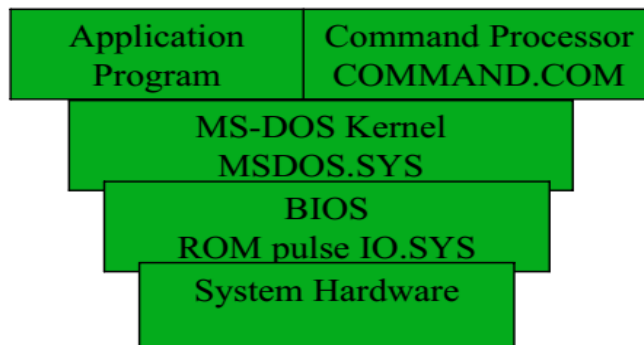


LECTURE 12: MS-DOS Functions and BIOS Calls

MS-DOS Functions and BIOS Calls



- BIOS is hardware specific
- BIOS is supplied by the computer manufacturer
- Resident portion which resides in ROM and nonresident portion IO.SYS which provides a convenient way of adding new features to the BIOS

80x86 Interrupts

- An interrupt is an event that causes the processor to suspend its present task and transfer control to a new program called the interrupt service routine (ISR)
- There are three sources of interrupts
 - Processor interrupts
 - Software interrupts
 - Hardware interrupts
- Each interrupt must supply a type number which is used by the processor as a pointer to an interrupt vector table (IVT) to determine the address of that interrupt's service routine

LECTURE 12: MS-DOS Functions and BIOS Calls

80x86 Interrupts

- Each entry in the IVT points to the location of the corresponding ISR.
- Before transferring control to the ISR, the processor performs one very important task
 - It saves the current program address and flags on the stack
 - Control then transfers to the ISR
 - When the ISR finishes, it uses the instruction IRET to recover the flags and old program address from the stack
- Many of the vectors in the IVT are reserved for the processor itself and others have been reserved by MS-DOS for the BIOS and kernel.
 - 0 – 1F are used by the BIOS
 - 20 – 3F are used by the MS-DOS kernel

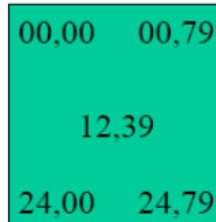
Interrupts

- There are some extremely useful subroutines within BIOS or DOS that are available to the user through the INT (Interrupt) instruction.
- The INT instruction is like a FAR call; when it is invoked
 - It saves CS:IP and flags on the stack and goes to the subroutine associated with that interrupt.
 - Format: **INT xx** ; the interrupt number xx can be 00-FFH
 - This gives a total of 256 interrupts
 - Two of them are widely used: INT 10H and INT 21H
 - Before the services of INT 10H and 21H is requested, certain registers must have specific values in them, depending on the function being requested.

LECTURE 12: MS-DOS Functions and BIOS Calls

INT 10H

- INT 10H subroutines are burned into the ROM BIOS of the 80x86-based PC and are used to communicate with the computer's screen



Cursor Locations

- INT 10H Function 06
 - AL = number of lines to scroll (with AL=00, window will be cleared)
 - BH = attribute of blank rows
 - CH, CL = upper row, left column
 - DH, DL = lower row, right column

INT 10H

INT 10H function 02; setting the cursor to a specific location

- Function AH = 02 will change the position of the cursor to any location.
- The desired cursor location is in DH = row, DL = column

EX. Write a program that clears the screen and sets the cursor at the center of the screen

```
; clearing the screen
MOV AX, 0600H ;scroll the entire page
MOV BH, 07 ; normal attribute (white on black)
MOV CX, 0000 ; upper left
MOV DX,184FH ; lower right
INT 10H

;setting the cursor at the center
MOV AH,02 ; set cursor option
MOV BH, 00 ; page 0
MOV DL, 39 ;
MOV DH, 12 ;
INT 10H
```

LECTURE 12: MS-DOS Functions and BIOS Calls

INT 10H

- **INT 10H function 03**; get current cursor position

```
MOV AH, 03
MOV BH, 00
INT 10H
```

Registers DH and DL will have the current row and column positions and CX provides info about the shape of the cursor.

INT 21H

- INT 21H is provided by DOS to be invoked to perform extremely useful functions.
- **INT 21H Option 09**: Outputting a string of data to the monitor
 - Can be used to send a set of ASCII data to the monitor.
 - AH = 09; DX = offset address of the ASCII data to be displayed.
 - Display the ASCII data string pointed to by DX until “\$”.

```
DATA_ASC DB 'The earth is one country', '$'
MOV AH, 09
MOV DX, OFFSET DATA_ASC
INT 21H
```

LECTURE 12: MS-DOS Functions and BIOS Calls

INT 21H

- **INT 21H Option 02:** Outputting a single character to the monitor
 - DL is loaded with the character first

```
MOV AH 02
MOVE DL,'J'
INT 21H
```
- **INT 21H Option 01:** Inputting a single character with echo
 - This function waits until a character is input from the keyboard, then echoes it to the monitor. After the interrupt, the input character will be in AL.

INT 21H

- **INT 21H Option 0AH:** Inputting a string of data from the keyboard with echo
 - AH = 0AH
 - DX = offset address at which the address is stored
 - First byte specifies the size of the buffer, second byte is the number of characters

```
ORG 0010H
DATA1 DB 6,?,6 DUP(FF)
MOV AH, 0AH
MOV DX, OFFSET DATA1
INT 21H
```

Ex. What happens if one enters USA and then <RETURN>

```
0010 0011 0012 0013 0014 0015 0016 0017
06 03 55 53 41 0D FF FF
```