University of Central Punjab
(Incorporated by Ordinance No. XXIV of 2002 promulgated by Government of the Punjab)
FACULTY OF INFORMATION TECHNOLOGY

Computer Organization and Assembly Language

Lab 9	
Topic	1. Video memory

Note: Ascii table is provided at the end.

PART 1

VIDEO MEMORY

Console Display:

Note : Each cell represents a word (2 byte).

Row 1,Col 1	**Row 1,Col 2**	**….**			**Row 1,Col 80**
Row 2,Col 1	**Row 2,Col 2**	**…**			**Row 2,Col 80**
…	**…**	**…**			**…**
…	**…**	**…**			**…**
…	**…**	**…**			**…**
…	**…**	**…**			**…**
…	**….**	**…**			**…**
…	**…**	**…**			**…**
Row 25,Col 1	**Row 25,Col 2**	**…**	**…**	**…**	**Row 25,Col 80**

; if you change the second byte, you can change the color of the character.

; character attribute is 8 bit value,

; high 4 bits set background color and low 4 bits set foreground color.

LET AX have 16 bits with character ‘A’ as a value byte and Brown background with white foreground color.

Blinking of the foreground color	Attribute byte							Value byte							
	Background			Foreground											
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	1	1	0	1	1	1	1	0	1	0	0	0	0	0	1

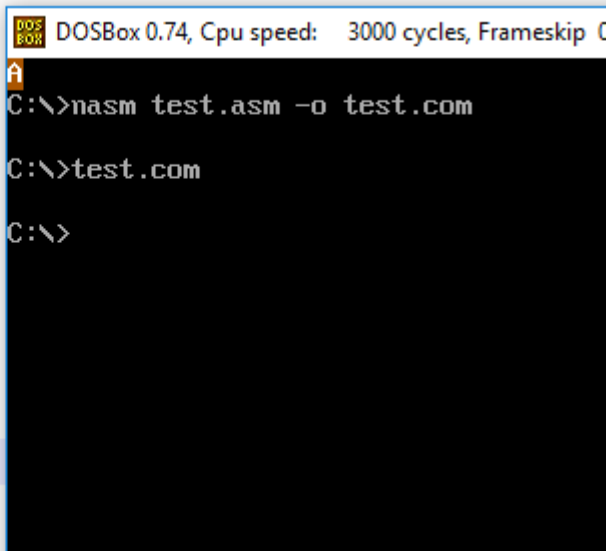
; hex	bin	color	
; 0	0000	black	possible background colors
; 1	0001	blue	
; 2	0010	green	
; 3	0011	cyan	
; 4	0100	red	
; 5	0101	magenta	
; 6	0110	brown	
; 7	0111	light gray	
; 8	1000	dark gray	possible foreground color
; 9	1001	light blue	
; a	1010	light green	
; b	1011	light cyan	
; c	1100	light red	
; d	1101	light magenta	
; e	1110	yellow	
; f	1111	white	

```
mov ax, 0xb800;
Mov es, ax;
mov di, 0;

mov ah, 0x6F;
mov al,0x41

Mov [es:di],ax;

mov ax,0x4c00
int 21h
```



Copy character array from one to another.

```
[org 0x100]
jmp start
data1 db 'Abcd,edfg,ijkl,mnopqr',0 ;this is zero means null.
data2: times 21 db 0
start:
mov si, data1
mov di, data2

l1:
mov al,[si]
mov [di],al
inc si
inc di
cmp al,0          ;comparing if the string is terminated or not.
jne l1

mov ax,0x4c00
int 21h
```

“To run code without debugging simply type test.com instead of afd test.com”

Type cls then enter before running the following codes.

