8085 Interrupts

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Microprocessor Architecture, 2019


بسم الله الرحمن الرحيم


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Introduction to interrupts

Definitions

1. **At home -** how do you know when someone wants to talk to you on the telephone?
   - A. Periodically pick up the phone and see if someone?s there This is known as **polling**.
   - B. Wait for the phone to ring and then answer it, This is **interrupt-driven**

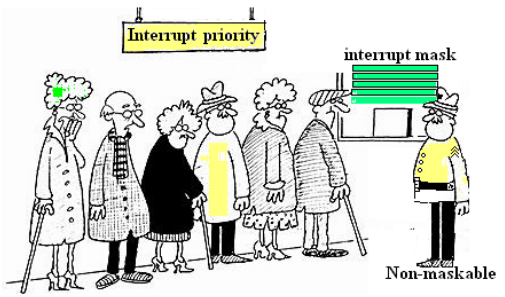
Interrupt

is a process where an external device can get the attention of the microprocessor.

- The process starts from the I/O device
- The process is asynchronous.

Neglecting ..

- Interrupts can sometimes be ignored (or masked)
  1. Good for when the CPU is doing something more important
  2. When the interrupt mask is set, interrupts are hidden (masked) and ignored
- Non-maskable interrupts cannot be ignored(NMI's take precedence)
- Interrupts may be prioritized



Servicing Interrupts and Exceptions

- When an exception occurs
  - CPU saves current state
    - PC, Flag Register
    - Global interrupts disabled
  - CPU saves current state
    - PC, Flag Register
    - Global interrupts disabled
  - Jump to interrupt service routine (ISR)
    - Execute routine
    - RETI - return from interrupt
  - Restore state
    - Flag Register (re-enables global interrupts)
  - Return to user program (restore PC)

Interrupt Vector Table (IVT)

