EXPERIMENT REPORT OF ASSEMBLY LANGUAGE

Assignment 1 Experiment 4

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Problem Description:

In this experiment, a piece of 8259 is used to expand the hardware interrupt source of a 8088 processor from one to eight. In its interrupt request IR0, a spin button is connected. When we press the spin button, a high level input will generate a interrupt request. The PIT 8259 is set to be working single piece, normal EOI, level triggered, slave buffered mode, and the interrupt number for IR0 is 40H. As is shown in Figure 5.1 and Figure 5.2.

On the other side, a latch buffer chip 74LS373 is used to interface 8 led lights, and this unit is used as the output device of experiment.

You are required to do:

1) Program the PIC 8259;
2) Write a interrupt service routine (ISR), which is a far typed sub procedure. In the ISR, you are required to change display of the lantern, and move the light upward. If the light has already been the top led, then roll back to the bottom one;
3) Register the ISR to the operating system, and run your program with the hardware schematic design.

Code:

```
.MODEL SMALL

.MODEL SMALL

.STACK 32

.DATA
```

```
    PORT_LED EQU 68H
    PORT_8259LOW EQU 60H
    PORT_8259HIGH EQU 62H
    pattern_code db 01H
.CODE
MAIN PROC FAR
    MOV AX, @DATA
    MOV DS,AX
    CLI
        ;TODO1: regist ISR
    PUSH DS
    MOV AX,0
    MOV DS,AX
    mov SI,40h*4
    MOV BX,OFFSET ISR
    MOV[SI],BX
    MOV BX,SEG ISR
    MOV[SI+2],BX
    POP DS
        ;TODO2: initialize 8259 cmd1,2,4
    MOV DX,PORT_8259LOW
    MOV AL,00010011B ;ICW 1
    OUT DX,AL
    MOV DX,PORT_8259HIGH
    MOV AL,40H ;ICW 2
    OUT DX,AL
    MOV AL,00000001B ;ICW 4
    OUT DX,AL
        ;TODO3: light the LSB light
    MOV DX,PORT_LED
```

```
        MOV AL, pattern_code
        out DX,AL
        STI
FIX_BUG:
        MOV DX,60H
        MOV AL,40H   ;dump 40H, which is the int number, to data bus
        OUT DX,AL
        JMP FIX_BUG

        MOV AX, 4C00H
        INT 21H
MAIN ENDP
;;=============================================================
;SubrOUTine: ISR
ISR     PROC FAR
        cli
        PUSH AX
        PUSH DX
        MOV AL,pattern_code
        ROL AL,1
        MOV DX,PORT_LED;
        OUT DX,AL
        MOV pattern_code,AL
        MOV DX,PORT_8259LOW
        MOV AL,20H
        OUT DX,AL
        POP DX
        POP AX
        sti
        IRET
```

ISR ENDP

END MAIN

Screenshot:

