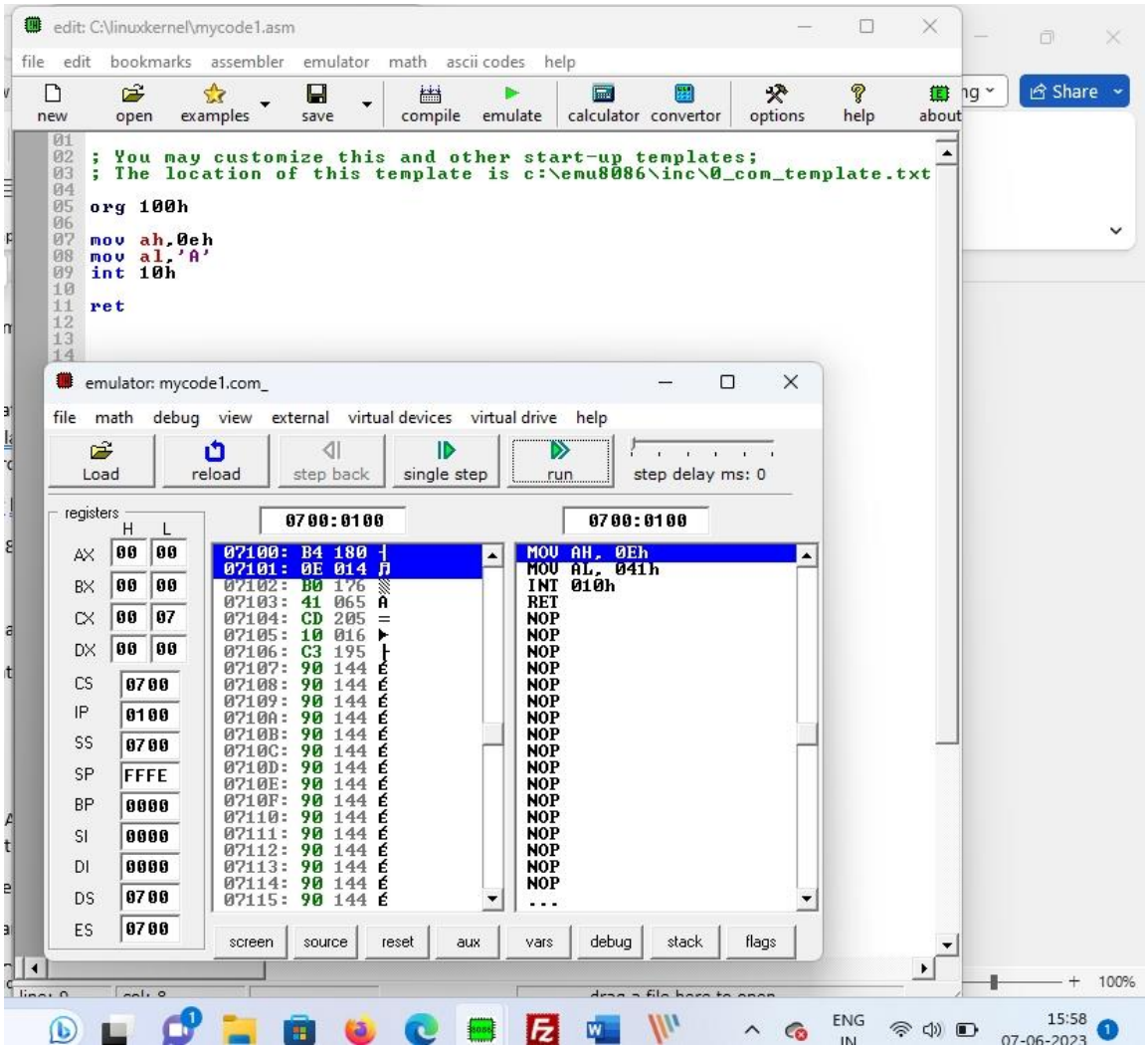
This article is about the emulator for 8086 Microprocessor by Intel

What is an Emulator?

