National University of Computer and Emerging Sciences

Lab Manual 06
Computer Organization and Assembly Language Lab

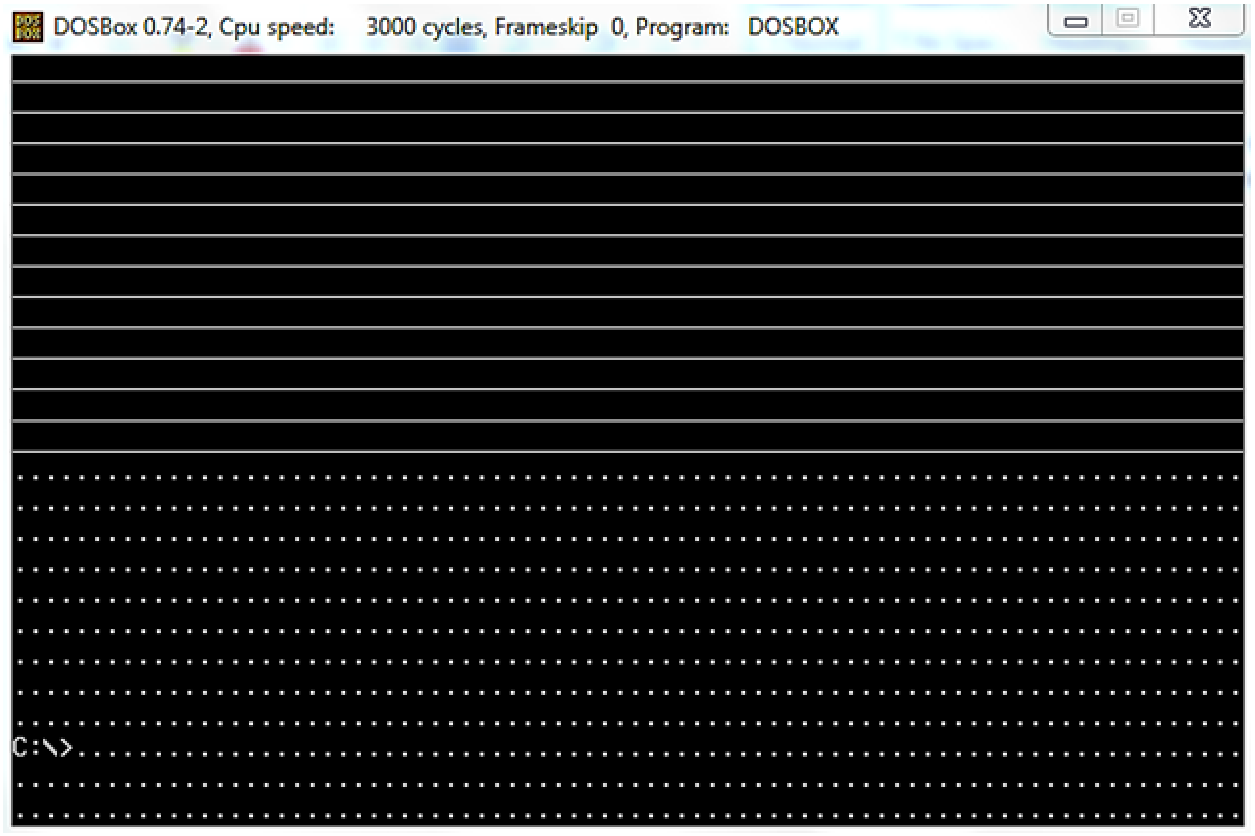
Department of Computer Science

FAST-NU, Lahore, Pakistan

Lab Manual – Video Memory

Activity 1: Code to clear screen is given in example 7.1. Your task is to modify this code and print '_' (underscore) on first 13 rows of screen and '.' In rest of the rows. Required output is given below. Properly calculate the cells required with each character.

Required Output:

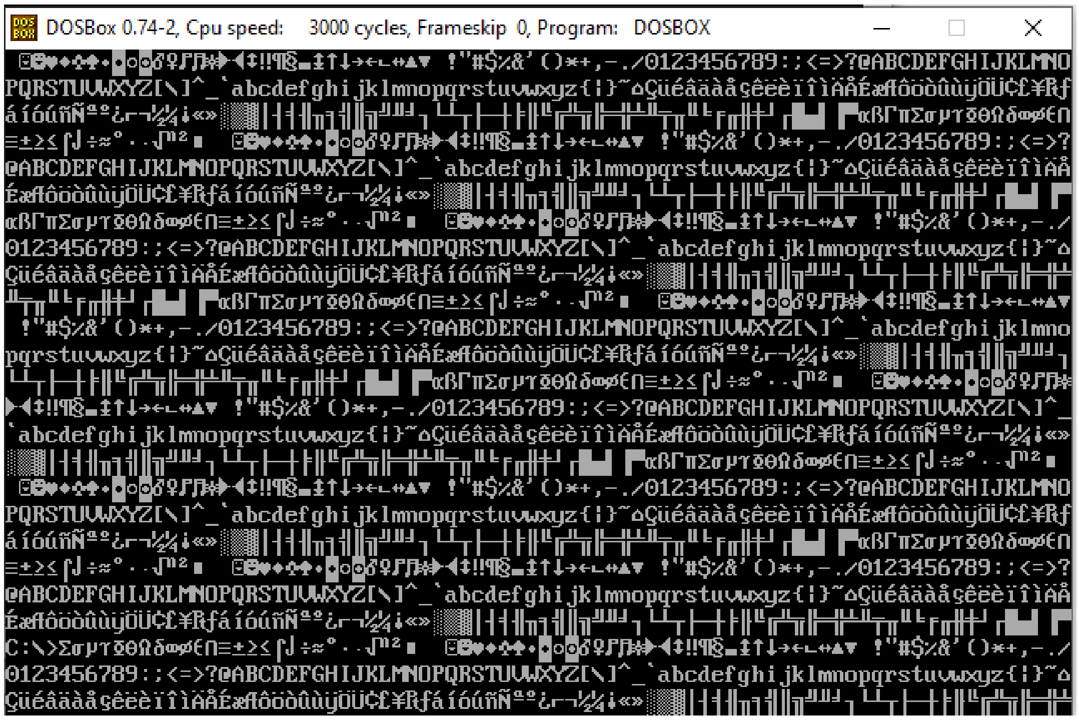

DOSBox 0.74-2, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX
C:\>

We did following code in class:

```
; clear the screen

[org 0x0100]


                    mov ax, 0xb800                              ; load video base in ax

                    mov es, ax                                  ; point es to video base

                    mov di, 0                                   ; point di to top left
column

                                                                       ; es:di pointint
to --> 0xB800:0000 (B8000)


nextchar:      mov word [es:di], 0x0720             ; clear next char on screen
```

```
                    add di, 2                                   ; move to next screen
location

                    cmp di, 4000                            ; has the whole screen cleared

                    jne nextchar                            ; if no clear next position


                    mov ax, 0x4c00 ; terminate program

                    int 0x21
```

Activity 2: Update above code such that it prints all characters (ASCII 0 to 255) on screen starting from location zero onwards and fills all the screen as shown in the figure below:



DOSBox 0.74-2, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX

```
 ☺☻♥♦♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
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pqrstuvwxyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíóúñÑªº¿⌐¬½¼¡«»░▒▓│┤╡╢╖╕╣║╗╝╜╛┐
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```
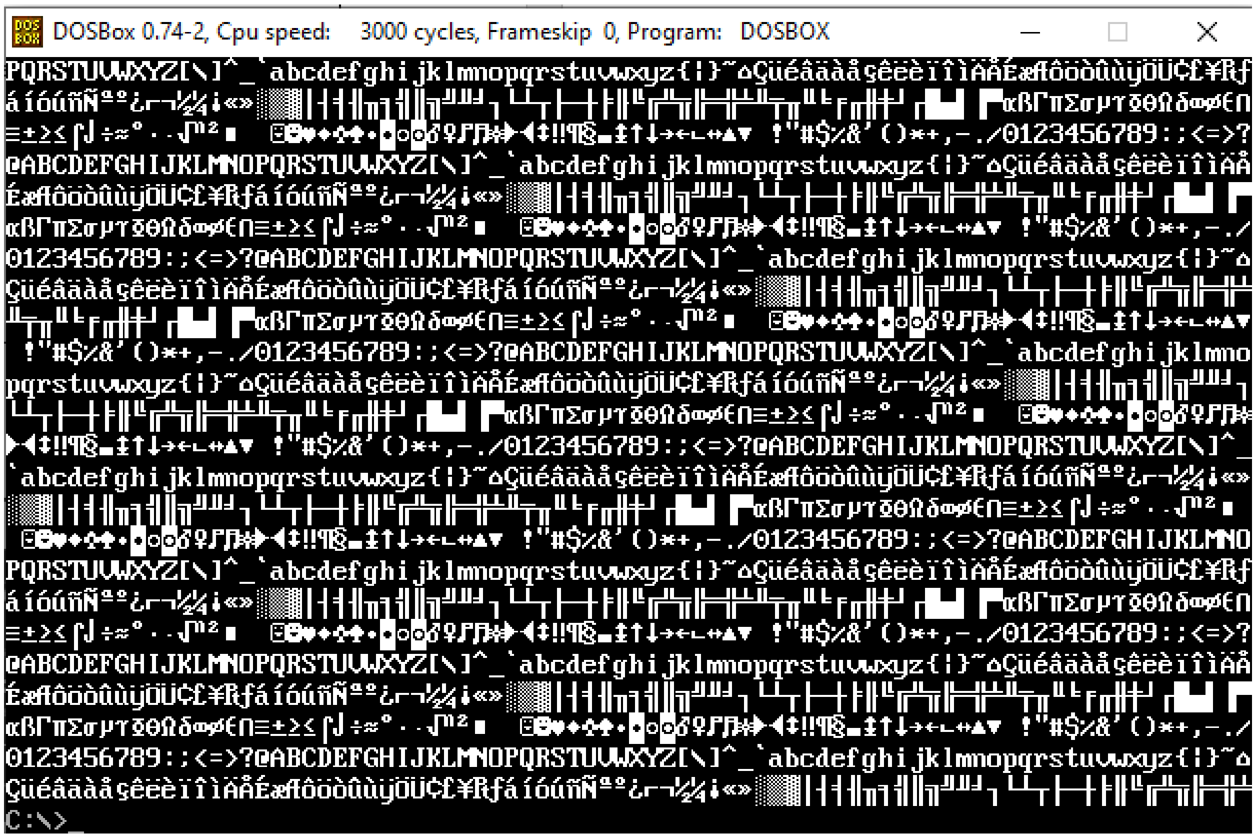

Activity 3: Update the code written in Activity 2 to print blinking characters with high intensity as shown in the figure below:



