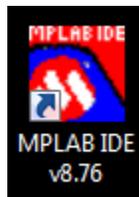


# A TUTORIAL FOR MPLAB IDE AND ISIS SIMULATION

Aim of this tutorial is to show how to use MPLAB IDE and ISIS simulator. Tutorial covers an object that writing a code to light a LED is tied to the 0th bit of PORTB. In this way, PORTB in PIC16F84A should be set as an output port. After showing how to open a project and how to write an assembly code in MPLAP IDE at part one, an ISIS simulation will be done at part two.

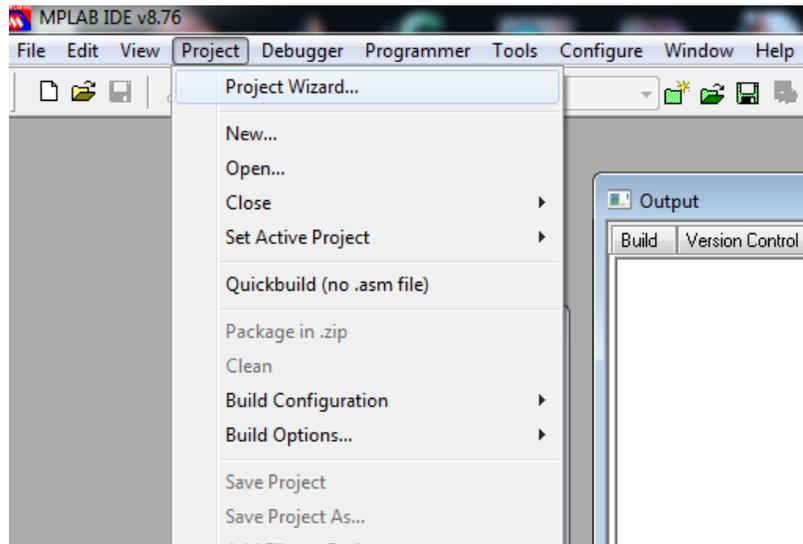
## 1. Introduction to MPLAB IDE

- 1) Open MPLAP IDE. Icon of the editor can be seen in **Figure-1**.



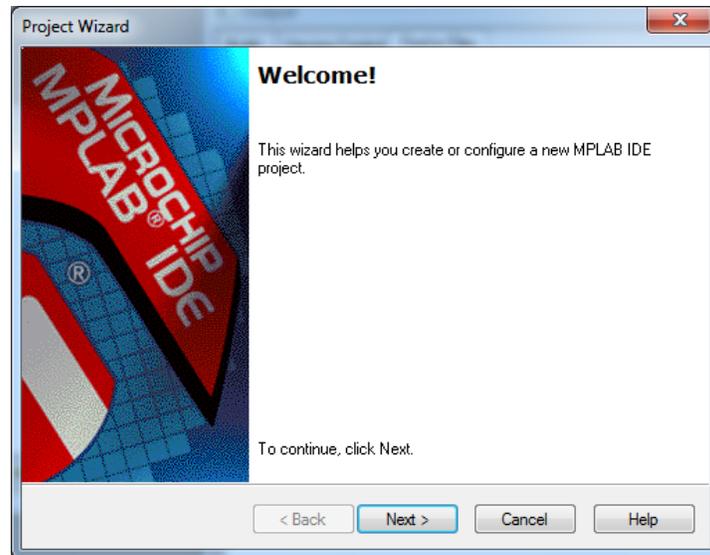
**Figure-1**

- 2) From the “**Project**” choose “**Project Wizard**”, **Figure-2**.



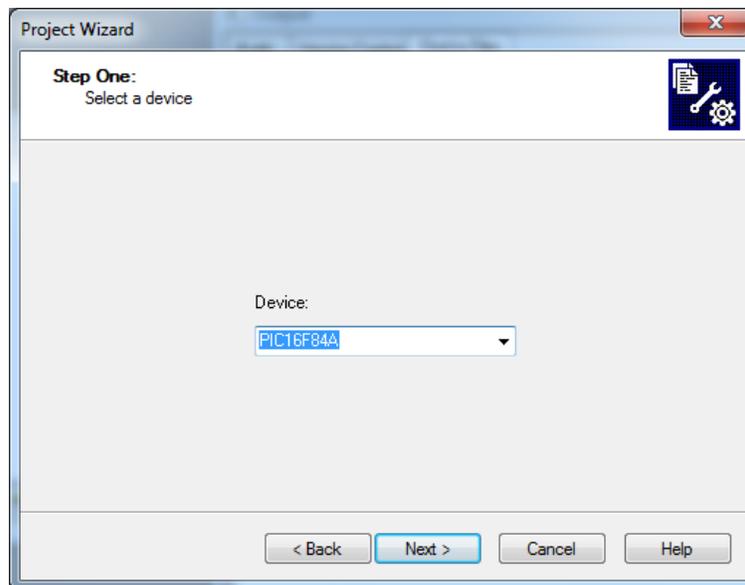
**Figure-2**

- 3) Click “**Next**” in the **Figure-3** window.