Emulator is a software that can help you write and run or interpret code without actually having the hardware. This 8086 emulator will help you run 8086 assembly language programs without actually having 8086 Intel Microprocessor.

Download 8086 Emulator here

Here is the screenshot of 8086 Emulator



Following is the brief explanation of 8086 Registers

- There are four Data Registers in 8086
    - AX
    - BX
    - CX
    - DX

    AX has two parts AH and AL that means AX is a 16 bit register and AH is 8 bit part of it and AL is another 8 bit part of it.

    In Computer Systems a bit is 1 or 0

A nibble is 4 bits and a byte is 8 bits and a word is 16 bits.

Same applies for BX, CX and DX registers.

- Now we have CS and IP registers
  To access instructions the 8086 uses the registers CS and IP. The CS register contains the segment number of the next instruction and the IP contains the offset. IP is updated each time an instruction is executed so that it will point to the next instruction.
- SS and SP register - In 8086, the main stack register is called stack pointer - SP. The stack segment register (SS) is usually used to store information about the memory segment that stores the call stack of currently executed program. SP points to current stack top.
- BP is another 16-bit register. This is base pointer register. This register is primary used in accessing the parameters passed by the stack. It's offset address relatives to stack segment.
- Source Index (SI) is a 16- bit register. SI is used for indexed, based indexed and register indirect addressing, as well as a source data address in string manipulation instructions. Destination Index (DI) is a 16-bit register.
- DS − It stands for Data Segment. It consists of data used by the program andis accessed in the data segment by an offset address or the content of other register that holds the offset address
- ES Register The es (Extra Segment) register is an extra segment register. 8086 programs often use this segment register to gain access to segments when it is difficult or impossible to modify the other segment registers.

Now we will right out first assembly language program in Intel 8086 Emulator will print A to output screen

Download and install 8086 emulator from above link and write down the following code in the editor window.

```
org 100h


mov ah,0eh

mov al,'A'

int 10h


ret
```