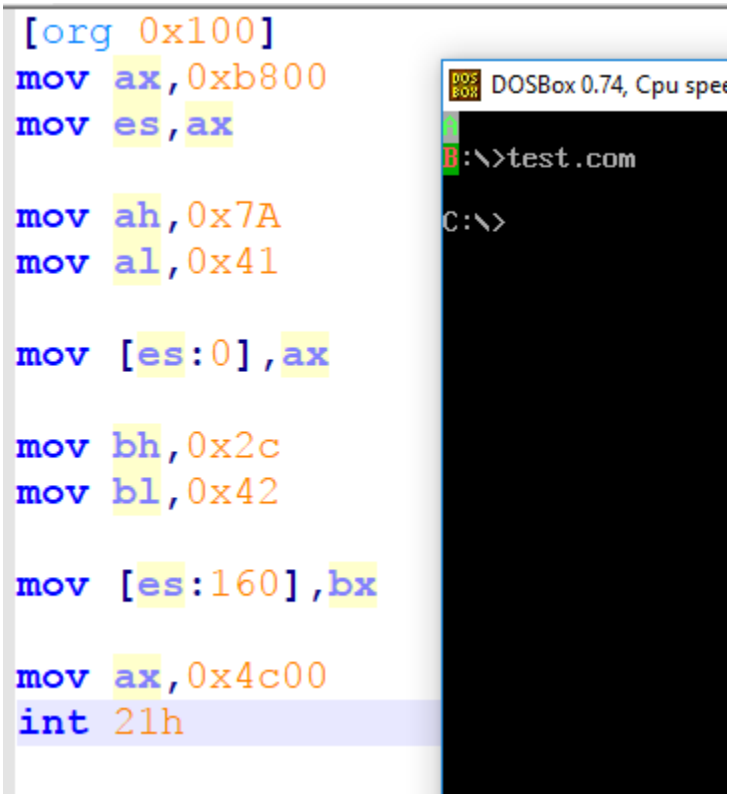
Display string on screen

```
[org 0x100]
jmp start
str1 db 'I am a student of University of Central Punjab',0
start:
mov ax, 0xb800;                ;segment address from where video memory starts.
Mov es, ax;
mov di, 0;                     ;location on screen where we want to start displaying our string.
mov cx, 46;                    ; string length, 11 characters.
mov si, str1;
mov ah, 0x1A;                  ; Attribute byte for the characters to be displayed.
label:
Mov al, [si];                  ;reading the characters in al.
Inc si                         ; pointing to next character in string
Mov [es:di],ax;                ; printing message on the screen, whole register of size word is written at
Add di,2;
cmp cx,30
jne skip
change_blinking:
mov ah,0x9A
skip:
loop label

mov ax,0x4c00
int 21h
```

For example:

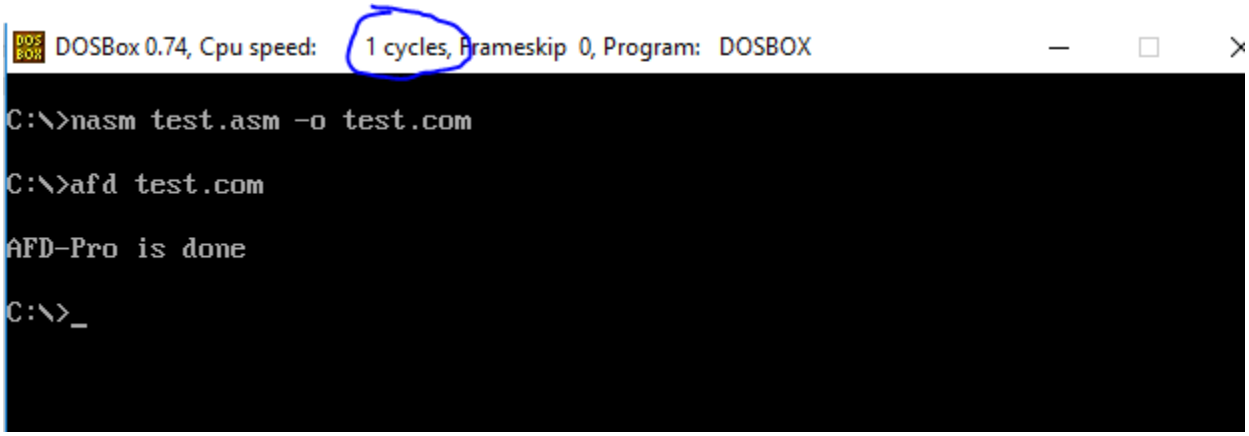
- Different attribute values of each word
- Different locations can be accessed for the display.