Hardware interrupts of 8085

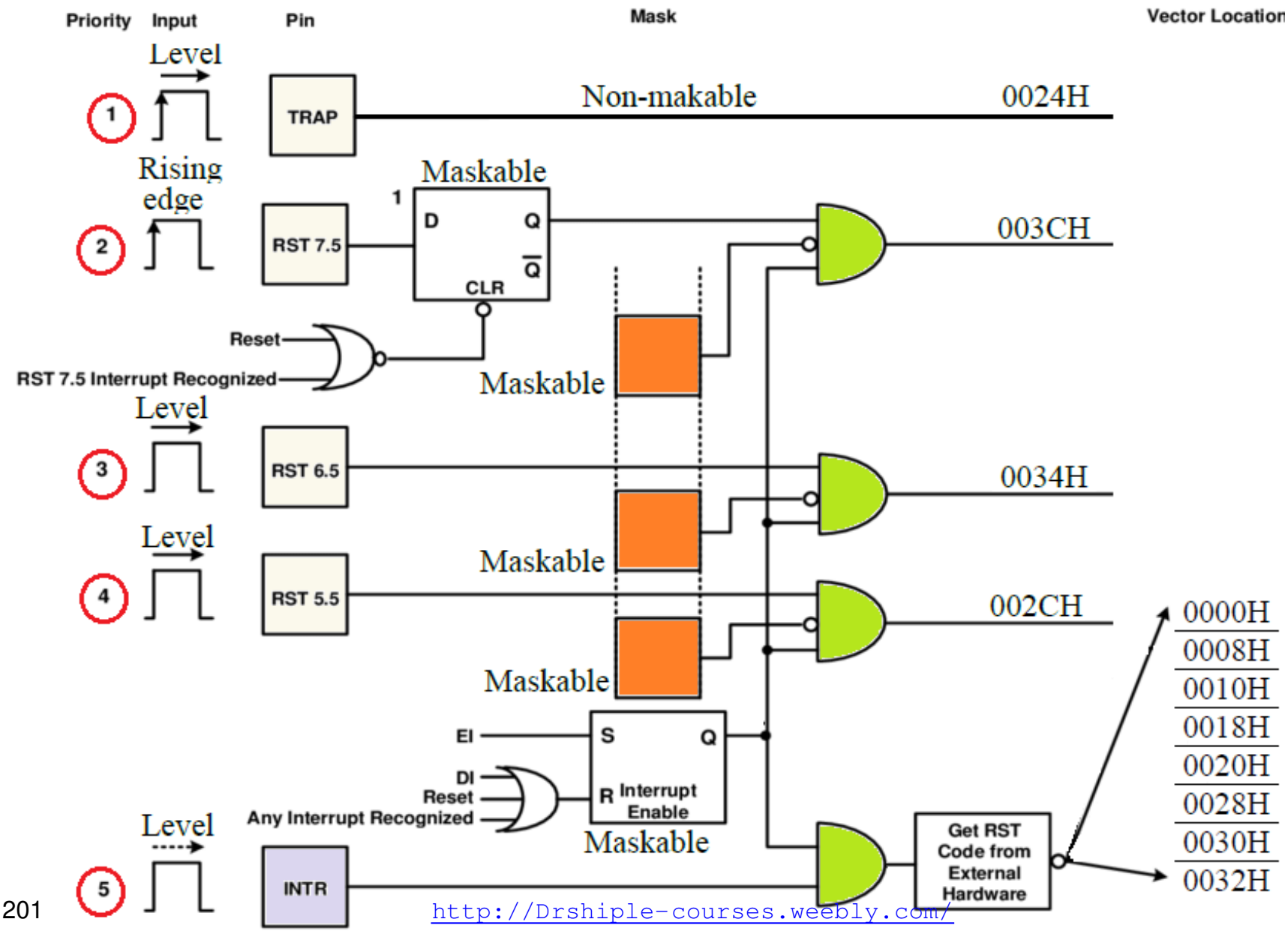
vectored

Interrupt	Interrupt vector address	Maskable or non-maskable	Edge or level triggered	priority
TRAP	0024H	Non-makable	Level	1
RST 7.5	003CH	Maskable	Rising edge	2
RST 6.5	0034H	Maskable	Level	3
RST 5.5	002CH	Maskable	Level	4
INTR	Decided by hardware	Maskable	Level	5

non-vectored

Instruction	Machine hex code	Interrupt Vector Address
RST 0	C7	0000H
RST 1	CF	0008H
RST 2	D7	0010H
RST 3	DF	0018H
RST 4	E7	0020H
RST 5	EF	0028H
RST 6	F7	0030H
RST 7	FF	0032H