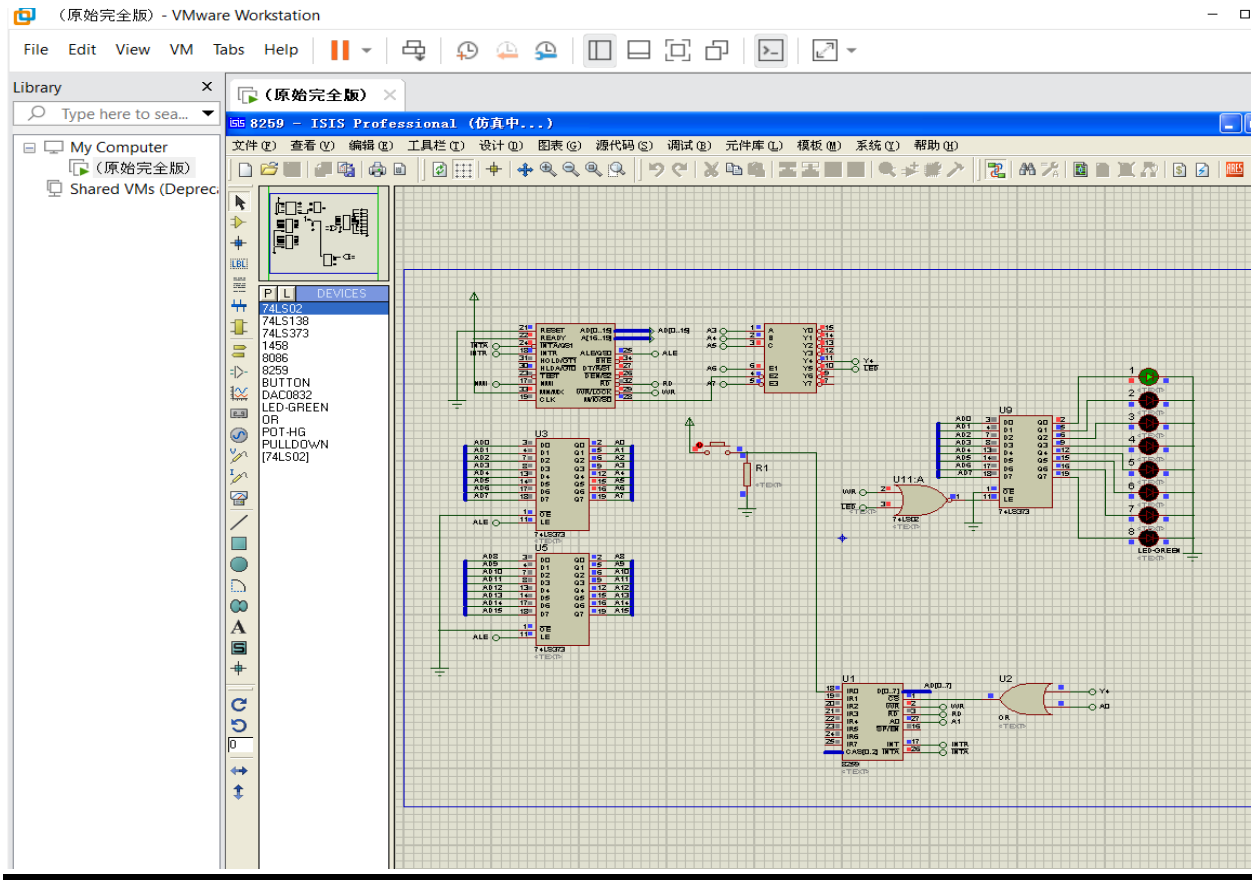

Figure: The hardware schematic design

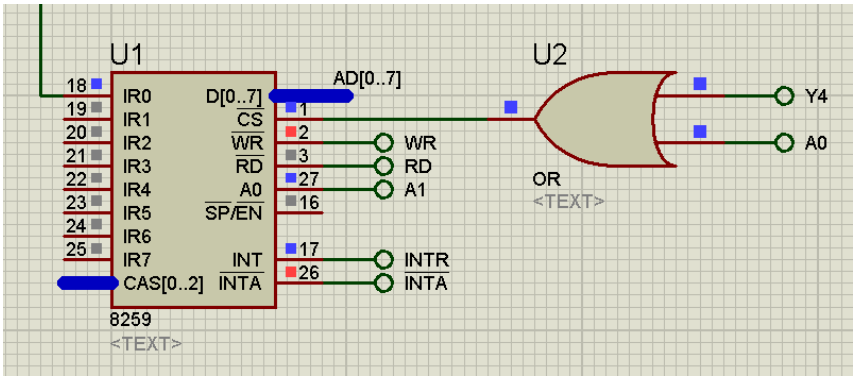

Figure: The PIC 8259

Debugging:

This is a new IDE for me ,I have never used it before .So,at the beginning ,I couldn't understand the use of so many features.Eventually,after watching video.

There is some bugs with the 8259 component of Proteus software. It will not response to the second round of INTA signal. Thus 8086 will not retrieve correct interrupt number from 8259.

As a result, we must ensure that when the 8086 is handling the interrupt request and try to retrieve interrupt number from 8259, the correct interrupt number appears in the data bus. We satisfied the requirement above by output the interrupt number 40H to a null port in a continuous loop.

Attachment:

1) Exp-4_ assignment-1.docx

2) Exp-4_ assignment-1.pdf

3) lantern.asm

4) 8259.DSN

5) 8259.BMP

6）Exp-4_ assignment-1.mkv

Acknowledgement:

I complete this assignment by myself by using online videos and taking help from online.The most useful help from teacher's hint given in question ,the theory class and the lecture note from the practical class