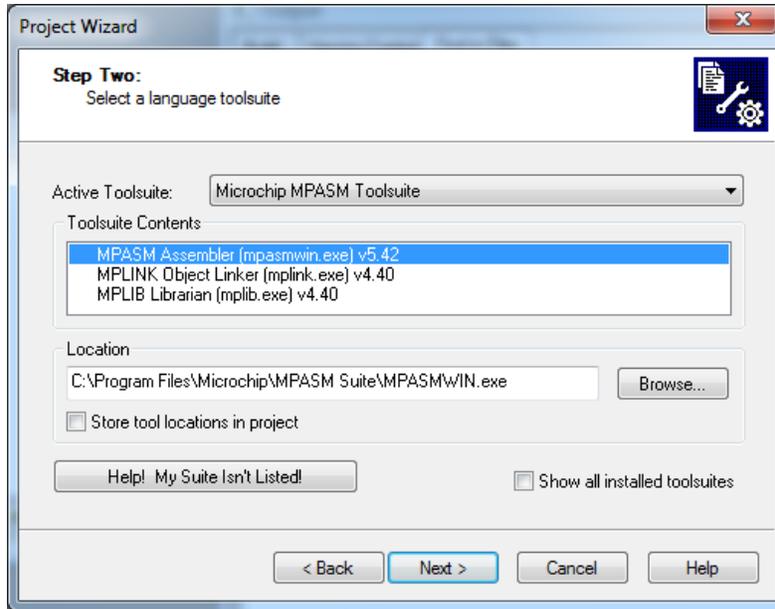
**Figure-3**

- 4) Select the device. In our case choose “**PIC16F84A**” and click “**Next**”.



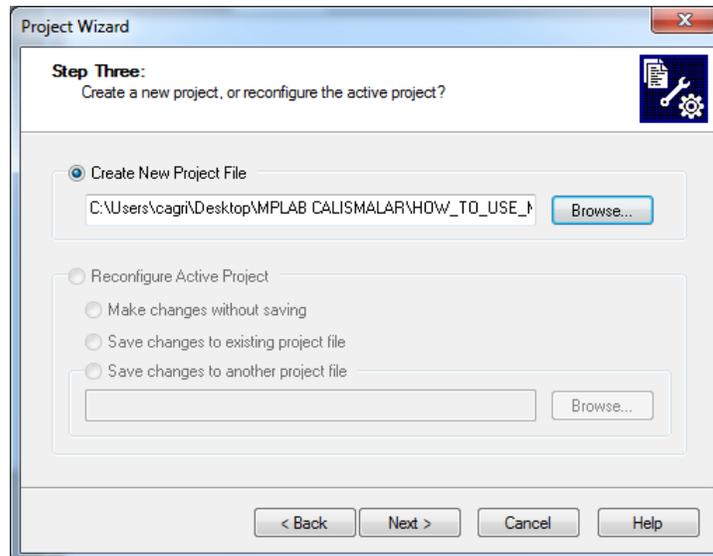
**Figure-4**

- 5) Choose programming language. If you want to use Assembly choose “**MPASM Assembler**” in the **Figure-5**, then click “**Next**”.