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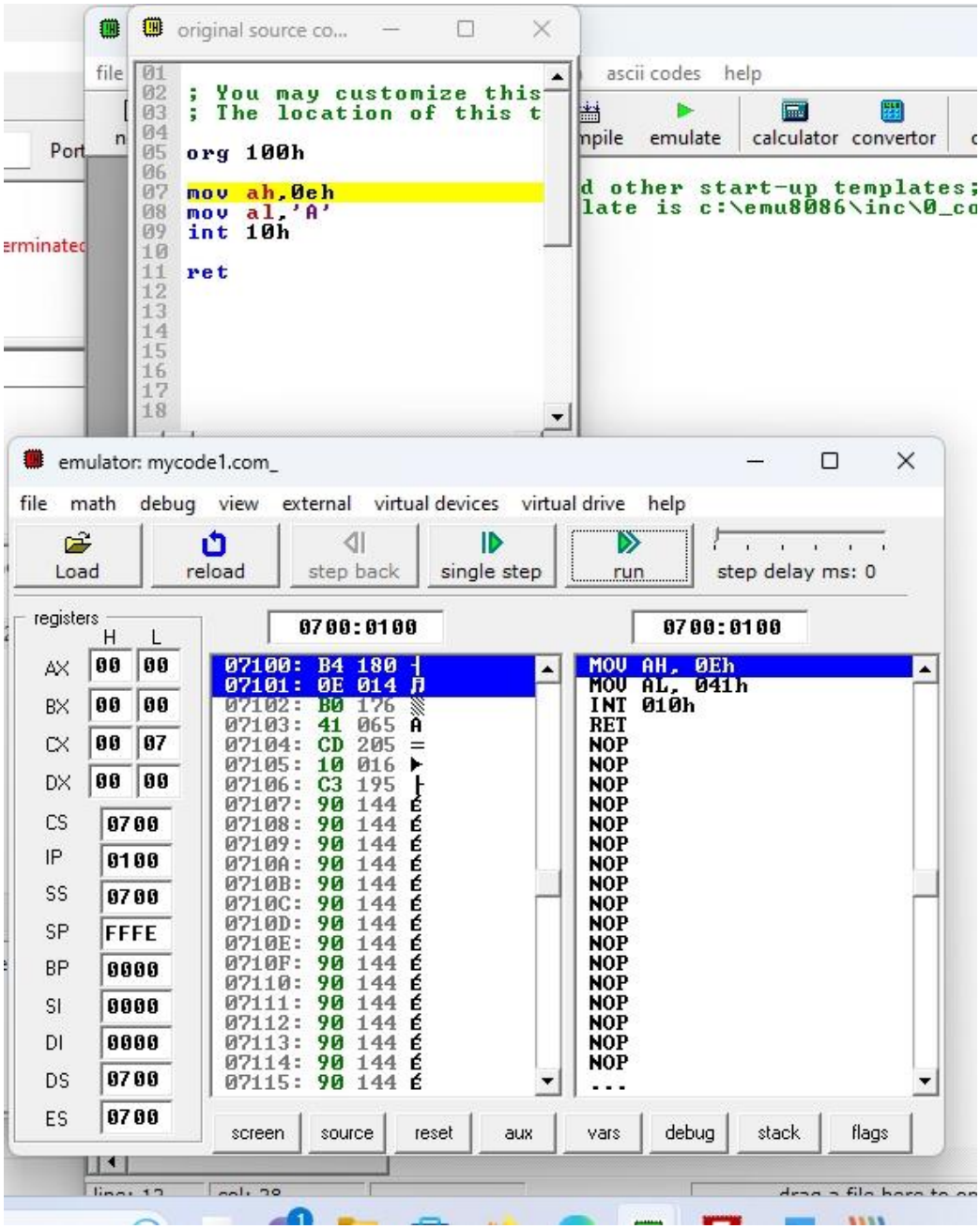
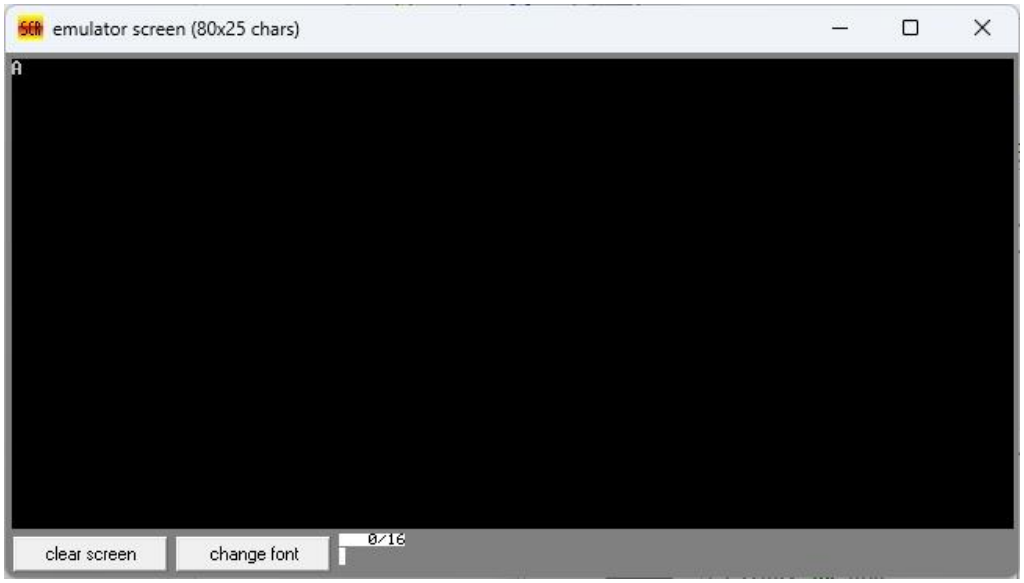
above code will move character A to al register which is low bit part of ax register

