

CENG 336

INT. TO EMBEDDED SYSTEMS

DEVELOPMENT

Spring 2006

Recitation 06

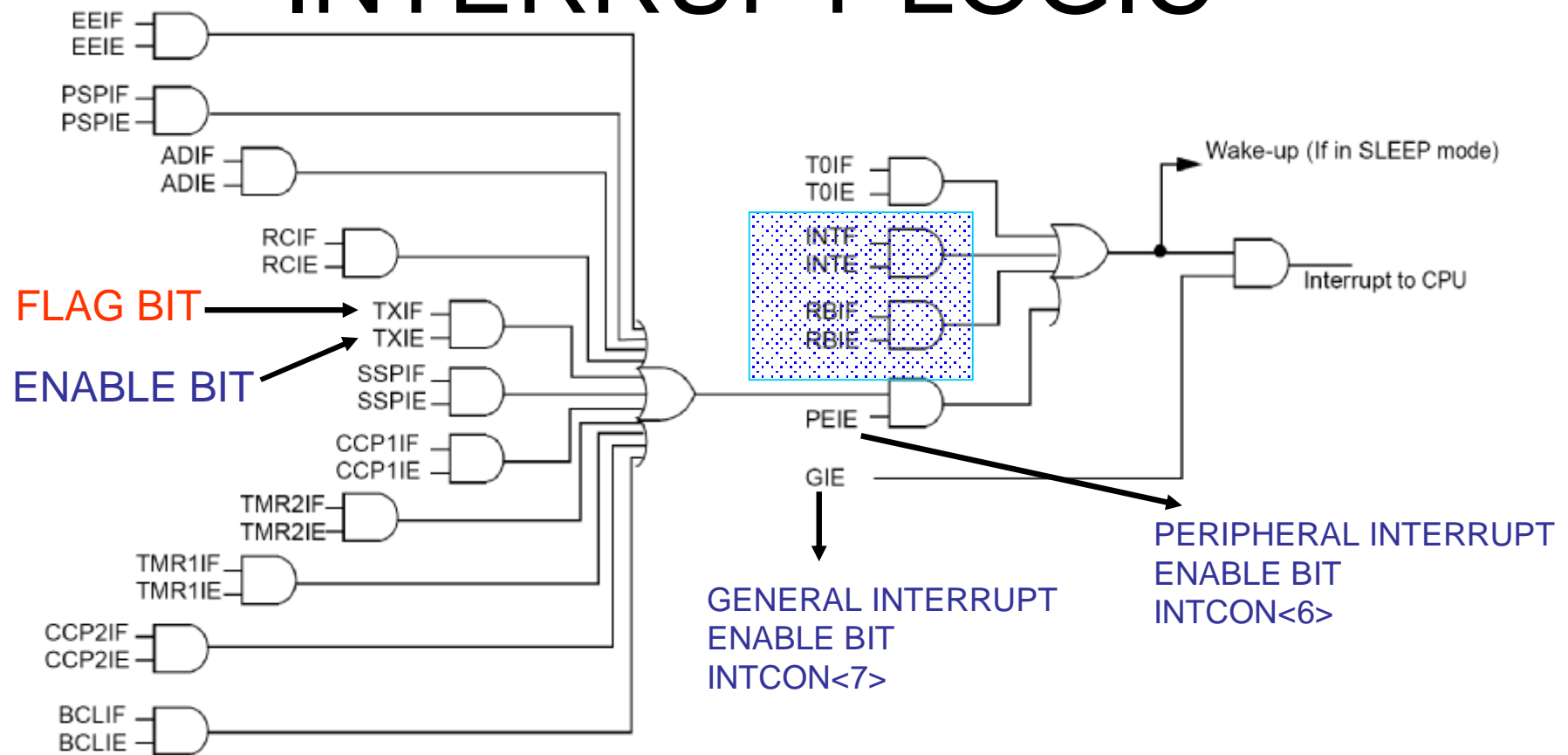
OUTLINE

- Interrupts overview
- External interrupt & PORTB<7:4>
on change interrupts
- Sample program simulations