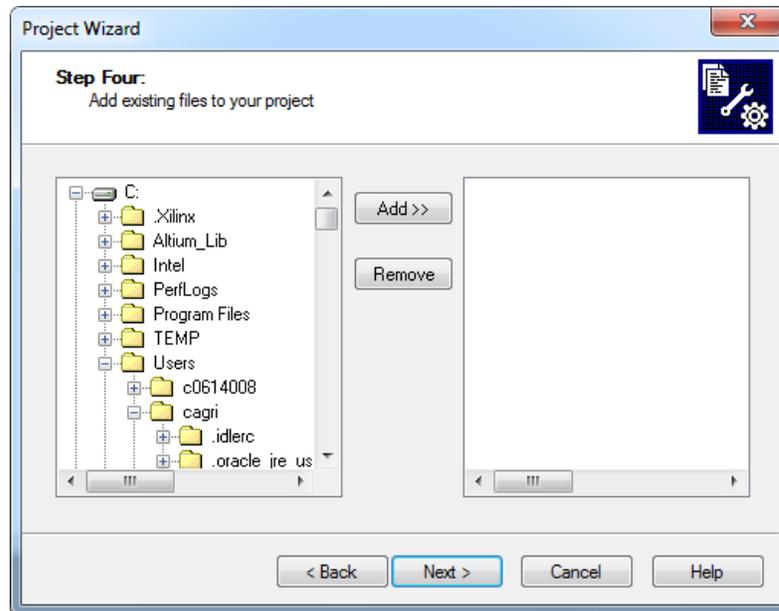
**Figure-5**

- 6) Choose directory of the project. Open a new file for your each separate works. Click “Next” in **Figure-6**.



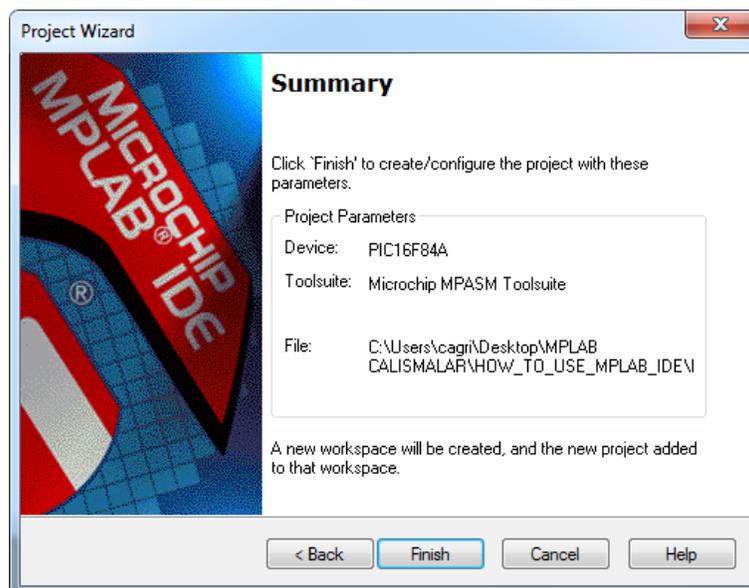
**Figure-6**

- 7) If you want a blank project, click "Next" in **Figure-7** without changing anything.