After writing the above code click emulate and following output



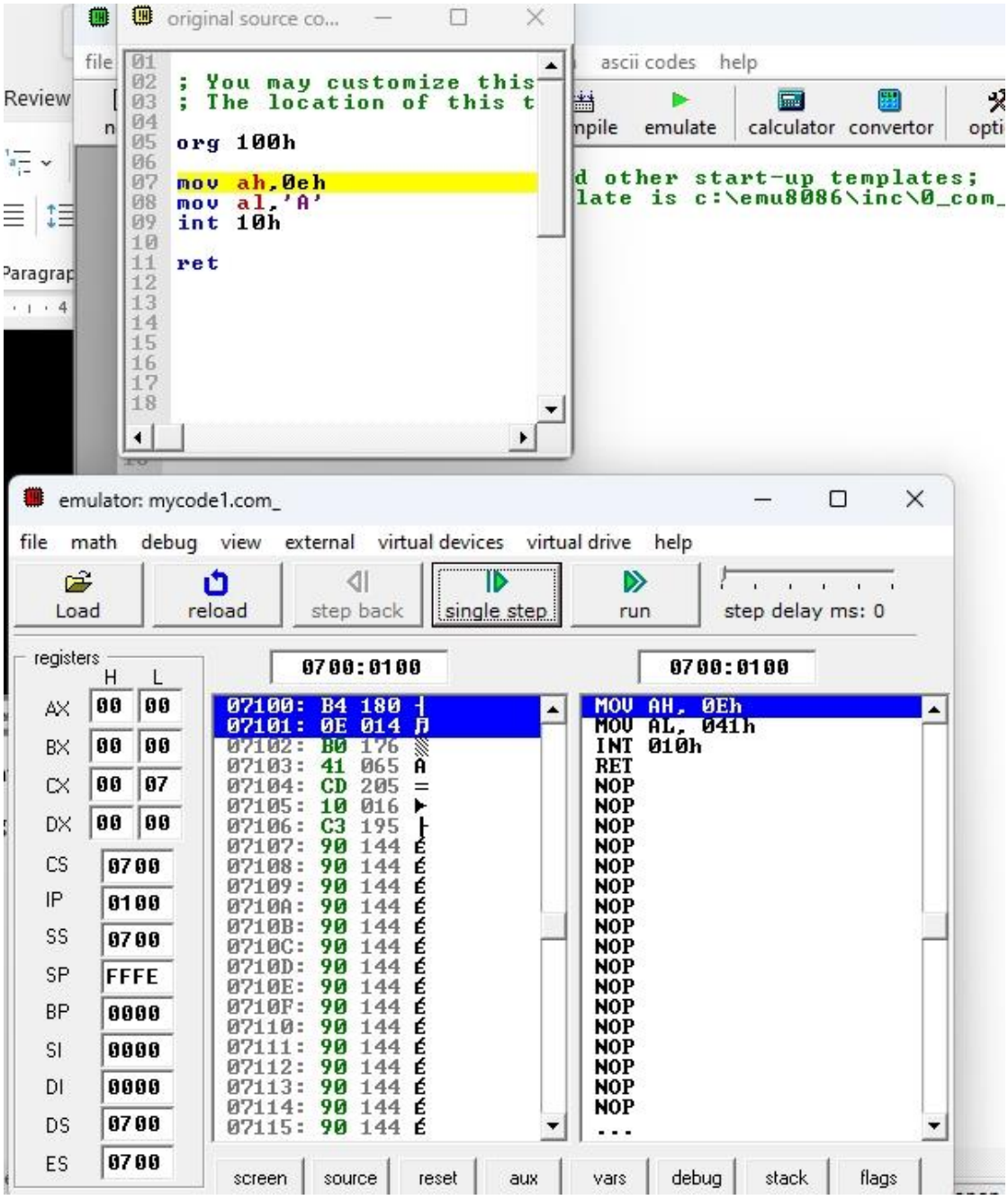
Now click on run and you will get the following output



