COMPUTER ORGANIZATION AND ARCHITECTURE – LAB TASK 4

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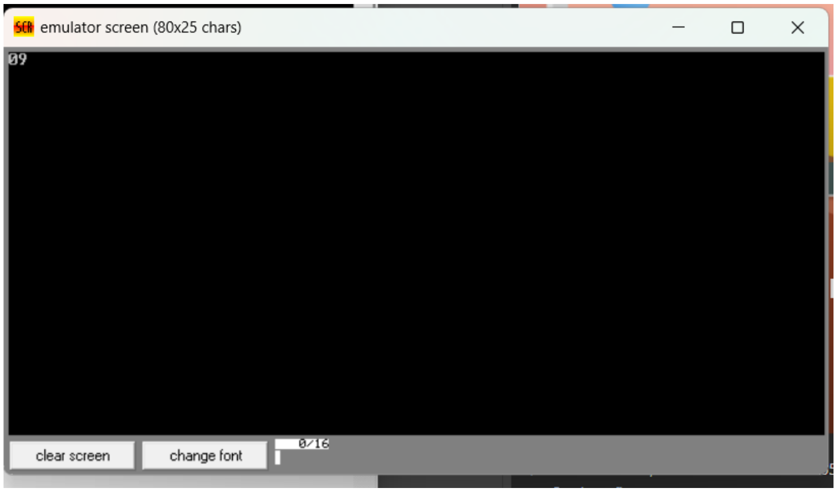
1. Write an assembly language program to perform multiplication of 8-bit data.

```
org 100h        ; Set starting address


mov al, 03h     ; Load AL with 07h

mov bl, 03h     ; Load BL with 03h

mul bl          ; Multiply AL by BL, result in AX (AL * BL)


mov bl, al      ; Move result (AL) to BL for later use

mov ah, al      ; Move AL to AH


; Convert upper nibble to ASCII

and ah, 0F0h    ; Mask lower nibble, keep upper

shr ah, 4       ; Shift upper nibble to lower position

add ah, 30h     ; Convert to ASCII '0'-'9'

cmp ah, 39h     ; Compare with '9'

jle print_first_digit ; If less or equal to '9', skip next step

add ah, 7       ; Convert to ASCII 'A'-'F'


print_first_digit:

mov dl, ah      ; Move first digit to DL

mov ah, 02h     ; Prepare for output

int 21h         ; Print first digit
```

```
; Convert lower nibble to ASCII
mov ah, bl      ; Move result (BL) back to AH
and ah, 0Fh     ; Mask upper nibble, keep lower
add ah, 30h     ; Convert to ASCII '0'-'9'
cmp ah, 39h     ; Compare with '9'
jle print_sec_digit ; If less or equal to '9', skip next step
add ah, 7       ; Convert to ASCII 'A'-'F'

print_sec_digit:
mov dl, ah      ; Move second digit to DL
mov ah, 02h     ; Prepare for output
int 21h         ; Print second digit

mov ah, 4Ch     ; Prepare for program termination
int 21h         ; Terminate program
```

OUTPUT:



