ESTERN MEDITERRANEAN UNIVERSITY

DEPRTMENT OF ELECTRICAL&ELECTRONIC ENGINEERING

Invoking an interrupt

Invoking an interrupt can be done using the INT x86 assembly language instruction. For example, to print a character to the screen using BIOS interrupt 0x10, the following x86 assembly language instructions would be executed:

```
mov ah, 0x0e
mov al, '!'
int 0x10
```

Interrupt table

A list of common BIOS interrupts can be found below. Note that some BIOSes (particularly old ones) will not support all of these interrupts.

Interrupt vector	Description
00h	CPU: Executed after an attempt to divide by zero or when the quotient does not fit in the destination
01h	CPU: Executed after every instruction while the trace flag is set
02h	CPU: NMI, used e.g. by POST for memory errors
03h	CPU: The lowest non-reserved interrupt, it is used exclusively for debugging, and the INT 03 handler is always implemented by a debugging program
04h	CPU: Numeric Overflow. Usually caused by the INTO instruction when the overflow flag is set.
05h	Executed when Shift-Print screen is pressed, as well as when the BOUND instruction detects a bound failure.

<table>
<tr><td>06h</td><td>CPU: Called when the Undefined Opcode (invalid instruction) exception occurs. Usually installed by the operating system.</td></tr>
<tr><td>07h</td><td>CPU: Called when an attempt was made to execute a floating-point instruction and no numeric coprocessor was available.</td></tr>
<tr><td>08h</td><td>IRQ0: Implemented by the system timing component; called 18.2 times per second (once every 55 ms) by the PIC</td></tr>
<tr><td>09h</td><td>IRQ1: Called after every key press and release (as well as during the time when a key is being held)</td></tr>
<tr><td>0Bh</td><td>IRQ3: Called by serial ports 2 and 4 (COM2/4) when in need of attention</td></tr>
<tr><td>0Ch</td><td>IRQ4: Called by serial ports 1 and 3 (COM1/3) when in need of attention</td></tr>
<tr><td>0Dh</td><td>IRQ5: Called by hard disk controller (PC/XT) or 2nd parallel port LPT2 (AT) when in need of attention</td></tr>
<tr><td>0Eh</td><td>IRQ6: Called by floppy disk controller when in need of attention</td></tr>
<tr><td>0Fh</td><td>IRQ7: Called by 1st parallel port LPT1 (printer) when in need of attention</td></tr>
<tr><td>10h</td><td>Video Services - installed by the BIOS or operating system; called by software programs
<table>
<tr><th>AH</th><th>Description</th></tr>
<tr><td>00h</td><td>Set Video Mode</td></tr>
<tr><td>01h</td><td>Set Cursor Shape</td></tr>
<tr><td>02h</td><td>Set Cursor Position</td></tr>
<tr><td>03h</td><td>Get Cursor Position And Shape</td></tr>
<tr><td>04h</td><td>Get Light Pen Position</td></tr>
<tr><td>05h</td><td>Set Display Page</td></tr>
<tr><td>06h</td><td>Clear/Scroll Screen Up</td></tr>
<tr><td>07h</td><td>Clear/Scroll Screen Down</td></tr>
<tr><td>08h</td><td>Read Character and Attribute at Cursor</td></tr>
<tr><td>09h</td><td>Write Character and Attribute at Cursor</td></tr>
<tr><td>0Ah</td><td>Write Character at Cursor</td></tr>
<tr><td>0Bh</td><td>Set Border Color</td></tr>
<tr><td>0Ch</td><td>Write Graphics Pixel</td></tr>
<tr><td>0Dh</td><td>Read Graphics Pixel</td></tr>
<tr><td>0Eh</td><td>Write Character in TTY Mode</td></tr>
<tr><td>0Fh</td><td>Get Video Mode</td></tr>
<tr><td>13h</td><td>Write String</td></tr>
</table></td></tr>
<tr><td>11h</td><td>Installed by the BIOS; returns equipment list</td></tr>
<tr><td>12h</td><td>Installed by the BIOS or operating system; returns Conventional Memory Size</td></tr>
</table>

13h

Low Level Disk Services; installed by the BIOS or operating system; called by software programs

AH	Description
00h	Reset Disk Drives
01h	Check Drive Status
02h	Read Sectors From Drive
03h	Write Sectors To Drive
04h	Verify Sectors On Drive
05h	Format Track On Drive
08h	Get Drive Parameters
09h	Init Fixed Drive Parameters
0Ch	Seek To Specified Track
0Dh	Reset Fixed Disk Controller
15h	Get Drive Type
16h	Get Floppy Drive Media Change Status

14h

Routines for communicating via the serial port. Used by software programs.

