CE-222

Computer Organization and Assembly Language

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Simulator Manual

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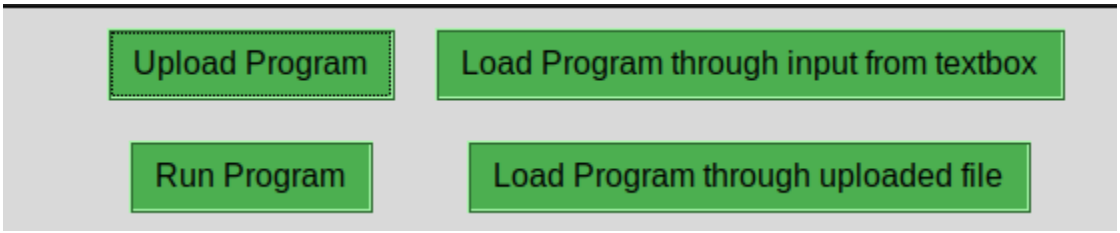
Abstract

This implementation of our redesigned basic computer simulator runs on python, with tkinter providing the GUI. All the registers have been declared as string arrays, and the flags as single characters. The memory is defined as a string array of 30x16 in order to run the sample programs only, however, it can be increased to its original size of 4096 to unlock the complete capability of the simulator.

The image below shows the buttons included in the simulator.

There are 4 buttons in this simulator:

1. **Upload Program: it uploads the program from a text file stored in the local computer.**
2. **Load Program through input box: it loads the program written in the text box.**
3. **Run program: it executes the loaded program.**
4. **Load Program through uploaded file: it loads the program in the registers and RAM from the file uploaded.**



The Images below shows the registers and the RAM used in the simulator by the Computer.

0	0008
1	0007
E	0000
PC	0003
IR	3C02
AR	3C02
DR	0006
TR	0007
XR	0000
B	0001
C	0000
F	0000
INPR	0000
OUTR	0000
CMP_FLAG_B	0000
CMP_FLAG_C	0000
CMP_FLAG_D	0000
INP_FLAG	0000
OUT_FLAG	0000
IEN	0000

0: 0100000000001010	1: 0010010000000100
2: 0011110000000010	3: 0011110011000001
4: 0000000000000010	5: 0000100000001011
6: 0011111000000001	7: 0110100100000100
8: 0000000000000000	9: 0000000000000000
10: 0000000000001100	11: 0000000000000110
12: 0000000000000001	13: 0000000000000000
14: 0000000000000000	15: 0000000000000000
16: 0000000000000000	17: 0000000000000000
18: 0000000000000000	19: 0000000000000000
20: 0000000000000000	21: 0000000000000000
22: 0000000000000000	23: 0000000000000000
24: 0000000000000000	25: 0000000000000000
26: 0000000000000000	27: 0000000000000000
28: 0000000000000000	29: 0000000000000000

