Report: MS-DOS Assembly Program to Draw the Letter T

1. Objective

Write an 8086 assembly program that draws a large letter **T** starting at **row 10, column 5**, with a **width of 11 characters** and **height of 15 lines**.
The letter is formed from the characters of my full name **"al amin hossain nayem"**, used sequentially and repeated as needed.

Rules set by instructor

- Use **only MS-DOS interrupts** (no BIOS calls).
- All text output must be produced by DOS interrupt **21h**.
- Cursor movement must be accomplished with ASCII control codes (CR/LF) and spaces.
- The program must terminate cleanly.

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2. Development Environment

- **Assembler/Emulator:** EMU8086
- **Output format:** TINY .COM executable
- **Operating system:** MS-DOS environment provided by EMU8086

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3. Program Logic

1. **Data Preparation**
    - letters array stores 25 characters: enough to fill the 11-wide top and the 14-line stem.
2. **Positioning**
    - Print 9 pairs of Carriage Return (13) and Line Feed (10) characters to reach **row 10**.
    - Print 4 spaces to reach **column 5**.
3. **Top Bar of T**
    - Output 11 letters from letters using int 21h AH=02h.

4. **Vertical Stem**
    - Loop 14 times:
        - Print CR/LF to move down one line.
        - Print 9 spaces to reach **column 10**.
        - Print the next letter from letters.
5. **Exit**
    - Call int 21h AH=4Ch to return to DOS.

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4. Key MS-DOS Interrupts Used

Interrupt	AH	Purpose
21h	02h	Display a single character (DL holds it)
21h	4Ch	Terminate program and return to DOS

No BIOS (int 10h) calls are used, fulfilling the requirement to use **only MS-DOS interrupts**.

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5. Program Listing (main part)

```
org 100h
.data
letters db 'ALAMINHOSSAINNAYEMALAMINH$'

.code
start:
  mov ax,@data
  mov ds,ax

  ; Move to row 10
```

```
    mov cx,9
down_loop:
    mov ah,02h
    mov dl,13
    int 21h
    mov dl,10
    int 21h
    loop down_loop

    ; Move to column 5
    mov cx,4
right_loop:
    mov ah,02h
    mov dl,' '
    int 21h
    loop right_loop

    ; Print top bar (11 chars)
    mov si,0
    mov cx,11
top_bar:
    mov ah,02h
    mov dl,[letters+si]
    int 21h
    inc si
    loop top_bar
```

```
    ; Print vertical stem (14 lines)
    mov bx,0
stem_lines:
    cmp bx,14
    je  done
    mov ah,02h
    mov dl,13
    int 21h
    mov dl,10
    int 21h
    mov cx,9
space_loop:
    mov ah,02h
    mov dl,' '
    int 21h
    loop space_loop
    mov ah,02h
    mov dl,[letters+si]
    int 21h
    inc si
    inc bx
    jmp stem_lines

done:
    mov ax,4C00h
```

int 21h

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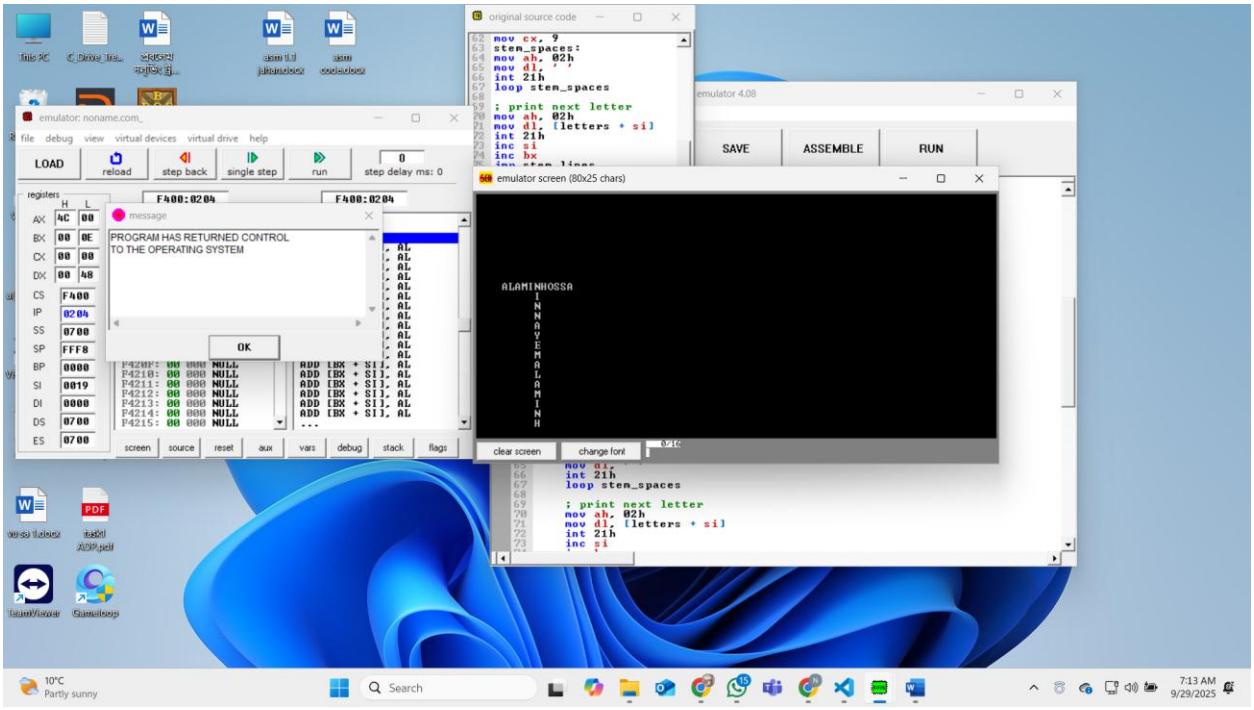
6. Result of Execution

When assembled and run in EMU8086, the program displays:



“PROGRAM HAS RETURNED CONTROL TO THE OPERATING SYSTEM” after successful execution.

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7. Conclusion

The program successfully:

- Positions the cursor to the specified location using only CR/LF and spaces.
- Prints a large letter **T** with a width of 11 and a height of 15 using the letters of my name.
- Uses **only MS-DOS interrupts** (int 21h) and exits cleanly.

This fulfills all requirements of the assignment.