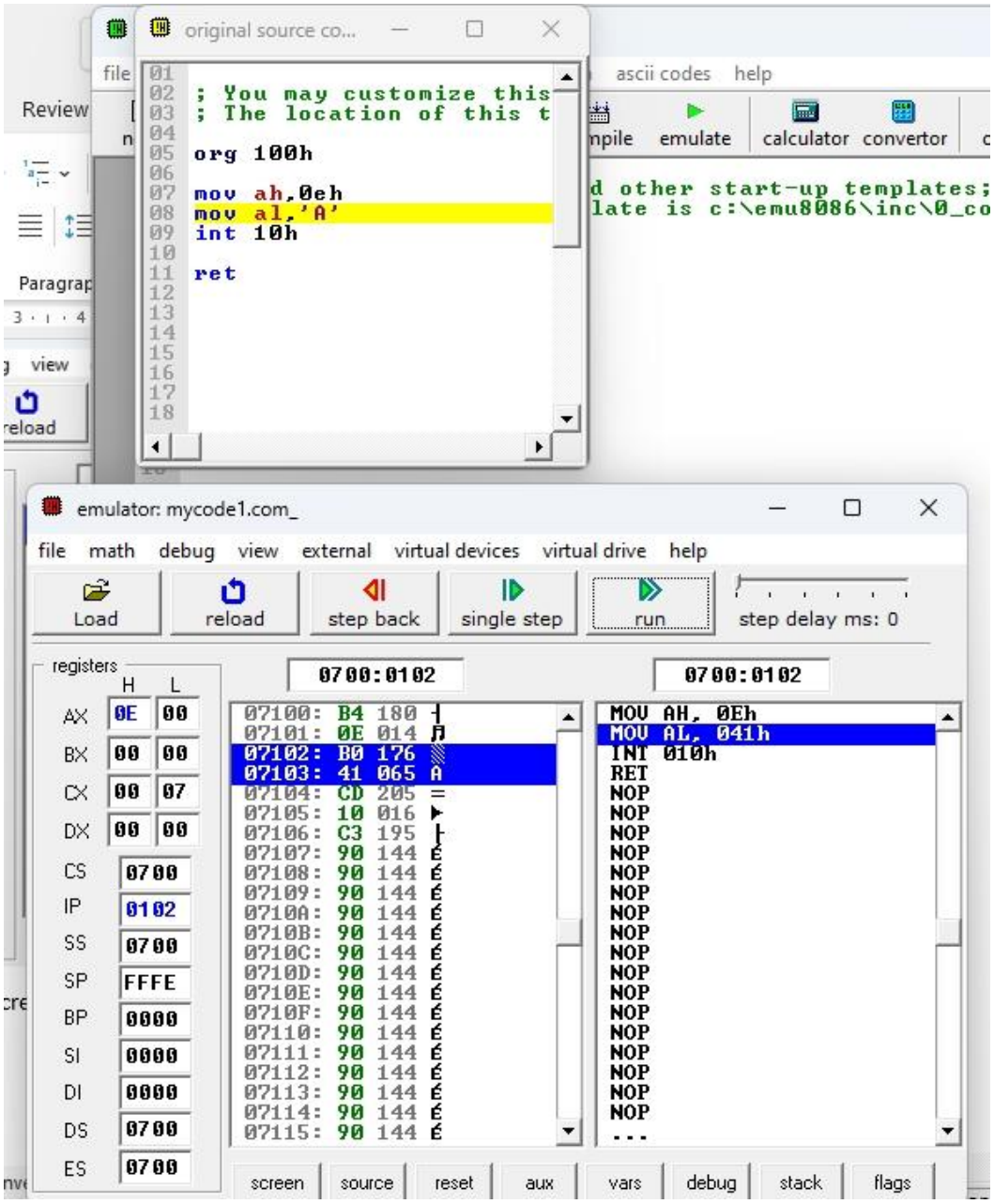
Now we can see status of registers in this emulator by running code line by line

for this click on single step

Following are three screenshots in which you can see the contents of AH and AL registers