Display code which writes and clears the string from screen.

USE CTRL+F11 to reduce cycles / sec or CTRL+F12 to increase the speed of dosbox.

Slow down the speed of dosbox by press and hold ctrl and press F11 till 1 cycle




```
[org 0x100]
jmp start
str1 db 'HELLO WORLD'
start:
mov ax, 0xb800;
Mov es, ax;
mov di, 500;
mov cx, 11;     ; string length, 11 characters.
mov si, str1;
mov ah, 0x1A;; Attribute byte, use any number
l1:
Mov al, [si];
Inc si; pointing to next character in string
Mov [es:di],ax;          ; printing message on the screen;
Add di,2;
loop l1
```

```
mov cx, 2000; ; total screen locations.
mov ax, 0x0720; Attribute byte (07) and (20h) ASCII for space character.
mov di, 0;        ; start from top left
l2:
Mov [es:di],ax;           ; writing blank spaces on whole screen
Add di,2;
loop l2
mov ax,0x4c00
int 21h
```

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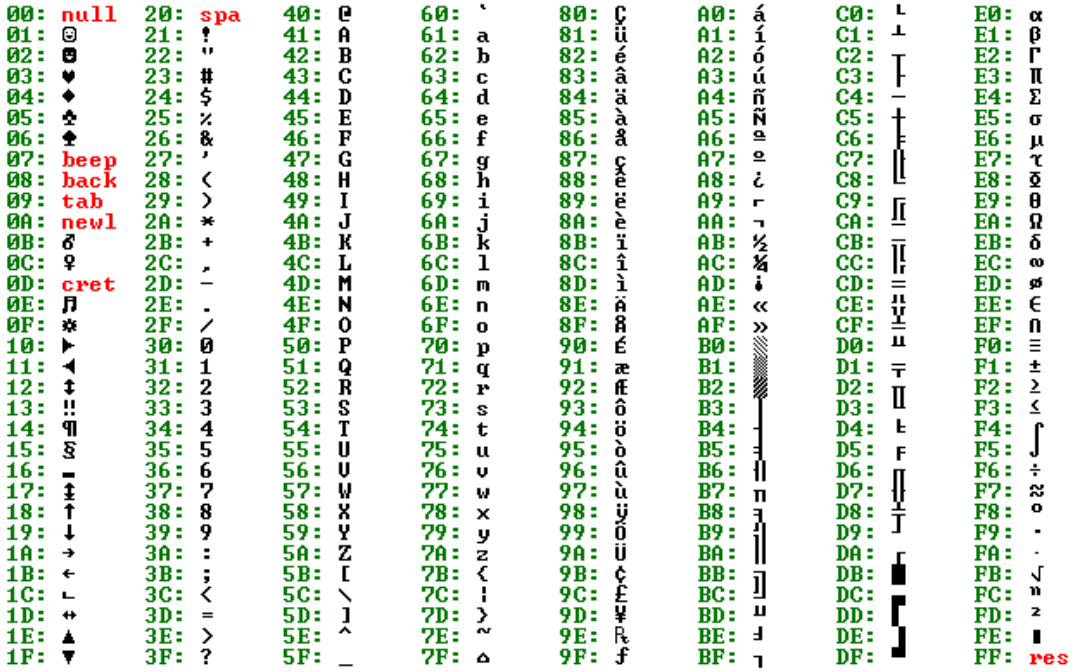
ASCII CODES

HEX format



ASCII CODES

Decimal format