```
DOSBox 0.74-2, Cpu speed:    3000 cycles, Frameskip  0, Program:   DOSBOX
PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒ
áíóúñÑªº¿⌐¬½¼¡«»░▒▓│┤╡╢╖╕╣║╗╝╜╛┐└┴┬├─┼╞╟╚╔╩╦╠═╬╧╨╤╥╙╘╒╓╫╪┘┌█▄▌▐▀αßΓπΣσµτΦΘΩδ∞φε∩
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pqrstuvwxyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíóúñÑªº¿⌐¬½¼¡«»░▒▓│┤╡╢╖╕╣║╗╝╜╛┐
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►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒáíóúñÑªº¿⌐¬½¼¡«»
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PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒ
áíóúñÑªº¿⌐¬½¼¡«»░▒▓│┤╡╢╖╕╣║╗╝╜╛┐└┴┬├─┼╞╟╚╔╩╦╠═╬╧╨╤╥╙╘╒╓╫╪┘┌█▄▌▐▀αßΓπΣσµτΦΘΩδ∞φε∩
≡±≥≤⌠⌡÷≈°∙·√ⁿ²■   ☺☻♥♦♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'()*+,-./0123456789:;<=>?
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C:\>_
```
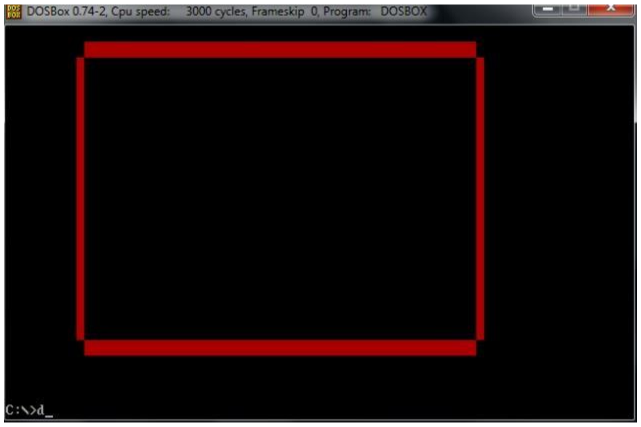

Activity 4: Write a function **PrintRectanlge** that prints a rectangle having its TopLeft and BottomRight corners at (top,left) and (bottom,right) coordinates respectively where top, left, bottom and right are parameters passed by caller. Also pass attribute by caller to print colored rectangle. Following is a red rectangle with TopLeft = (2, 10) and BottomRight = (20, 60).



```
DOSBox 0.74-2, Cpu speed:    3000 cycles, Frameskip  0, Program:   DOSBOX
C:\>d_
```

Activity 5: Modify your PrintRectangle function and introduce some delay in two consecutive pixels' .

Help: Call following sleep function before next iteration of your print loop(s). Following code is doing nothing just counting from FFFF to 0000.

```
sleep:          push cx
                mov cx, 0xFFFF
delay:          loop delay
                pop cx
                ret
```