8086 Interrupt Types:

The 8086 Interrupt Types are

Dedicated Interrupts:

Type 0 : Divide by Zero Interrupt

When the quotient from either a DIV or IDIV instruction is too large to fit in the result register; 8086 Interrupt Types will automatically execute type 0 interrupt.

Type 1 : Single Step Interrupt

The type 1 interrupt is the single step trap. In the single step mode, system will execute one instruction and wait for further direction from user. Then user can examine the contents of registers and memory locations and if they are correct, user can tell the system to execute the next instruction. This feature is useful for debugging assembly language programs.

An 8086 Interrupt Types system is used in the single step mode by setting the trap flag. If the trap flag is set, the 8086 will automatically execute a type 1 interrupt after execution of each instruction. But the 8086 has no such instruction to directly set or reset the trap flag. These operations can be performed by taking the flag register contents into memory, changing the memory contents so to set or reset trap flag and save the memory contents into flag register.

Type 2 : Non Maskable Interrupt

As the name suggests, this interrupt cannot be disabled by any software instruction. This interrupt is activated by low to high transition on 8086 NMI input pin. In response, 8086 will do a type 2 interrupt.

Type 3 : Breakpoint

The type 3 interrupt is used to implement **break point** function in the system. The type 3 interrupt is produced by execution of the INT 3 instruction. Break point function is often used as a debugging aid in cases where single stepping provides more detail than wanted. When you insert a breakpoint, the system executes the instructions upto the breakpoint, and then goes to the breakpoint procedure. In the break point procedure you can write a program to display register contents, memory contents and other information that is required to debug your program. You can insert as many breakpoints as you want in your program.

Type 4 : Overflow Interrupt

The type 4 interrupt is used to check overflow condition after any signed arithmetic operation in the system. The 8086 Interrupt Types overflow flag, OF, will be represented in the destination register or memory location.

For example, if you add the 8-bit signed number 0111 1000 (+ 120 decimal) and the 8 bit signed number 0110 1010 (t 106 decimal), result is 1110 0010 (- 98 decimal). In signed numbers, MSB (Most significant Bit) is reserved for sign and other bits represent magnitude of the number. In the previous example, after addition of two 8-bit signed numbers result is negative, since it is too large to fit in 7 bits. To detect this condition in the program, you can put interrupt on overflow instruction, INTO, immediately after the arithmetic instruction in the program. If the overflow flag is not set when the 8086 executes the INTO instruction, the instruction will simply function as an NOP (no operation). However, if the overflow flag is set, indicating an overflow error, the 8086 will execute a type 4 interrupt after executing the INTO instruction.

Another way to detect and respond to an overflow error in a program is to put the jump if overflow instruction (JO) immediately after the arithmetic instruction. If the overflow flag is set as a result of arithmetic operation, execution will jump to the address specified in the JO instruction. At this address, you can put an error routine which responds in the way you want to the overflow.

Software Interrupts:

Type 0 – 255 :

The 8086 INT instruction can be used to cause the 8086 to do one of the 256 possible interrupt types. The interrupt type is specified by the number as a part of the instruction. You can use an INT2 instruction to send execution to an NMI interrupt service routine. This allows you to test the NMI routine without needing to apply an external signal to the NMI input of the 8086 Interrupt Types.