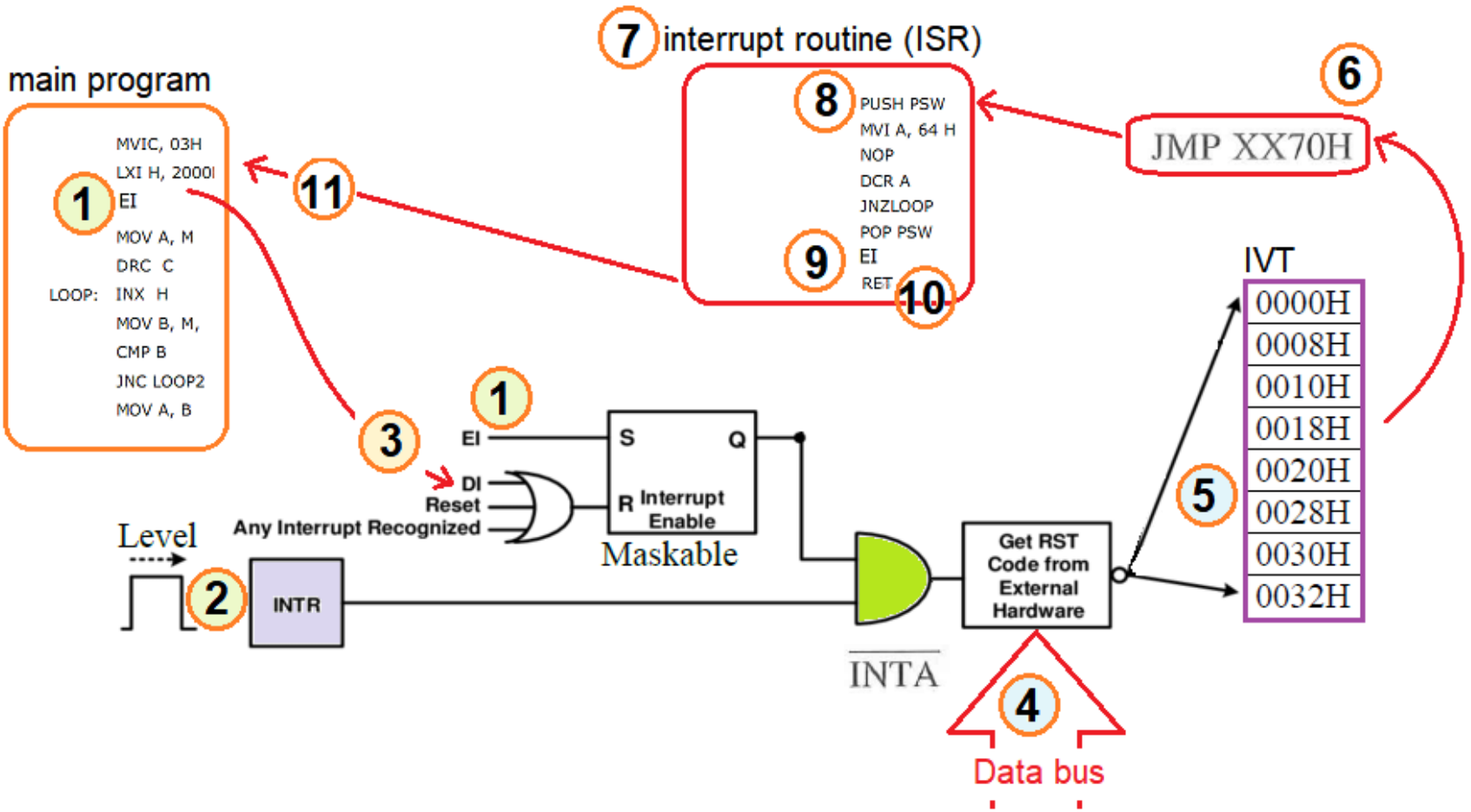
Interrupt summary



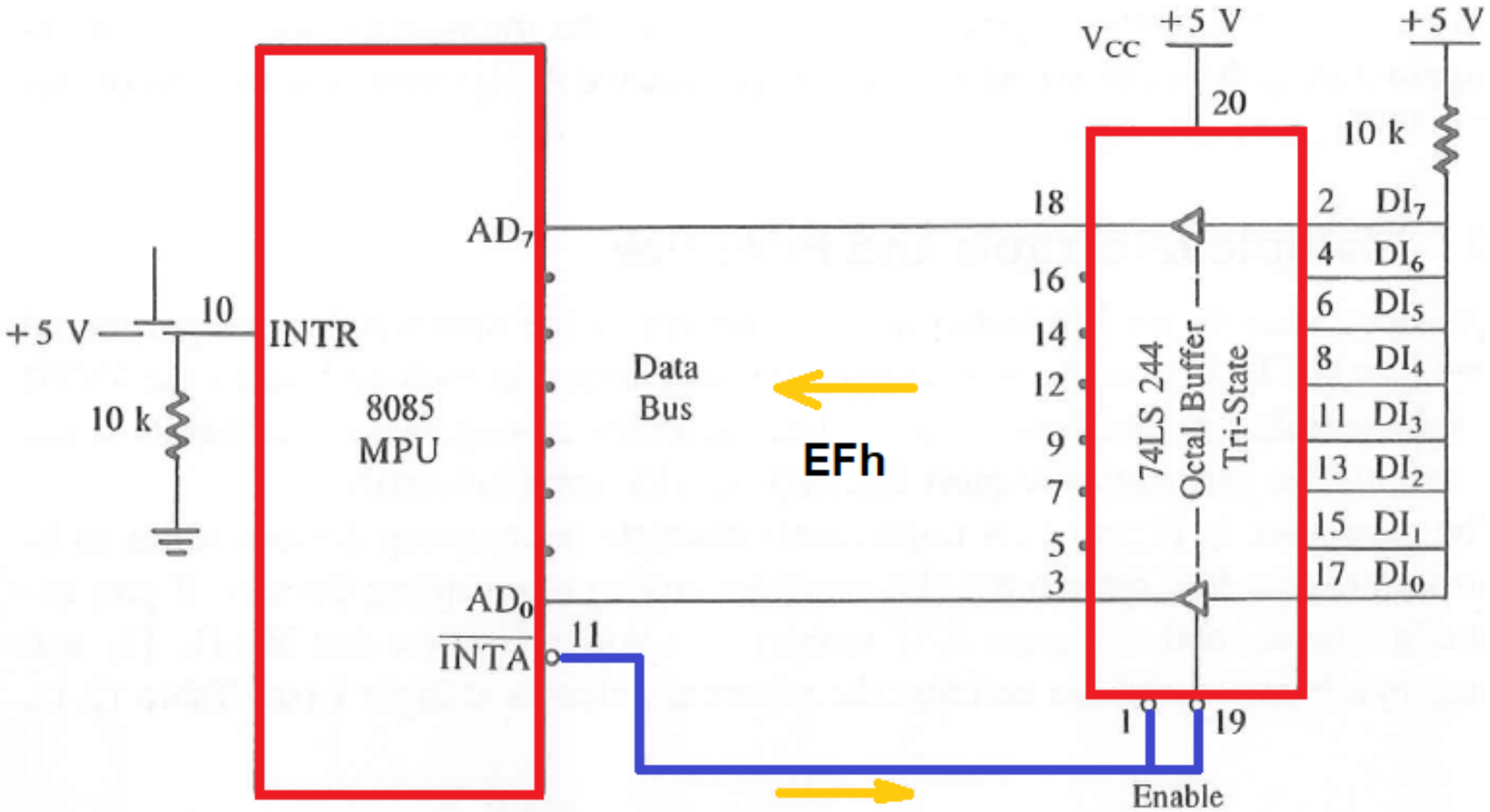
Interrupt assembly instructions

Instructions		Operation	Flag	Description
Mnemonics	Arguments			
SIM		mask=A	——	Set Interrupt Mask
RIM		A=mask	——	Read Interrupt Mas
DI			——	Disable Interrupts
EI			——	Enable Interrupts
RST	z	-[SP]=PC,PC=z	——	Restart (3X7)

