Lab3 Report

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Lab Name: Task Counter

Lab Task

You are required to write in LC-3 assembly language. Your program consists of 3 parts:

1. The user program, starting at x3000.
2. The interrupt service routine, starting at x0800.
3. And the system booting code, starting at x0200.

Algorithm

Let's explain three parts respectively.

In the system booting code, all we need to do is setting PC and PSR for the user program, enabling keyboard interrupt, initializing keyboard interrupt function address and initializing registers.

In the interrupt service routine, what we need to do depends on the input. The input can be divided into three kinds: number, enter and other input. If the input is number, we need to change the counter. If the input is enter, we need to change the counter, too. If the input is other input, we need to print 40 times on the monitor. In order to avoid calling interrupt or trap inside interrupt, I decide to send the data to DSR to print it out.

Some important data are shown as follows.

Classify the input:

```
LDI R3, KSDR2
ST R3, InputData

LD R1, InputData
AND R3, R3, #0

;Is Enter?
ADD R2, R1, #-10
BRz CounterSub

;Is Number?
ADD R2, R1, #-16
ADD R2, R2, #-16
ADD R2, R2, #-16
BRzp BiggerThanZero
BRn OtherInput

BiggerThanZero:
ADD R2, R1, #-16
```

```
ADD R2, R2, #-16
ADD R2, R2, #-16
ADD R2, R2 ,#-9
BRnz IsNumber
BRp OtherInput
```

Print the data out:

```
;Print out input 40 times
PrintLoop2:
LDI R2, DSR2
BRzp PrintLoop2
STI R1, DDR2

;Creat some delay
DELAY2:
ST R4, DELAY2_R4
LD R4, DELAY2_COUNT

DELAY2_LOOP:
ADD R4, R4, #-1
BRnp DELAY2_LOOP

LD R4, DELAY2_R4

ADD R3, R3, #1
ADD R2, R3, #-15
ADD R2, R2, #-15
ADD R2, R2, #-10
BRn PrintLoop2
```

In the user program, we need to initialize the counter and create endless loop to print the value of counter.

Some thoughts after checking

To be honest, I don't make a perfect reply to my TA's questions. Luckily, there is no bug in my program. I think it's a good time to review what I have learnt and ask some questions.