Lab 5 for COMP 2280
Due Date: April 3 (Friday), 2020

Total: 10 points

Resources

- The standard ASCII table.
- See the sample program "keyinteg.asm" in Module 11. Modify the sample program to complete this lab.

Question 1

Implement a keyboard Interrupt Service Routine (ISR) that takes the character typed on the keyboard and extracts the two least significant bits in the character to get a decimal number between 0 and 3 inclusive. Convert the decimal number to ASCII and display the result.

For example if the user types the character a, 1 is displayed on the monitor. If the user types the character b, 2 is displayed on the monitor. If the user types the character c, 3 is displayed on the monitor.

Use polling to update the display — you are not allowed to use a TRAP instruction for output. Also, There are a few things that you need to keep in mind when implementing your solution:

- You must define and setup the stack used for the interrupt
- You cannot let the main program end — looping forever is the standard technique to accomplish this
- You need to set up your addresses for referencing the device registers (as shown in the sample program. See the module 11 for details.)
- You must initialize the interrupt vector table with the address of your ISR (the address of the keyboard interrupt is at location x0180)

Simulator: Use the online simulator (https://wchargin.github.io/lc3web/) to do this lab. Also, use the online simulator to assemble the sample code.

The new LC3 Tools (available with the 3rd edition of the book) do not allow the user program to update the interrupt vector table. This makes sense because the user should not be allowed to access privileged memory locations. But, we need to access the privileged memory locations to do this lab.

Bonus: 5 points

If you can do this lab using the new LC3 Tools without getting the "Access violation" error, I will give you five additional bonus points. Only the student who can solve this problem first will get the bonus points (only one student). Send me your solution by email (before others do it) to get the bonus points!