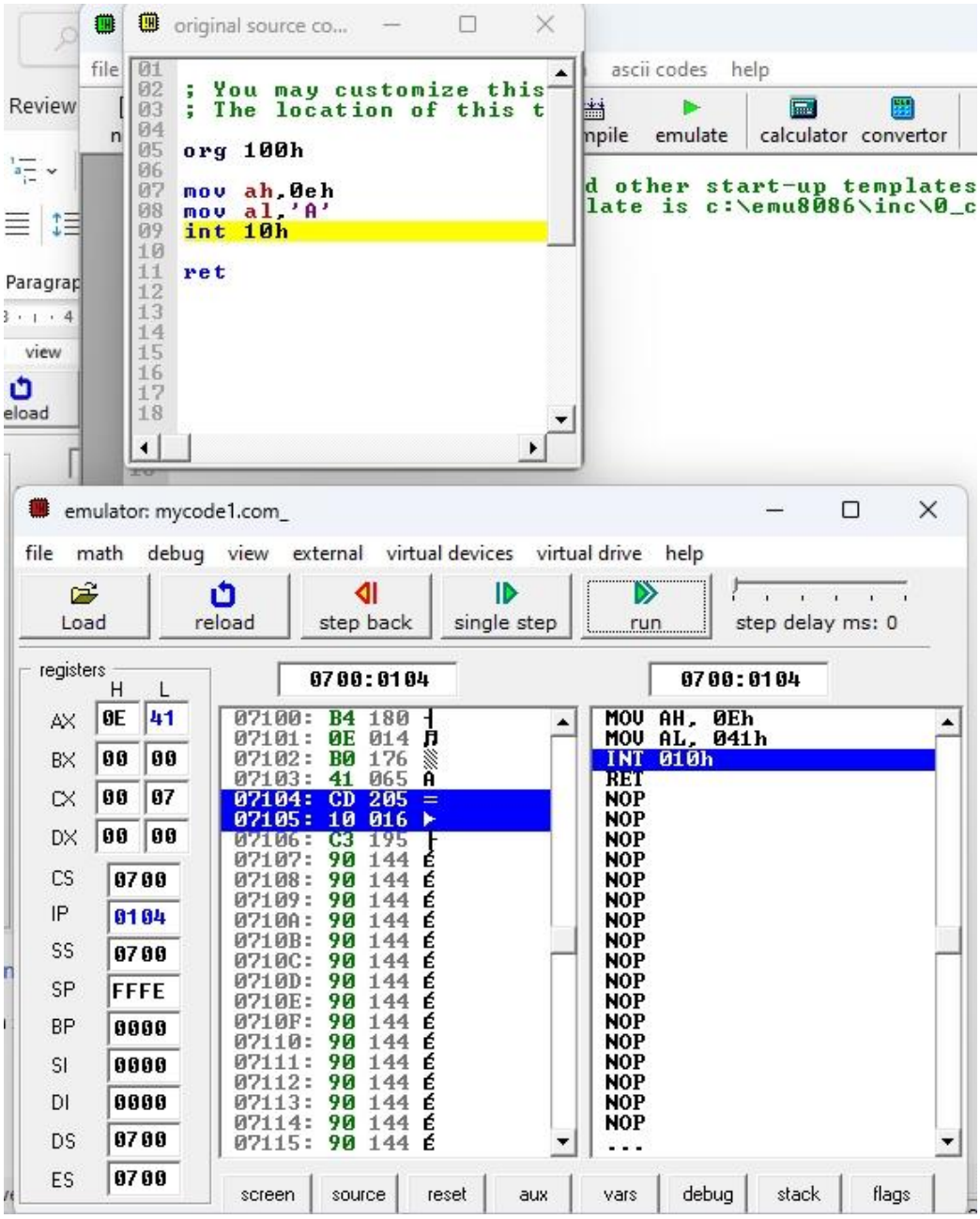


Following is the screenshot for 2 line of code after you click single step



Now see the contents of AH register changed to OE

Now Again Click on single step



Now Contents of AL register changed to 41 because hexadecimal equivalent of 65 ASCII Code or alphabet A is 41h

Now Again Click on single step for two times and you will A on output screen.

Second program is to mov 0x11h to AX Register and mov 0x11h to BX Register and add the values in AX and BX Registers.

After addition sum will be stored in AX Register.