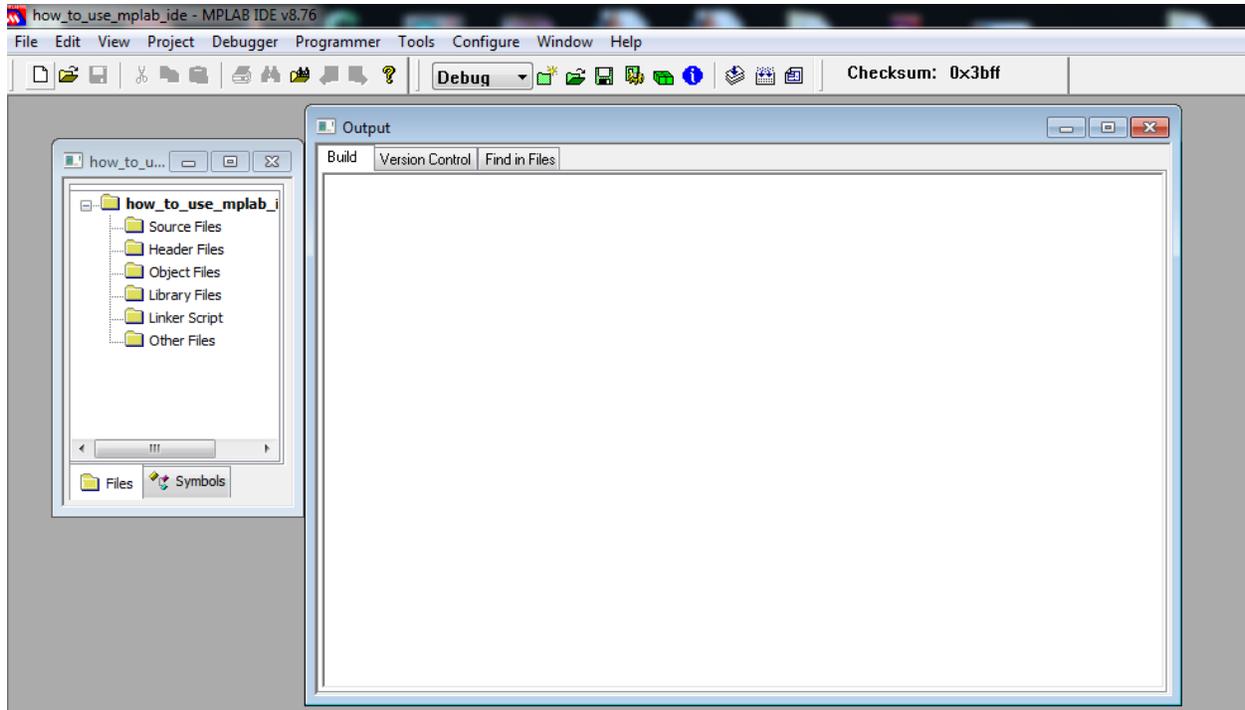
**Figure-7**

8) Click "**Finish**" as a final step of project creation in MPLAB IDE.



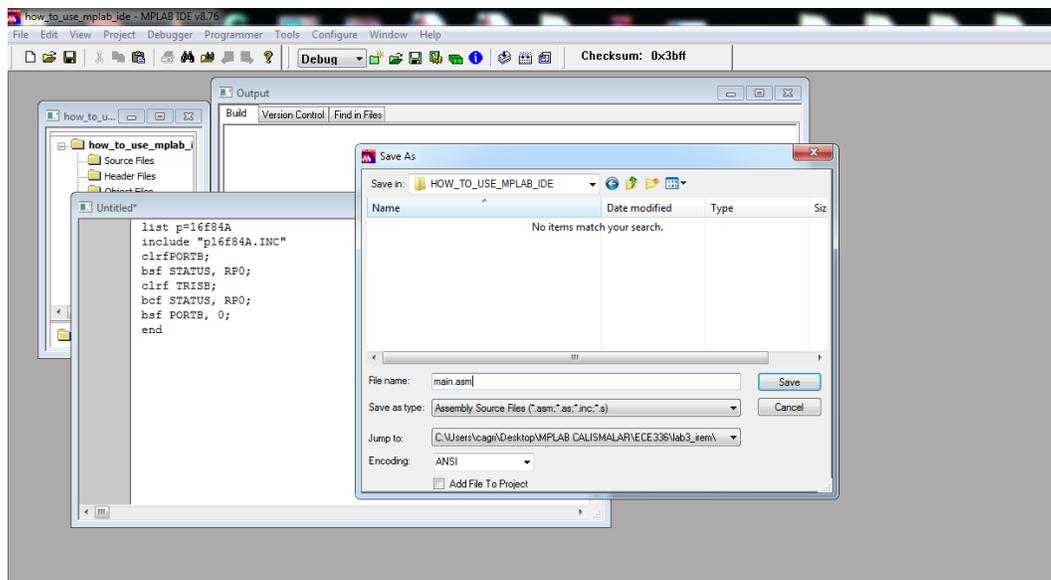
**Figure-8**

9) A new project is created. Your window should look like in **Figure 9**. Next step is to write our assembly code. To open a new file to write the code click "**File-> New**".



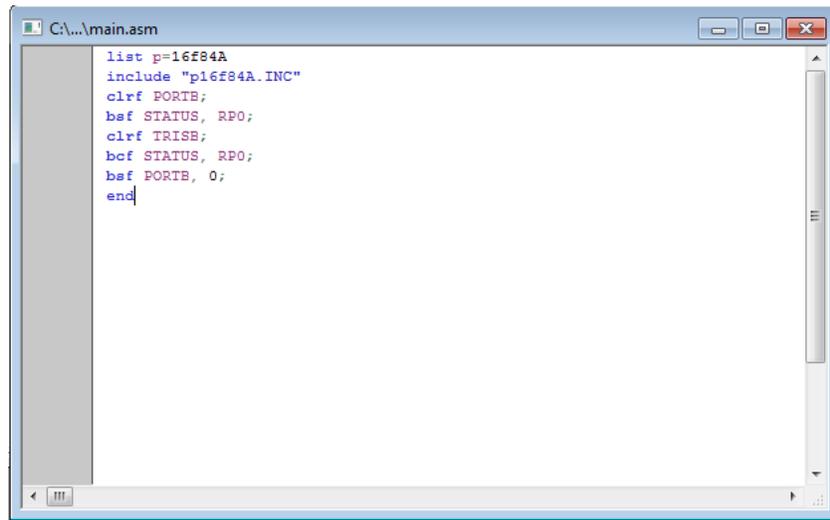
**Figure-9**

10) After writing your assembly code, it should be saved. Save the file by clicking floppy disk icon in the menu. As it seen in the **Figure-10**, it should be saved in ".asm" file format which means that this file should be compiled as an assembly file.



