

Homework-2

Assignment Date : 16.11.2017
Due Date : 07.12.2017 at 18:00

Using the Educational CPU Simulator software (Mikbil), write an assembly program to perform the LED (Light Emitted Diode) applications described below.

In an infinite loop, the main program should read the switches from the PIA.A (polling method), and perform the required LED applications on PIA.B.

The **Peripheral Interface Adapter** (PIA) in Mikbil will be used as user interface.

- The **PIA.A port** that represents ON/OFF switches will be used for user input.
- The **PIA.B port** that represents LED lights will be used for program output.

The followings are predefined symbolic names and their addresses for PIA registers in Mikbil.

You may use either the predefined symbolic names, or the addresses in the program.

PIA Register Types	Predefined Symbolic Name	Address
Port Registers	İSKELE.A	\$8080
	İSKELE.B	\$8083
Data Direction Registers	YÖNLEN.A	\$8081
	YÖNLEN.B	\$8084
Status/Control Registers	DURDEN.A	\$8082
	DURDEN.B	\$8085

Data Direction Registers should be configured (conditioning) at the beginning of program.

YÖNLEN.A : As receiver (Store \$00 to direction register)

YÖNLEN.B : As transmitter (Store \$FF to direction register)

To perform **data** load and store operations, **İSKELE.A** and **İSKELE.B** should be used.

USER INPUT : PIA.A port

The leftmost 3 switches will be used by user to select the type of three different LED applications.

The rightmost 2 switches will be used by user to select the speed of application (applies to all applications).

(The leftmost switch is numbered as S7, the rightmost switch is numbered as S0.)

All switches are OFF initially.



The first leftmost switch is ON.

Type of LED application: Walking One-LED.



The followings describe the leftmost 3 switches and the corresponding application descriptions.
(1 = ON, 0=OFF)

Switch			Application name	Description
S7	S6	S5		
1	0	0	Walking One-Led	One LED moves from left to right, one step at a time.
0	1	0	Walking Two-Leds	Two LEDs move from left to right, two steps at a time.
0	0	1	Flashing All LEDs	All LEDs are flashing at the same time.

The followings describe the rightmost 2 switches and the corresponding speed descriptions.

Switch		Speed : Loop counter of WAIT subroutine
S1	S0	
0	0	300000 (Default speed)
0	1	150000
1	1	70000

PROGRAM OUTPUT : PIA.B port

Program should implement the following three different types of LED applications.

1 - Walking One-LED Application

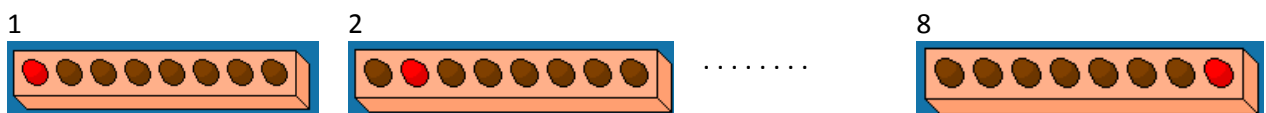
When program starts first time, all of the LEDS should be OFF.

When the user turns the first leftmost switch (S7) in PIA.A from OFF to ON, the program should apply the Walking One-LED application.

Each LED in PIA.B should be turned ON and OFF one by one.

There must be a waiting time after a LED ON, and after a LED OFF.

The following sequence shows lights of the LEDs (always from left to right direction).



When program reaches to the last LED (the rightmost LED), it should start from the first LED again (the leftmost LED).

2 - Walking Two-LEDs Application

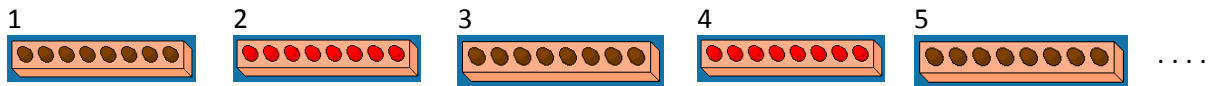
This application is similar to the first application, except that each two LEDs in PIA.B should be turned ON and OFF two by two.

3 - Flashing All LEDs Application

ALL of the LEDs in PIA.B should be turned ON at the same time, and should be turned OFF at the same time.

There must be a waiting time after all LEDs ON, and after all LEDs OFF.

The following sequence shows the all LEDs flashing.



SUBROUTINE FOR WAITING TIME

You should write a subroutine for the purpose of waiting times, and call it from the main program whenever necessary.

The default looping counter should be from 1 to 30000 in the subroutine.

The speed will be controlled by the user as described above.