CS401 – Computer Architecture & Assembly Language Programming

Lab Exercise – Week 14

Lab 14: Write a program that will transfer Student name to another Computer using serial port. You will type on your name on command prompt of one computer and it will be displayed on 2nd computer's command prompt.

```
[org 0x0100]

jmp start

screenpos: dw 0 ; where to display next character

; subroutine to clear the screen

clrscr: push es

push ax

push cx

push di

mov ax, 0xb800

mov es, ax ; point es to video base

xor di, di ; point di to top left column

mov ax, 0x0720 ; space char in normal attribute

mov cx, 2000 ; number of screen locations

cld ; auto increment mode

rep stosw ; clear the whole screen

pop di

pop cx

pop ax

pop es

ret

serial: push ax

push bx
```

```
push dx
push es
mov dx, 0x3FA ; interrupt identification register
in al, dx ; read register
and al, 0x0F ; leave lowerniblle only
cmp al, 4 ; is receiver data available
jne skipall ; no, leave interrupt handler
mov dx, 0x3F8 ; data register
in al, dx ; read character
mov dx, 0xB800
mov es, dx ; point es to video memory
mov bx, [cs:screenpos] ; get current screen position
mov [es:bx], al ; write character on screen
add word [cs:screenpos], 2 ; update screen position
cmp word [cs:screenpos], 4000 ; is the screen full
jne skipall ; no, leave interrupt handler
call clrscr ; clear the screen
mov word [cs:screenpos], 0 ; reset screen position
skipall: mov al, 0x20
out 0x20, al ; end of interrupt
pop es
pop dx
pop bx
pop ax
iret
start: call clrscr ; clear the screen
mov ah, 0 ; initialize port service
```

```
mov al, 0xE3 ; line settings = 9600, 8, N, 1
xor dx, dx ; port = COM1
int 0x14 ; BIOS serial port services
xor ax, ax
mov es, ax ; point es to IVT base
mov word [es:0x0C*4], serial
mov [es:0x0C*4+2], cs ; hook serial port interrupt
mov dx, 0x3FC ; modem control register
in al, dx ; read register
or al, 8 ; enable bit 3 (OUT2)
out dx, al ; write back to register
mov dx, 0x3F9 ; interrupt enable register
in al, dx ; read register
or al, 1 ; receiver data interrupt enable
out dx, al ; write back to register
in al, 0x21 ; read interrupt mask register
and al, 0xEF ; enable IRQ 4
out 0x21, al ; write back to register
main: mov ah, 0 ; read key service
int 0x16 ; BIOS keybaord services
push ax ; save key for later use
retest: mov ah, 3 ; get line status
xor dx, dx ; port = COM1
int 0x14 ; BIOS keyboard services
and ah, 32 ; trasmitter holding register empty
jz retest ; no, test again
pop ax ; load saved key
```

```
mov dx, 0x3F8 ; data port

out dx, al ; send on serial port

jmp main
```

Mechanism to Conduct Lab:

Students and teacher communicate through Skype/Adobe Connect. Students will write code using Notepad or Programmer's Notepad and will share code and screen output.

NASM: https://vulms.vu.edu.pk/Courses/CS401/Downloads/AssmSoft.zip

DOSBox: http://sourceforge.net/projects/dosbox/files/dosbox/0.74-2/DOSBox0.74-2-win32-installer.exe/download

Programmers Notepad: https://github.com/simonsteele/pn/releases/download/v2.4.2/portable-pn2421440.zip