**Figure-10**

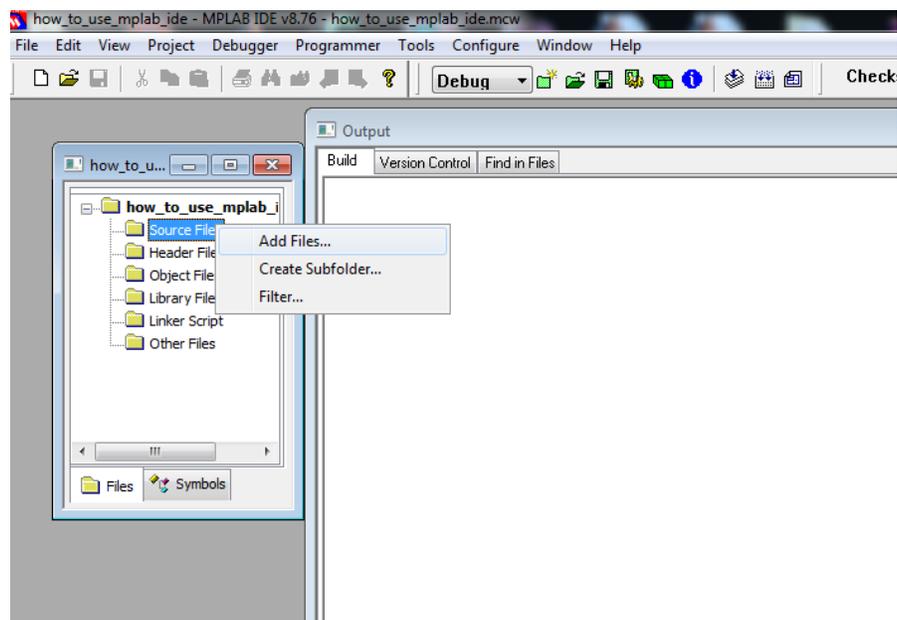
11) After saving code, it will be colored. Special commands are colored as blue and keywords are colored as magenta in **Figure-11**.



```
C:\...\main.asm  
list p=16F84A  
include "p16f84A.INC"  
clrf PORTB;  
bsf STATUS, RP0;  
clrf TRISE;  
bcf STATUS, RP0;  
bsf PORTB, 0;  
end
```

**Figure-11**

12) Next step is to add assembly file,"main.asm", to the project. Right click the "**Source Files**" and then left click the "**Add Files**".



**Figure-12**

13) Assembly file is added to the project. Next step is to build it in order to see whether there are errors or not. In the menu, press **"build all"** like shown in the **Figure-13**. Then in the next window press **"Absolute"**.

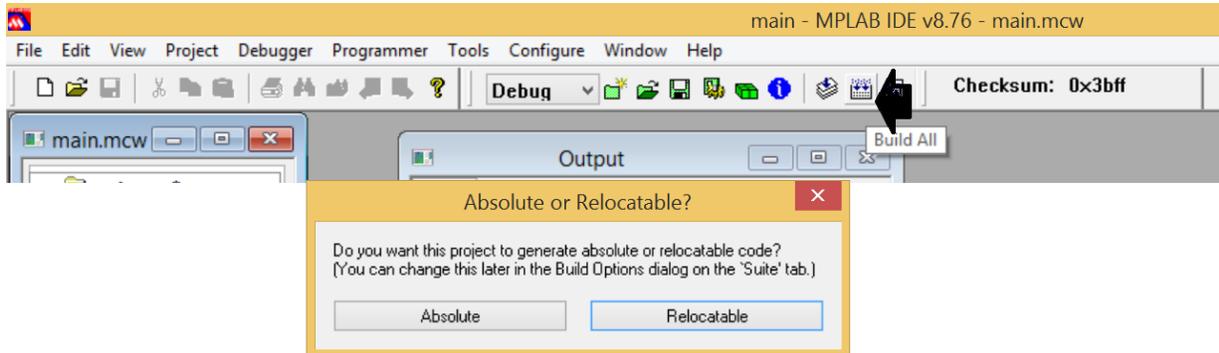


Figure-13

14) If your code is correct in terms of assembly syntax rules then **"BUILD SUCCEEDED"** should be seen in the Output window of the project, **Figure-14**. After this step, ".hex" file is created and we are ready for the simulation.