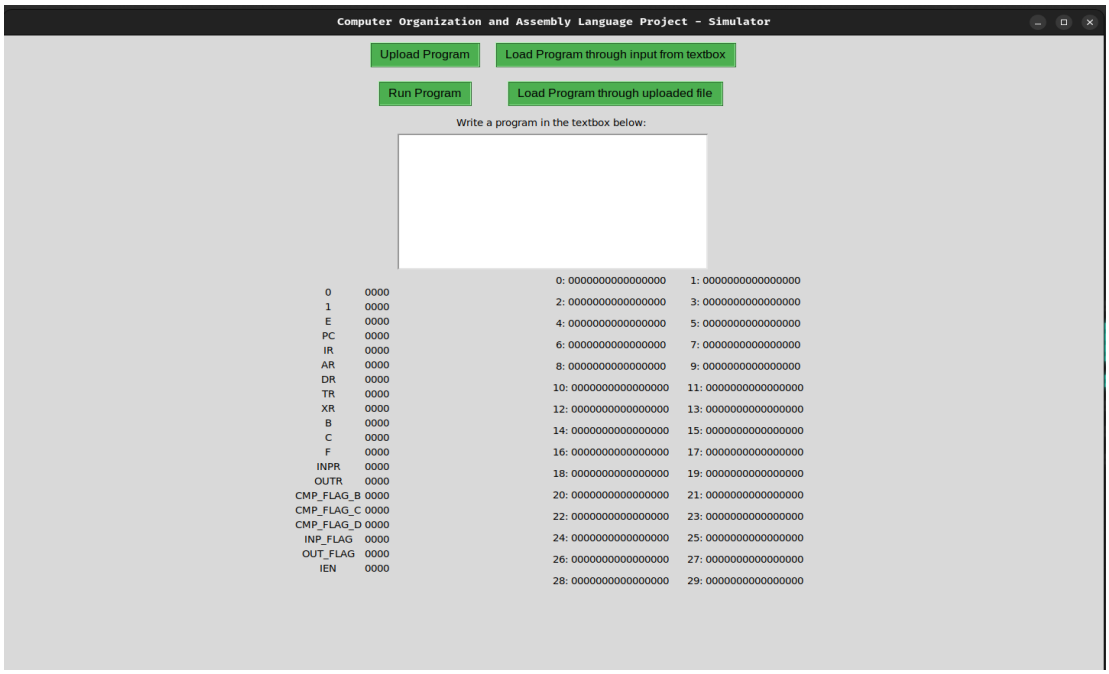
A program can be executed on the simulator through two methods:

1. Writing the instructions in the textbox.
2. Uploading a .txt file containing the instructions.

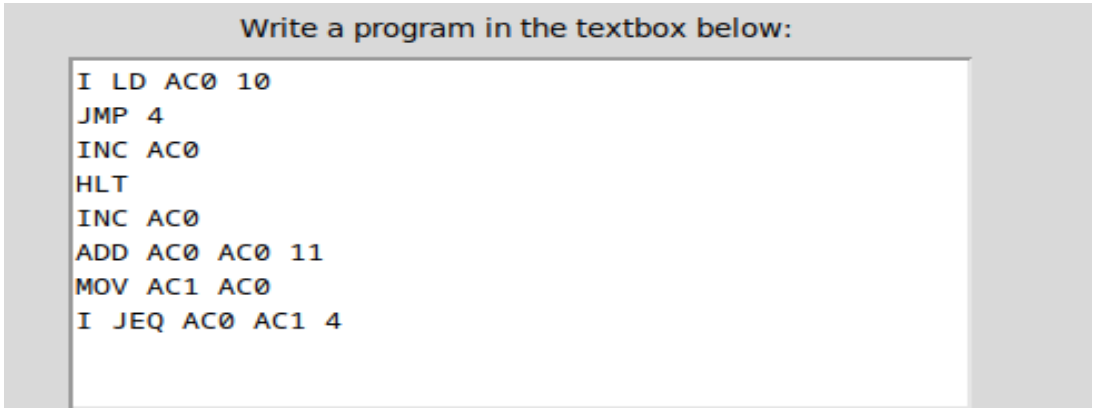
Method 1 (Text Box):

A program is entered in the text box and it is loaded in the ram and registers using the load button. The program is executed using the Run Program Button.