AH	Description
00h	Serial Port Initialization
01h	Transmit Character
02h	Receive Character
03h	Status

15h

Miscellaneous (System services support routines)

AH	AL	AX	Description
00h			Turn on cassette drive motor
01h			Turn off cassette drive motor
02h			Read data blocks from cassette
03h			Write data blocks to cassette
4Fh			Keyboard Intercept
83h			Event Wait
84h			Read Joystick
85h			Sysreq Key Callout
86h			Wait
87h			Move Block
88h			Get Extended Memory Size
C0h			Get System Parameters

<table>
<tr><td></td><td>
<table>
<tr><td>C1h</td><td></td><td></td><td>Get Extended BIOS Data Area Segment</td></tr>
<tr><td>C2h</td><td></td><td></td><td>Pointing Device Functions</td></tr>
<tr><td>E8h</td><td>01h</td><td>E801h</td><td>Get Extended Memory Size (Newer function, since 1994). Gives results for memory size above 64 Mb.</td></tr>
<tr><td>E8h</td><td>20h</td><td>E820h</td><td>Query System Address Map. The information returned from e820 supersedes what is returned from the older AX=E801h and AH=88h interfaces.</td></tr>
</table>
</td></tr>
<tr><td>16h</td><td>Implemented by the BIOS or operating system. Provides routines to be called by software programs which communicate with the keyboard.
<table>
<tr><th>AH</th><th>Description</th></tr>
<tr><td>00h</td><td>Read Character</td></tr>
<tr><td>01h</td><td>Read Input Status</td></tr>
<tr><td>02h</td><td>Read Keyboard Shift Status</td></tr>
<tr><td>10h</td><td>Read Character Extended</td></tr>
<tr><td>11h</td><td>Read Input Status Extended</td></tr>
<tr><td>12h</td><td>Read Keyboard Shift Status Extended</td></tr>
</table>
</td></tr>
<tr><td>17h</td><td>Print Services - used by software programs to communicate with the printer
<table>
<tr><th>AH</th><th>Description</th></tr>
<tr><td>00h</td><td>Print Character to Printer</td></tr>
<tr><td>01h</td><td>Initialize Printer</td></tr>
<tr><td>02h</td><td>Check Printer Status</td></tr>
</table>
</td></tr>
<tr><td>18h</td><td>Execute Cassette BASIC: True IBM computers contain BASIC in the ROM to be interpreted and executed by this routine in the event of a boot failure (called by the BIOS)</td></tr>
<tr><td>19h</td><td>After POST this interrupt is used by BIOS to load the operating system.</td></tr>
<tr><td>1Ah</td><td>Real Time Clock Services - called by software programs to communicate with the RTC
<table>
<tr><th>AH</th><th>Description</th></tr>
<tr><td>00h</td><td>Read RTC</td></tr>
<tr><td>01h</td><td>Set RTC</td></tr>
<tr><td>02h</td><td>Read RTC Time</td></tr>
<tr><td>03h</td><td>Set RTC Time</td></tr>
<tr><td>04h</td><td>Read RTC Date</td></tr>
<tr><td>05h</td><td>Set RTC Date</td></tr>
<tr><td>06h</td><td>Set RTC Alarm</td></tr>
<tr><td>07h</td><td>Reset RTC Alarm</td></tr>
</table>
</td></tr>
</table>

1Bh	Installed by the operating system; automatically called by INT 9 when Ctrl-Break has been pressed
1Ch	Called automatically by INT 08; available for use by software programs when a routine needs to be executed regularly
1Dh	Not to be called; simply a pointer to the VPT (Video Parameter Table), which contains data on video modes
1Eh	Not to be called; simply a pointer to the DPT (Diskette Parameter Table), containing a variety of information concerning the diskette drives
1Fh	Not to be called; simply a pointer to the VGCT (Video Graphics Character Table), which contains the data for ASCII characters 80h to FFh
41h	Address pointer: FDPT = Fixed Disk Parameter Table (1st hard drive)
46h	Address pointer: FDPT = Fixed Disk Parameter Table (2nd hard drive)
4Ah	Called by RTC for alarm
70h	IRQ8: Called by RTC
74h	IRQ12: Called by mouse
75h	IRQ13: Called by math coprocessor
76h	IRQ14: Called by primary IDE controller
77h	IRQ15: Called by secondary IDE controller

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