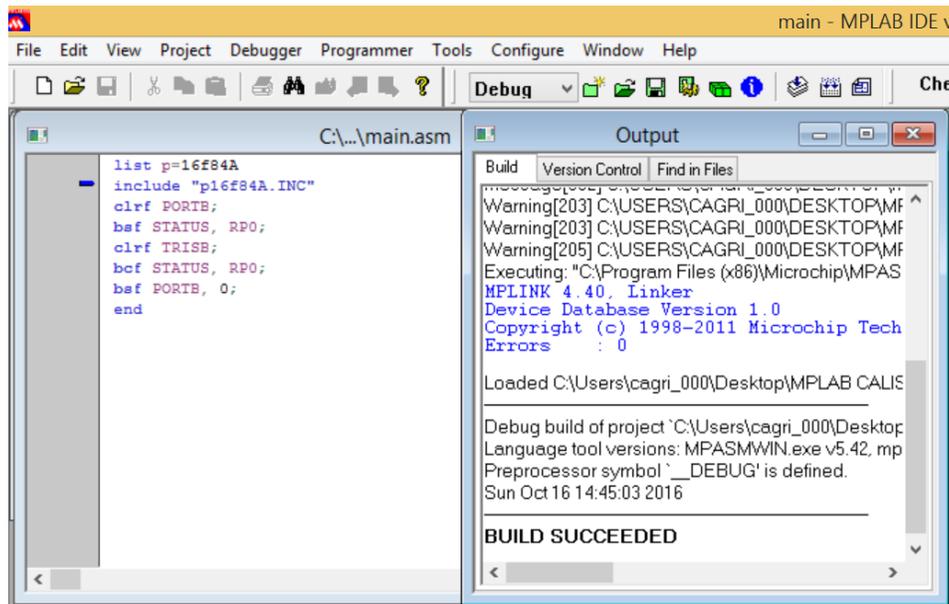
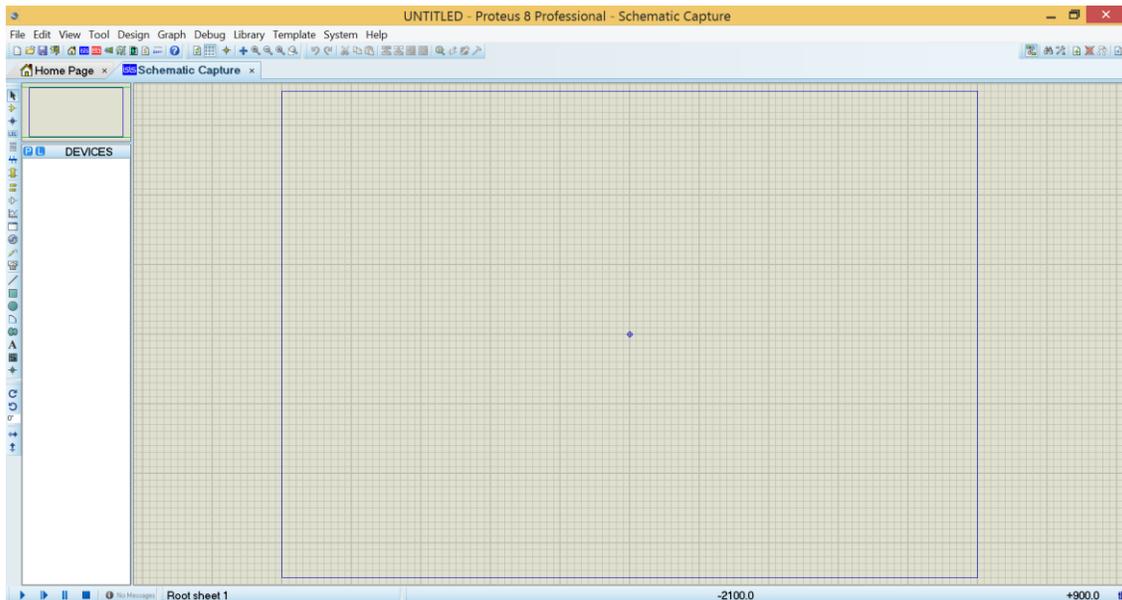