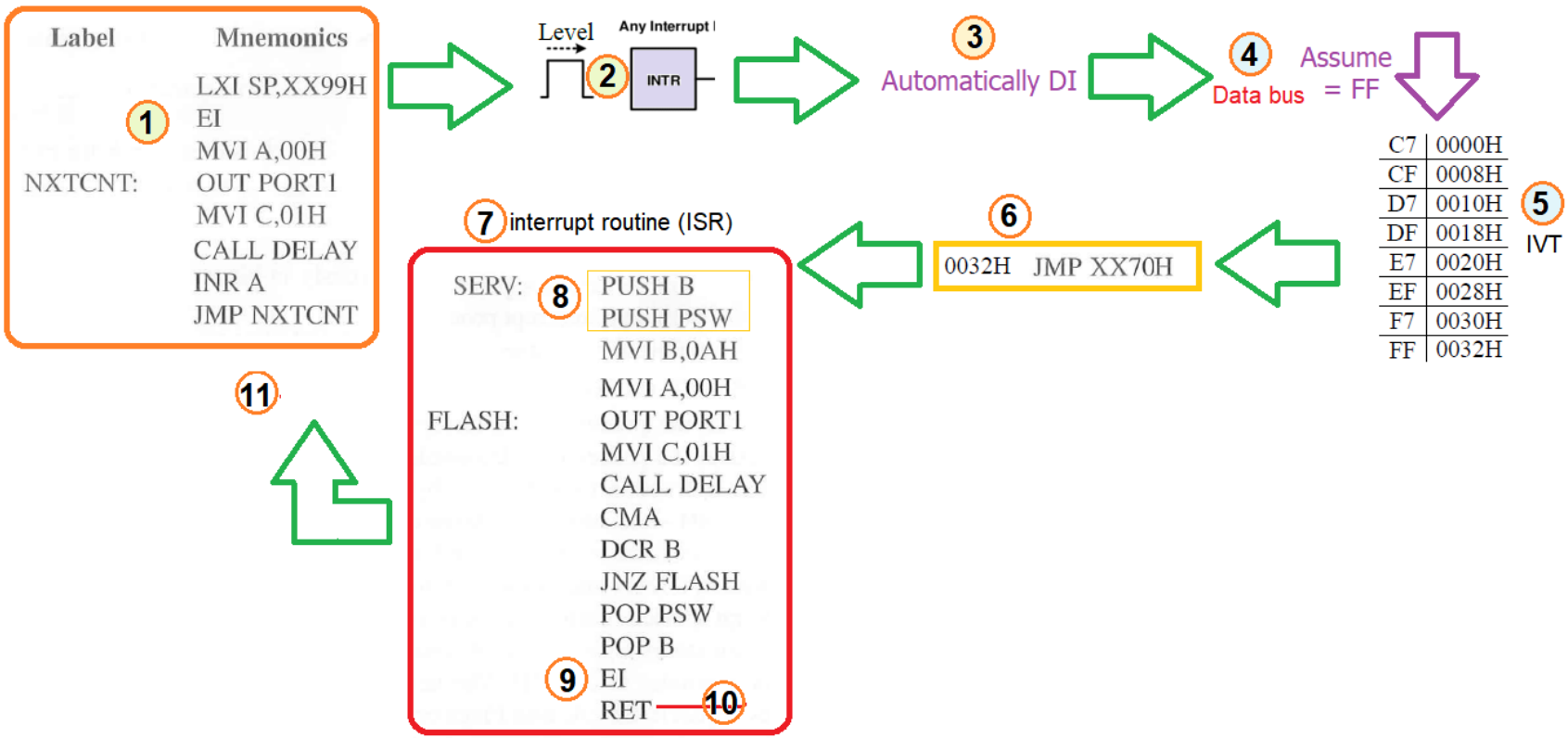
Interrupt life cycle



Interrupt life cycle



Interrupt life cycle



Classification of Interrupts

- Hardware (called Interrupts or Resets)
  - Reset
  - User-defined interrupt
  - Timer operations
  - CPU operations monitor failure
- Software
  - Reset
  - User-defined interrupt
  - Timer operations
  - CPU operations monitor failure