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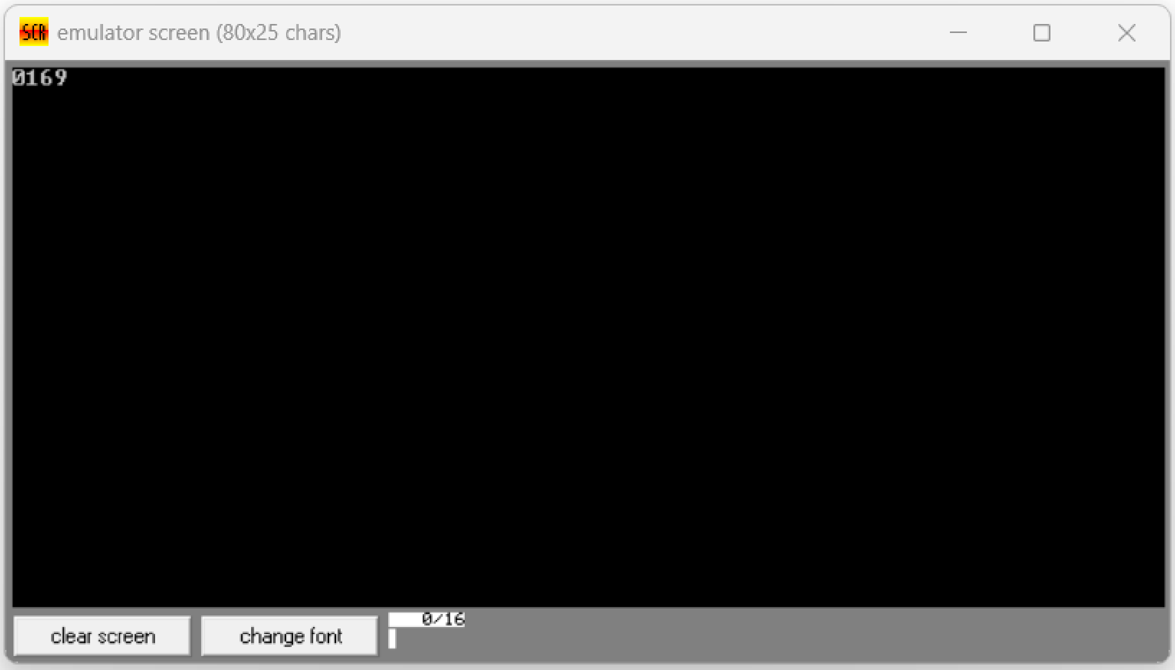
2. Write a program in assembly language to perform multiplication of 16-bit data.

```
org 100h          ; Set starting address

mov ax,0013h ;Load AX with 5678h
mov bx,0013h     ; Load BX with 1234h
mul bx            ; Multiply AX by BX, result in DX:AX

mov bx, ax        ; Move the lower 16 bits of the result (AX) into BX

; Convert and print the high nibble of BH
mov ah, bh        ; Move BH (high byte of BX) to AH
shr ah, 4         ; Shift right to isolate the high nibble
add ah, 30h       ; Convert to ASCII '0'-'9'
cmp ah, 39h       ; Compare with '9'
jle print_high_nibble ; If less than or equal, skip next step
add ah, 7         ; Adjust to ASCII 'A'-'F'

print_high_nibble:
mov dl, ah        ; Move the ASCII value to DL
mov ah, 02h       ; Set up for printing
int 21h           ; Print the high nibble of BH

; Convert and print the low nibble of BH
mov ah, bh        ; Move BH back to AH
and ah, 0fh       ; Mask the high nibble, keep the low nibble
add ah, 30h       ; Convert to ASCII '0'-'9'
```

```
cmp ah, 39h       ; Compare with '9'
jle print_low_nibble ; If less than or equal, skip next step
add ah, 7         ; Adjust to ASCII 'A'-'F'

print_low_nibble:
mov dl, ah        ; Move the ASCII value to DL
mov ah, 02h       ; Set up for printing
int 21h           ; Print the low nibble of BH

; Convert and print the high nibble of BL
mov ah, bl        ; Move BL (low byte of BX) to AH
shr ah, 4         ; Shift right to isolate the high nibble
add ah, 30h       ; Convert to ASCII '0'-'9'
cmp ah, 39h       ; Compare with '9'
jle print_high_nibble2 ; If less than or equal, skip next step
add ah, 7         ; Adjust to ASCII 'A'-'F'

print_high_nibble2:
mov dl, ah        ; Move the ASCII value to DL
mov ah, 02h       ; Set up for printing
int 21h           ; Print the high nibble of BL

; Convert and print the low nibble of BL
mov ah, bl        ; Move BL back to AH
and ah, 0fh       ; Mask the high nibble, keep the low nibble
add ah, 30h       ; Convert to ASCII '0'-'9'
```

```
cmp ah, 39h       ; Compare with '9'

jle print_low_nibble2 ; If less than or equal, skip next step

add ah, 7         ; Adjust to ASCII 'A'-'F'


print_low_nibble2:

mov dl, ah        ; Move the ASCII value to DL

mov ah, 02h       ; Set up for printing

int 21h           ; Print the low nibble of BL


; Terminate the program

mov ah, 4ch       ; Set up for program termination

int 21h           ; Terminate the program
```

OUTPUT:



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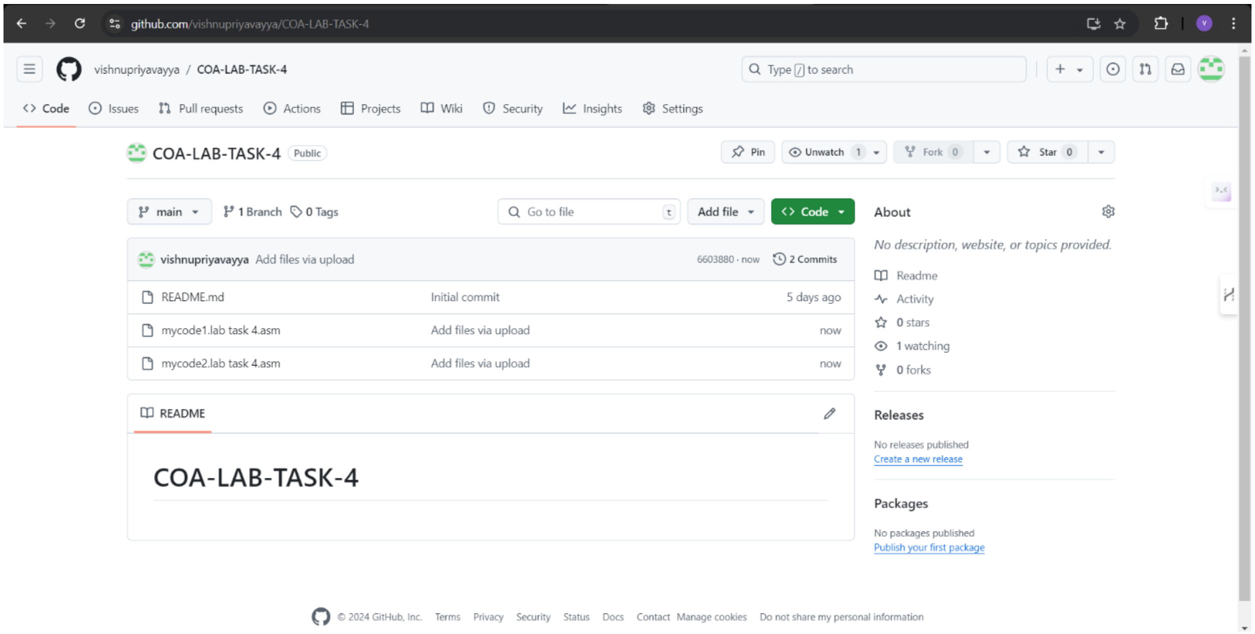
GITHUB LINK: https://github.com/vishnupriyavayya/COA-LAB-TASK-4



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COA-LAB-TASK-4

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