Figure-14

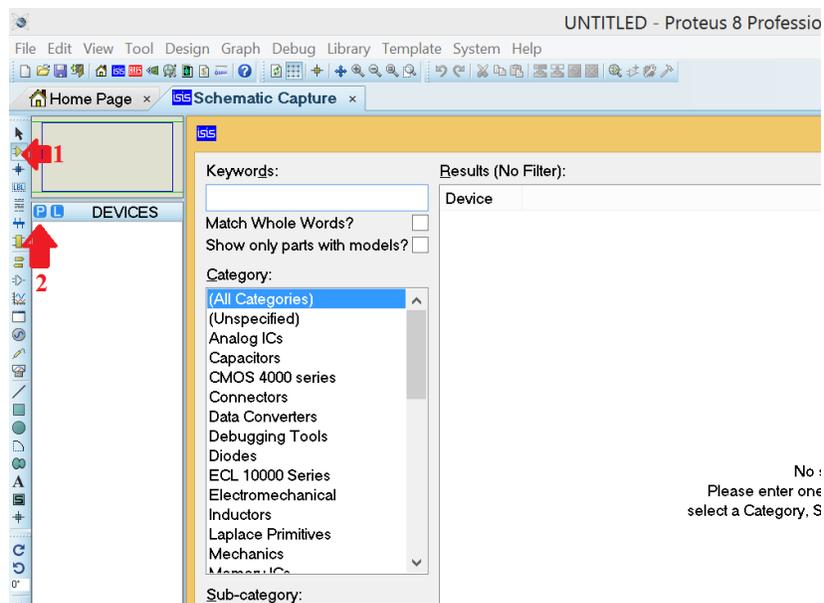
## 2. Simulate your assembly code in ISIS

1) Open ISIS, our simple project should be light the LED on 0th bit PORTB. In this scope, we need to add related components to the schematic project and construct the simulation circuit. In the **Figure-15**, a blank schematic page can be seen.



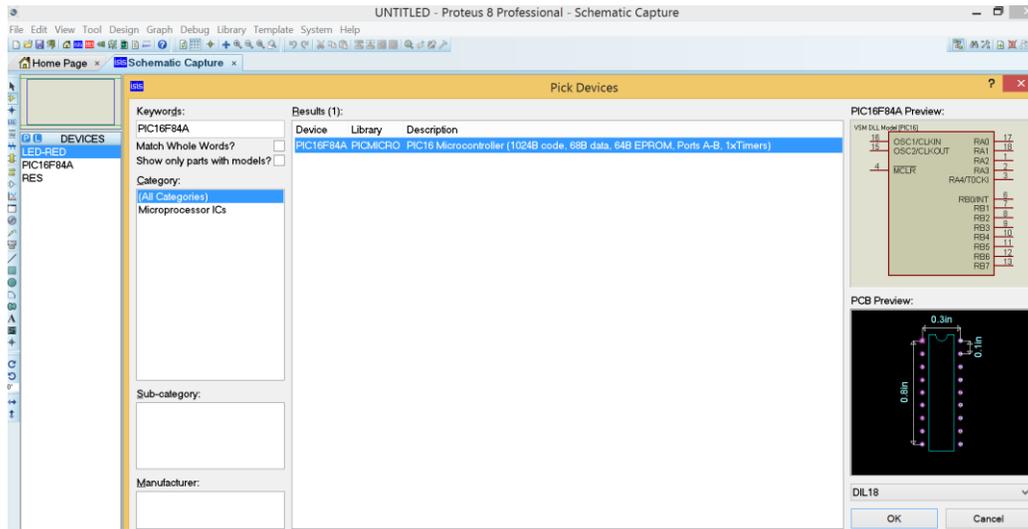
**Figure-15**

2) Circuit elements can be added from the ISIS libraries. At first click "Component Mode" icon, **Figure-16** step 1, then click "P" icon, **Figure-16** step 2, to open library window.



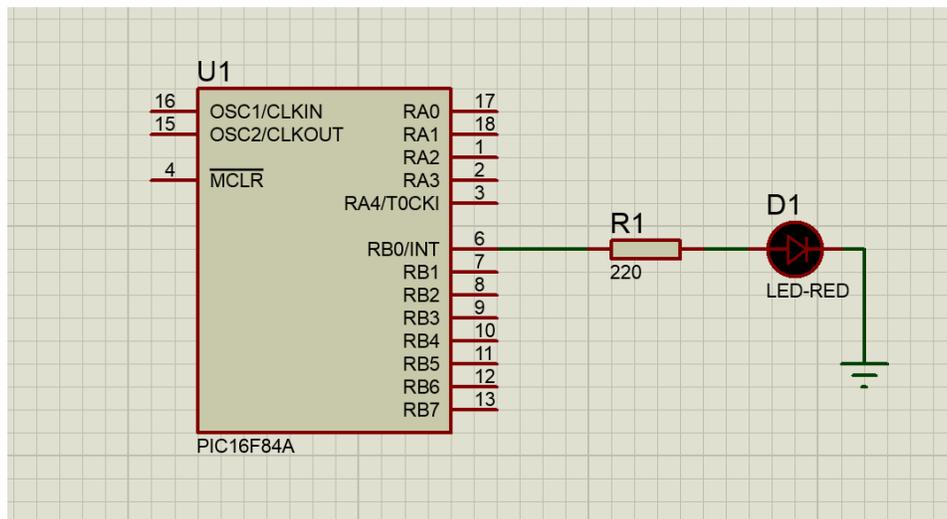
**Figure-16**

3) Type PIC16F84A, LED-RED, RES step by step then double click for each one. By doing this, these components will be added to the current ISIS project. **Figure-17** shows the operation.



