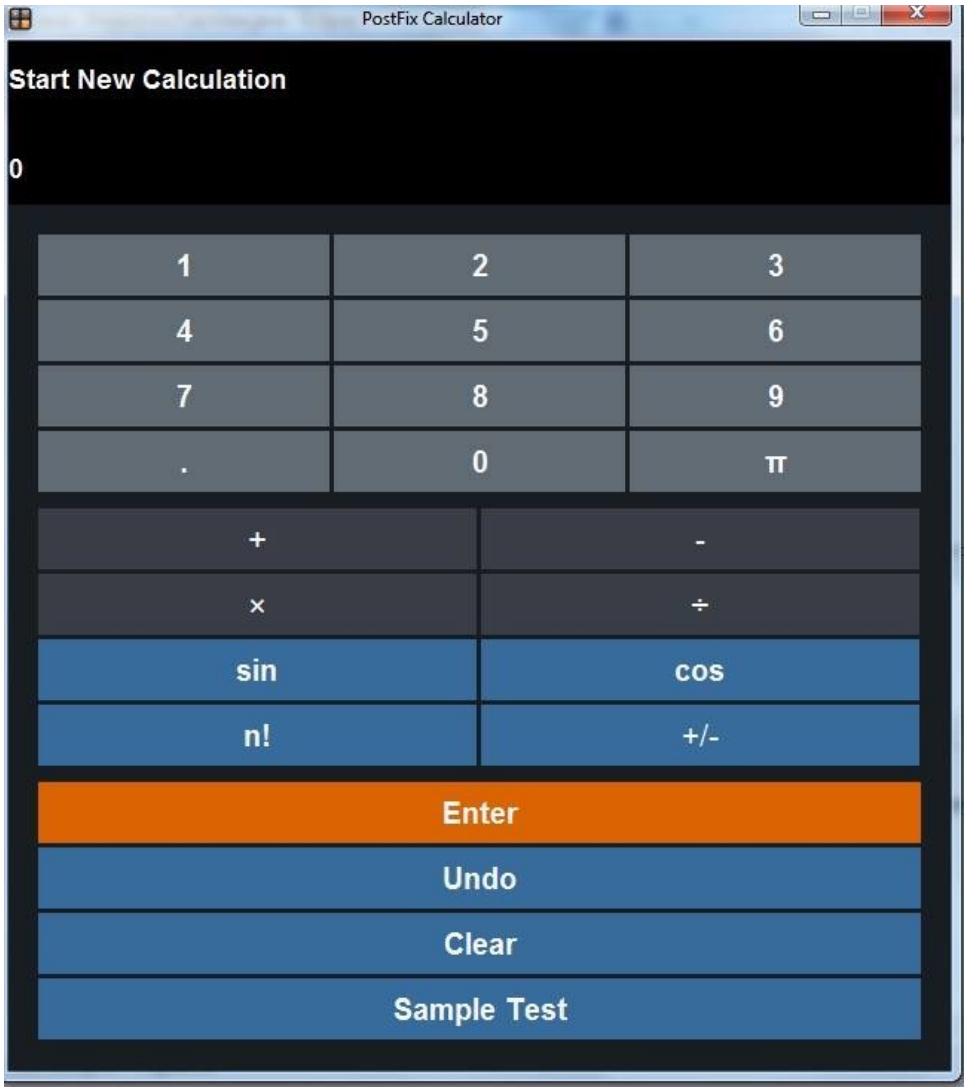
2.2 Product Functions

The “PostFix Calculator” is a very intuitive and user friendly calculator, as it does not require any parentheses. The calculator performs a wide range of functions, as provided in the table below.

Key	Function
0 - 9	Inputs the key pressed from zero to nine.
.	Inputs a decimal point. If there is no number prior to the decimal key, it is treated as if there is a 0 ahead of it.
π	Inputs pi to the top of the stack.
+	Performs the addition operation on the top two operands in the stack, and inputs the result on the top of the stack
-	Performs the subtraction operation on the top two operands in the stack, and inputs the result on the top of the stack
×	Performs the multiplication operation on the top two operands in the stack, and inputs the result on the top of the stack
÷	Performs the division operation on the top two operands in the stack, and inputs the result on the top of the stack
sin	Performs the sine function on the top operand in the stack, and inputs the result on the top of the stack
cos	Performs the cosine function on the top operand in the stack, and inputs the result on the top of the stack
!	Performs the factorial operation on the top operand in the stack, , and inputs the result on the top of the stack

Key	Function
+ / -	Changes the sign of the input if the user is typing input, otherwise changes the sign of the top expression in the stack
Enter	Pushes the input to the top of the stack.
Undo	Undoes the previous action. If the user is typing input, deletes the last digit or decimal point.
Clear	Clears the input field and the memory of the calculator, therefore loses all the previous actions.
Sample Test	User invokes a sample sequence of operations and it is displayed with the correct result.

