

**National University of Computer and Emerging Sciences**

# **Lab Manual**

**Computer Organization and Assembly Language**



## **Lab 10**

**Instructor**

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**Class**

CS3

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**Fast School of Computing**

FAST-NU, Lahore, Pakistan

# Objectives

- Hardware/Software Interrupts
- Graphics Mode
- Video Memory
- Design 2D Graphics

## Contents

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**Note for all questions:** You can make as many memory variables, subroutines as you need. Must read all the manual before starting.

### ACTIVITY 1:

**[50 Marks]**

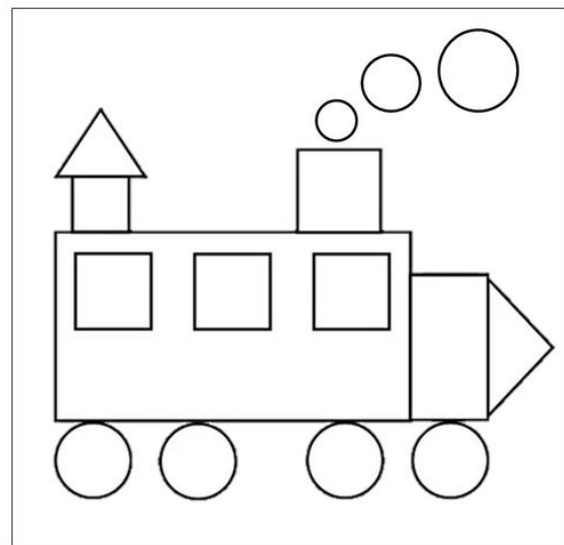
In the previous lab, you have used **int 10h** for graphics displaying a Diamond using **AX = 0x000D service** which extended your graphic resolution to 320 X 200. This lab is using **AX = 0x0010 service** which extended your graphic resolution to 640 X 350.

**Write a comprehensive program which:**

- 1) Generates an animation for the line drawing shown in the attached picture.
- 2) Your program should start working on the animation after you press any key from the keyboard.
- 3) Once the animation is finished you should your program should wait for key press before moving forward.
- 4) Circle drawing programs are given to you, for printing

**[hint]**

Use the Circle Drawing program in **the Appendix**. For more information about the graphics mode please refer to [1] and Chapter 12 of textbook.



## REFERENCES

- [1] [http://vitaly\\_filatov.tripod.com/ng/asm/asm\\_023.1.html](http://vitaly_filatov.tripod.com/ng/asm/asm_023.1.html)
- [2] <http://www.dosbox.com/download.php?main=1>
- [3] <http://sourceforge.net/projects/nasm>
- [4] <http://www.nasm.us/>
- [5] <http://www.programmersheaven.com/download/21643/download.aspx> (AFD)

## Appendix

```
; circle in graphics mode
[org 0x0100]
jmp start
; coordinates of a circle of radius 24
x24: dw 48,47,44,40,36,30,24,17,12,7,3,0,0,0,3,7,11,17,23,30,36,40,44,47,48
y24: dw 24,30,36,40,44,47,48,47,44,40,36,30,24,17,11,7,3,0,0,0,3,7,11,17,23
; coordinates of a circle of radius 45
x45: dw
90,89,88,86,83,79,75,70,64,58,52,46,40,34,28,22,17,12,8,5,2,0,0,0,0,2,5,8,12,17,22,28,34,40,46,52,58,6
4,70,75,79,83,86,88,89,90
y45: dw
45,51,57,63,68,73,78,82,85,87,89,89,89,88,86,83,80,76,71,66,60,54,48,41,35,29,23,18,13,9,6,3,1,0,0,0,2
,4,7,11,16,21,26,32,38,44
; coordinates of a circle of radius 72
x72: dw
144,143,142,141,139,137,134,130,127,122,118,113,108,102,96,90,84,78,72,65,59,53,47,41,36,30,25,21,
16,13,9,6,4,2,1,0,0,0,1,2,4,6,9,13,16,21,25,30,35,41,47,53,59,65,71,78,84,90,96,102,108,113,118,122,12
7,130,134,137,139,141,142,143,144
y72: dw
72,78,84,90,96,102,108,113,118,122,127,130,134,137,139,141,142,143,144,143,142,141,139,137,134,1
30,127,122,118,113,108,102,96,90,84,78,72,65,59,53,47,41,35,30,25,21,16,13,9,6,4,2,1,0,0,0,1,2,4,6,9,1
3,16,21,25,30,35,41,47,53,59,65,71
; coordinates of a circle of radius 120
x120: dw
240,239,239,238,237,235,234,232,229,226,223,220,217,213,209,204,200,195,190,185,180,174,168,163,
157,151,144,138,132,126,120,113,107,101,95,88,82,76,71,65,60,54,49,44,39,35,30,26,22,19,16,13,10,7,
5,4,2,1,0,0,0,0,0,1,2,4,5,7,10,13,16,19,22,26,30,35,39,44,49,54,59,65,71,76,82,88,95,101,107,113,119,1
26,132,138,144,151,157,163,168,174,180,185,190,195,200,204,209,213,217,220,223,226,229,232,234,2
35,237,238,239,239,240
y120: dw
120,126,132,138,144,151,157,163,168,174,180,185,190,195,200,204,209,213,217,220,223,226,229,232,
234,235,237,238,239,239,240,239,239,238,237,235,234,232,229,226,223,220,217,213,209,204,200,195,
190,185,180,174,168,163,157,151,144,138,132,126,120,113,107,101,95,88,82,76,71,65,59,54,49,44,39,
35,30,26,22,19,16,13,10,7,5,4,2,1,0,0,0,0,0,1,2,4,5,7,10,13,16,19,22,26,30,35,39,44,49,54,59,65,71,76,8
2,88,95,101,107,113,119
; setting up the parameters
counter : db 0;
radius : equ 120 ; choose radius (24, 45, 72, 120)
xoffset: equ 0 ; change to move circle along x axis
```

yoffset: equ 0 ; change to move circle along y axis

start:

mov si, x120 ; change x array as radius

mov di, y120 ; change y array as radius

mov ax, 0x0010 ; set 640 x 350 graphics mode

int 0x10 ; bios video services

mov ax, 0x0C07 ; put pixel in white color

xor bx, bx ; page number 0

mov cx, [si] ; first x position

add cx, xoffset ; moving point along x axis

mov dx, [di] ; first y position

add dx, yoffset ; moving point along y axis

l1:

int 0x10 ; bios video services

add si, 2 ; next location address

add di, 2 ; next location address

mov cx, [si]

add cx, xoffset

mov dx, [di]

add dx, yoffset

inc byte[counter]

cmp byte[counter], radius ; stopping condition

jle l1 ; jump if less

mov ah, 0 ; service 0 – get keystroke

int 0x16 ; bios keyboard services

mov ax, 0x0003 ; 80x25 text mode

int 0x10 ; bios video services

mov ax, 0x4c00 ; terminate program

int 0x21