**Figure-17**

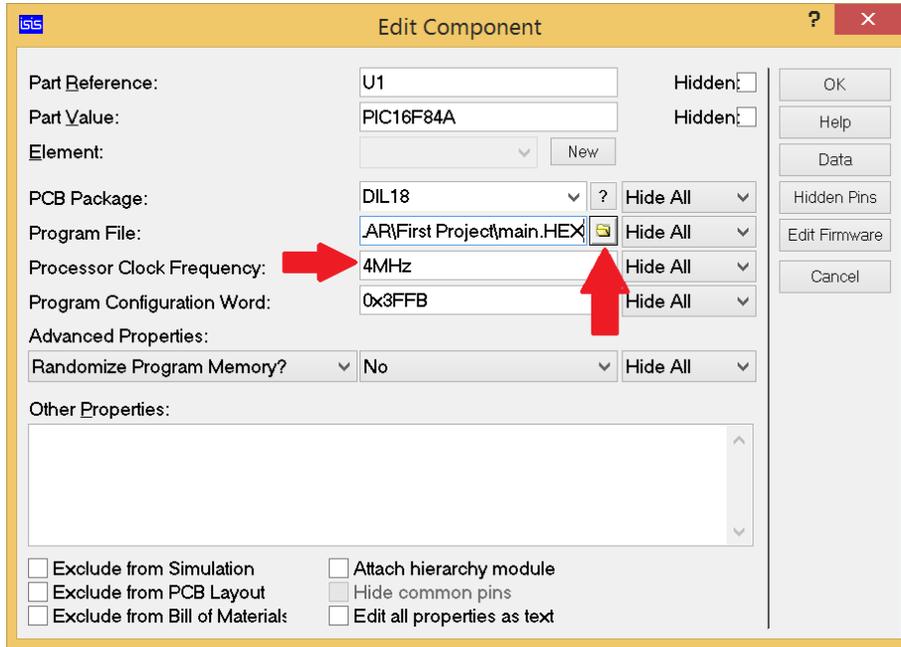
4) As it seen in the **Figure-18**, circuit for the simulation of our assembly code is constructed. GND object has been taken from "Terminals Mode" part. It is important to mention that, OSC pins and MCLR pin are left floating. In the simulation, there is no need to add them however, they should be used while constructing the circuit on breadboard or PCB.



**Figure-18**

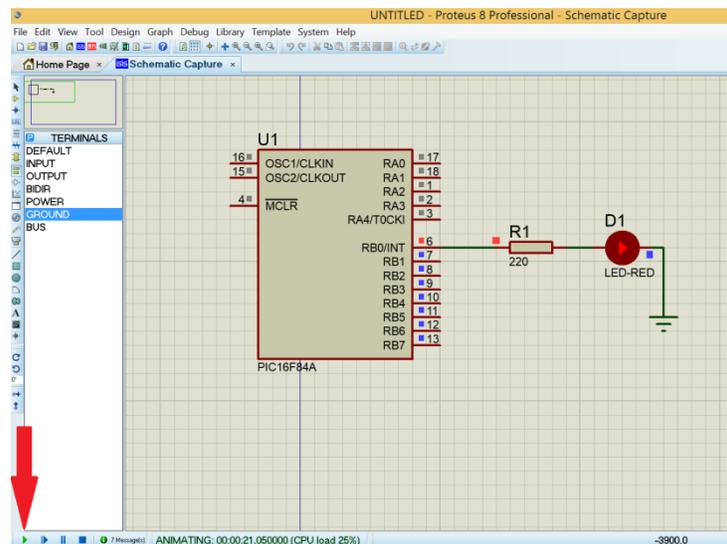
5) Circuit is constructed, now we need to load our ".hex" file to the PIC and run the simulation. By double clicking on the PIC16F84A IC on ISIS, a new window will be opened. From this

window, choose your "main.hex" file from the directory that you have created in part one. In **Figure-19**, "main.hex" file is added and clock frequency of the IC is set to 4 MHz. After setting these, press "OK" button.



**Figure-19**

6) Program is set up on IC. Final step is to run the simulation. Click play button and see the result, **Figure-20**. If you want any changes in the circuit, firstly you should stop the simulation.



**Figure-20**