ECGR 3183 - Fall 2004: Lab 3
Subroutines – Due 10/22/2004

Learning Objectives

This lab will require you to use subroutines to enter in two numbers from the keyboard and multiply them together.

Prerequisites

You should be familiar with the following concepts:
- With basic programming skills and also be familiar with assembly language.
- Performing basic logical operations on numbers (x AND y, x OR y, NOT z, etc.)
- Completed Lab 2 successfully.

Prelab Assignment

Write a flowchart or pseudocode of the lab solution. You must turn this in to the TA by the end of class on October 18. Keep a copy for yourself.

Laboratory Assignment

You are required to write code which will print a message on the screen to enter two numbers to multiply. Multiply these numbers together and display the results on the screen. Cease the program when the number zero is entered. Also, you must identify when there is overflow. Negative numbers will not be entered.

An example of the console display would be (***bold/italic*** characters are user inputs):

Welcome to the ECGR 3183 multiplier problem-solver. This program will multiply two numbers you enter and display the result.

Enter the first number, then type the enter key. Type zero ("0") and enter to end: ***234***
Enter the second number, then type the enter key. Type zero ("0") and enter to end: ***90***
The product is: 21060

Enter the first number, then type the enter key. Type zero ("0") and enter to end: ***0***
Thanks for using the ECGR 3183 multiplier problem-solver!

Steps

1. Build your program slowly, testing along the way. Solve each requirement one at a time. Make sure comments are written as you progress.
2. Continue to build and test the program until all of the requirements have been met. Did we mention you should write your comments as you progress, not at the end?
3. If you run into problems, use the break point functionality of LC-3 to step through the code until you find the problem. Once all the requirements have been met ensure that everything works.
4. Demonstrate the working program to your TA or professor.
5. Finish lab write-up and turn in your report as a print out. Also, email the code to the lab TA.

Requirements

Req. 1 – The code generated is to be written LC-3 assembly language

Req. 2 – The code is well commented and easy to follow

Req. 3 – Your lab report should include the final code listing

Req. 4 – You must use subroutines, and each subroutine (as well as the main program) can be no longer than 60 lines of code.

Req. 5 – You must have one main program, loaded at x3000, and as many subroutines as needed.

Req. 6 – When the program starts, print a welcome message. Then print the first number message

Req. 7 – When processing the "first number", accept only numeral characters and the enter key.

Req. 8 – Accept only one, two, or three digits for each number.

Req. 9 – If the number is too long, prompt again for a number.

Req. 10 – After the second number is entered, multiply the two numbers together. Remember to convert ASCII to binary numbers before you multiply, then binary to ASCII to output the result.

Req. 11 – If the result is too large, print an error message.