The user interface may be seen in the image below.



2.3 User Characteristics

There will only be one type of user for this software. This software will deployed for PC and can be accessed through Eclipse or launching it through terminal. The calculator takes input via the keys being pressed on the interface using the mouse. Input through the keyboard is not accepted.

2.4 General Constraints

The following design choices do not interfere in any way with the integrity of the software and meeting the specific requirements.
A constraint in the system, although mathematically correct, is that 0 division by 0 gives a Math Error.
Another constraint is that the factorial function will only operate on whole numbers and give a Math Error otherwise

3 Specific Requirements

This section covers all the customer requirements that were used to guide the project's software design, implementation and the testing.

3.1 Interface Requirements

- The client wants the expression to be in infix notation, with a minimum number if parentheses.
  For example:

Button pressed	Expression List	Value
Initial state	Start new calculation	0
2		2
1		21
Enter	21	21
3	21	3
5	21	35
Enter	21, 35	35
+	21 + 35 =	56
1	21 + 35	1
0	21 + 35	10
1	21 + 35	101
Enter	21 + 35, 101	101
4	21 + 35, 101	4
Enter	21 + 35, 101, 4	4
–	21 + 35, 101 − 4 =	97
×	(21 + 35) × (101 − 4) =	5432
Clear	Start new calculation	0

Table 1: Calculating the expression (21 + 35) × (101 − 4).

- Entry if numbers is in floating point; as real numbers. The output may be an integer, real number or in scientific notation; i.e., do the minimum work to display the result.
- A button that invokes a sequence of operations so you can see that the display is correct. The test simulates pressing the sequence of buttons to put the model into a given state and at the end invokes the routine to display the expression list.

3.2 Functional Requirements

The system is required to have the following buttons and their functions that are described as well. This is similar to the product functions since all the requirements were implemented accordingly.

Key	Function
0 - 9	Inputs the key pressed from zero to nine.
.	Inputs a decimal point. If there is no number prior to the decimal key, it is treated as if there is a 0 ahead of it.
π	This is zero operand function and should be treated as a constant.
+	Performs the addition operation on the top two operands in the stack, and inputs the result on the top of the stack
-	Performs the subtraction operation on the top two operands in the stack, and inputs the result on the top of the stack
×	Performs the multiplication operation on the top two operands in the stack, and inputs the result on the top of the stack
÷	Performs the division operation on the top two operands in the stack, and inputs the result on the top of the stack
sin	Performs the sine function on the top operand in the stack, and inputs the result on the top of the stack.
cos	Performs the cosine function on the top operand in the stack, and inputs the result on the top of the stack.
!	Performs the factorial operation on the top operand in the stack, , and inputs the result on the top of the stack
+ / -	Changes the sign of the number in the value field. Function should be able to perform correctly without the use of ‘Enter’ key. If the user is in the middle of entering a number, the value should be changed and then let the user continue entering the number.
Enter	Pushes the input to the top of the stack. If the user is typing input, deletes the last digit or decimal point.

Key	Function
Undo	While the user is typing in a number and ‘Undo’ is pressed, it should take back the last digit or decimal point pressed until doing so would clear the value entirely. If so, it should show the result of running the current expression in the expression list. If user is not typing and ‘Undo’ is pressed, it should remove the top item from the history list and update the display.
Clear	Clears the input field and the memory of the calculator, therefore loses all the previous actions.
Sample Test	User invokes a sample sequence of operations and it is displayed with the correct result.

4 Acceptance Cases

The following are test cases with results provided in the table. This should guide the explicit outputs and functions of all the features.
The commas represent that the value has been pushed in. (Enter key is pressed)

Feature	Expression	Output
Key input	9	9
Decimal	5.0	5.0
π	3π	3 x $\pi = 9.4247\ldots$
Addition	5, 5, +	5 + 5 = 10
Subtraction	9, 4, -	9 - 4 = 5
Multiplication	5, 6, x	5 x 6 = 30
Division	14, 7, ÷	14 ÷ 7 = 2
Sine Function	0, sin	sin(0) = 0
Cosine Function	π, cos	-1
Factorial Function	7, !	7! = 5040
Change Sign	6, + / -	-6 = -6
Enter	67, 9, 0,	67, 9, 0
Undo	While user is typing - 6689 Undo When user is not typing - 6, 5, + Undo	668 6, 5
Clear	67, 9, 87, 0, π, +, -, ! Clear	0

Feature	Expression	Output
Sample Test	Sample Test Clicked	(Any chosen sequence.) -5.25 + 6.47