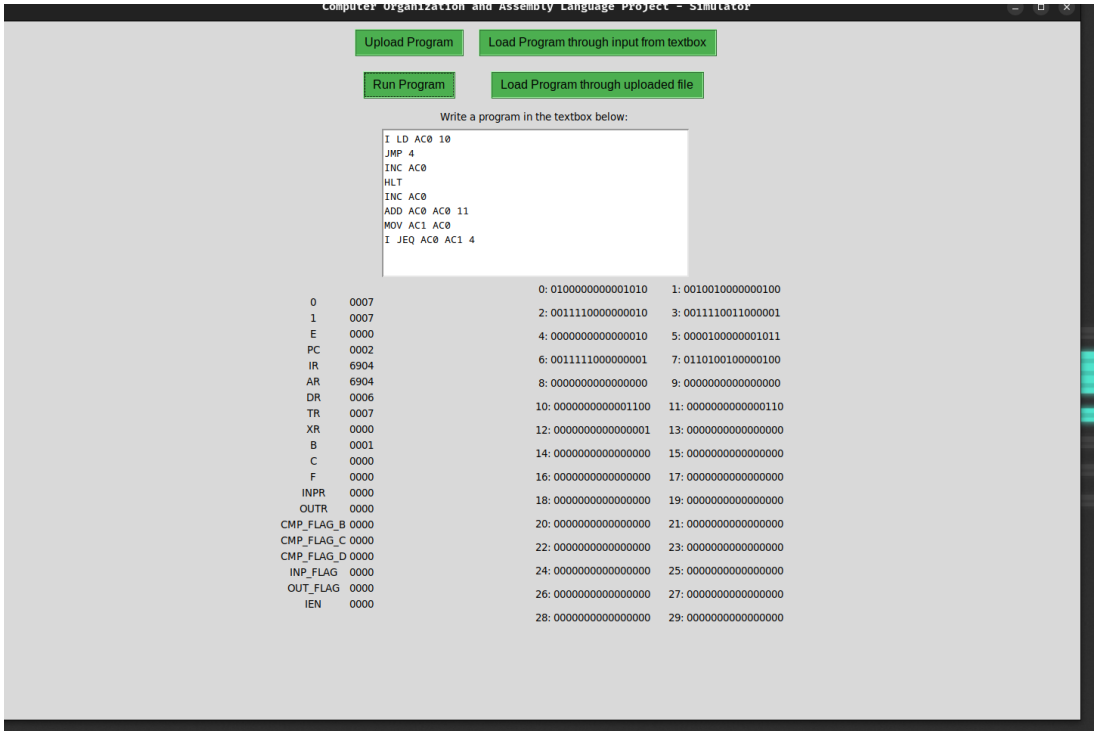
The simulator executes all the micro instructions one by one using a clock speed of 1 micro instruction per second.



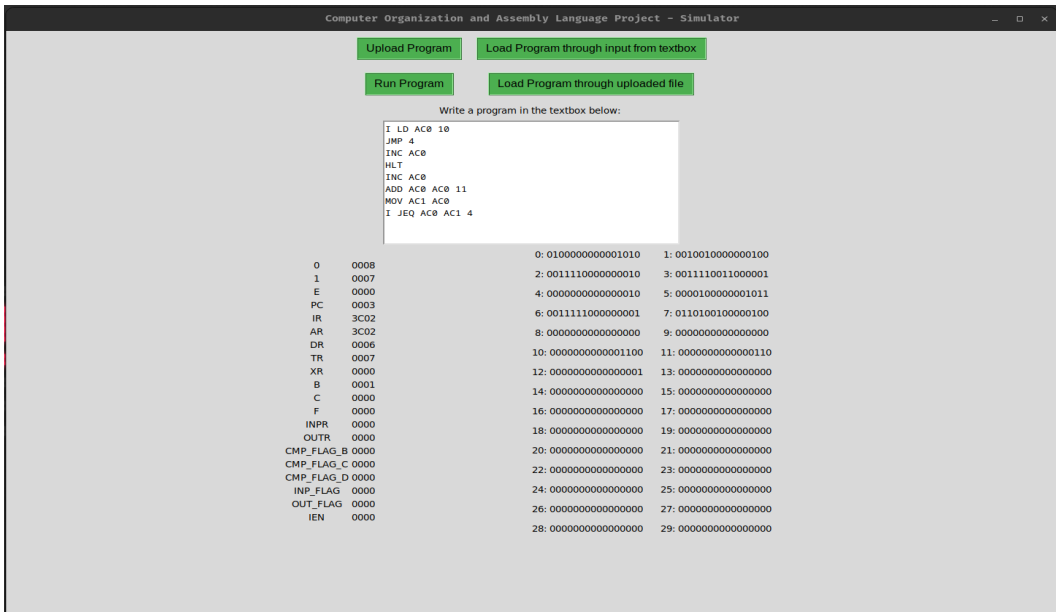
The image below shows the text box where the program is written. A sample program is written in the image.



The image below shows the program in running state.



The image below shows the program after the HLT state.



Method 2 (Uploading Program):

A program is uploaded from a text file using the upload button and it is loaded in the ram and registers using the load from file button. The program is executed using the Run Program Button.