---

org 100h

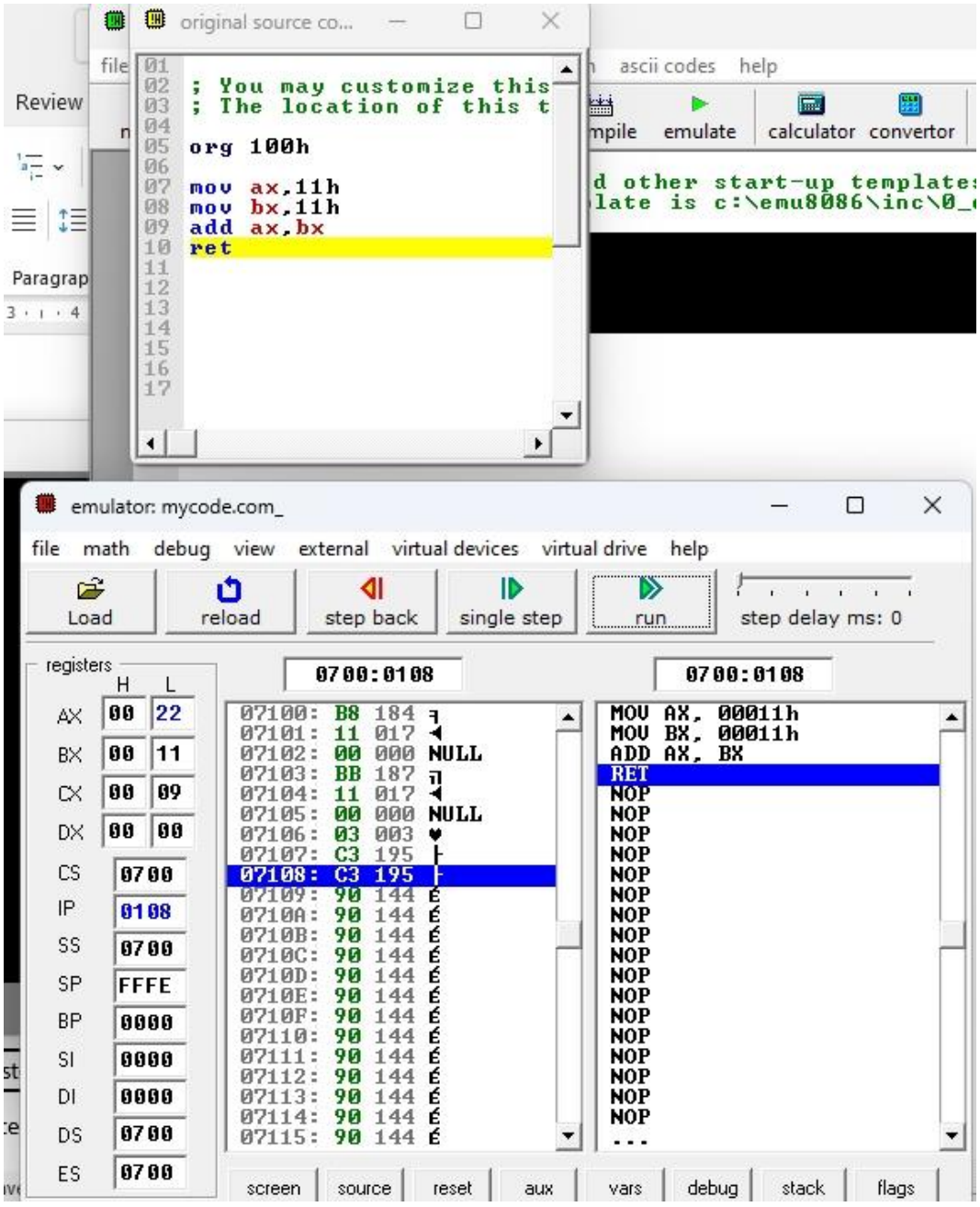
mov ax,11h

mov bx,11h

add ax,bx

ret

Following will be the output



Now I will explain you number systems used in computer systems

- Binary
- Octal
- Decimal
- Hexadecimal

Binary Number System can only have 0 or 1

Octal Number System can have values from 0 to 7

Decimal number system can have values from 0 to 9

Hexadecimal Number System is

0

1

2

3

4

5

6

7

8

9

A

B

C

D

E

F

We can easily convert one number system to another using softwares or computer programs.