INTERRUPTS

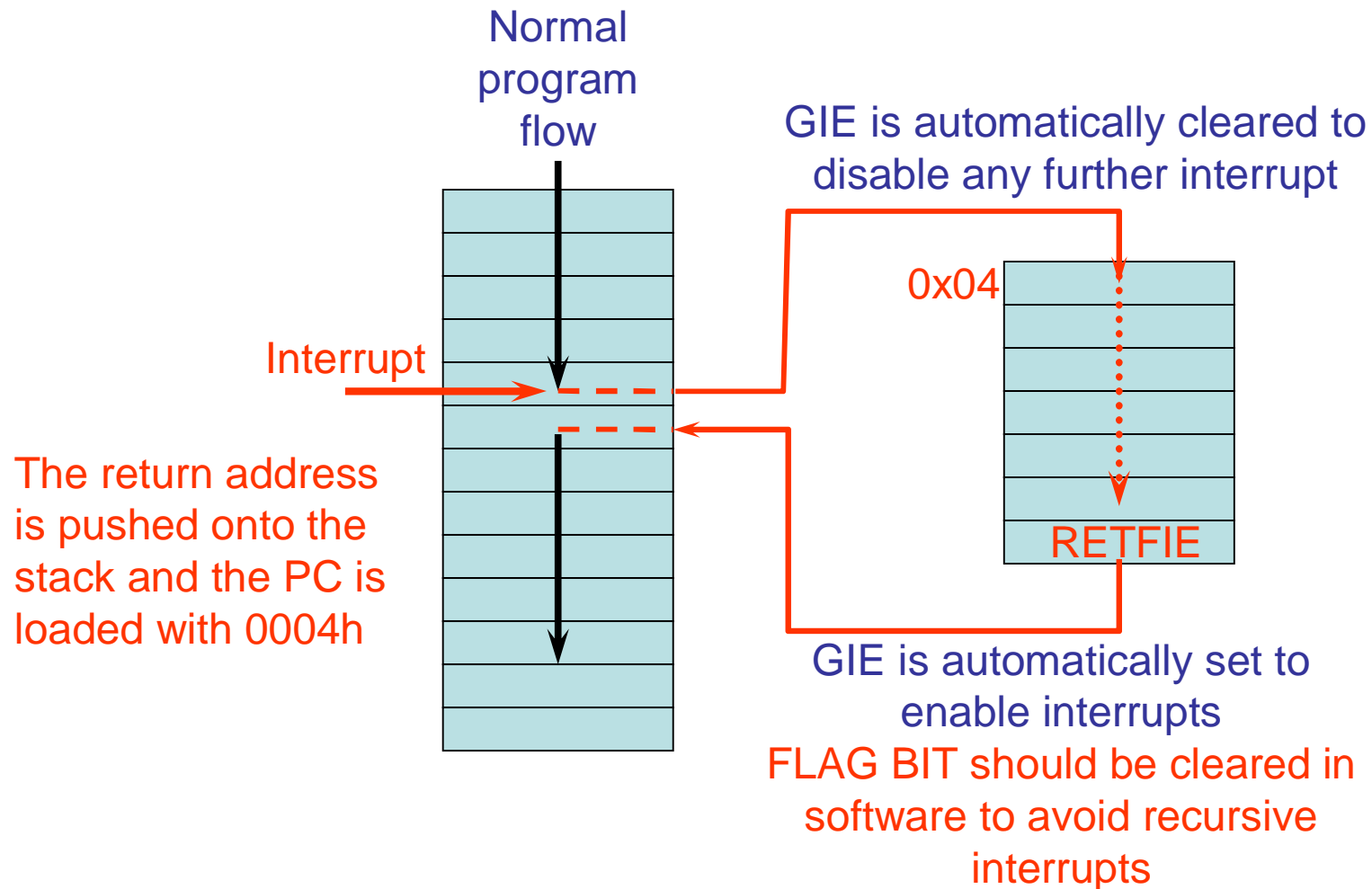
- **Programmed I/O:** The status of the I/O device is checked by the program
- **Interrupt I/O:** The I/O device request the interrupt, and an interrupt handling routine or interrupt service routine is needed
- An **interrupt** is a process or a signal that stops the microcontroller from what it is doing, so that something else can happen.

INTERRUPT LOGIC



FLAG BITS are set regardless of PEIE, GIE or enable bit according to the working conditions of peripheral.

EFFECTS & HANDLING



INT INTERRUPT

- External interrupt from RB0/INT pin

INTCON REGISTER (ADDRESS 0Bh, 8Bh, 10Bh, 18Bh)

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-x
GIE	PEIE	T0IE	INTE	RBIE	T0IF	INTF	RBIF
bit 7							bit 0
ENABLE BIT				FLAG BIT			

OPTION_REG REGISTER (ADDRESS 81h, 181h)

R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1	R/W-1
RBPU	INTEDG	T0CS	T0SE	PSA	PS2	PS1	PS0
bit 7							bit 0

INTEDG: Interrupt Edge Select bit

1 = Interrupt on rising edge of RB0/INT pin

0 = Interrupt on falling edge of RB0/INT pin

PORTB CHANGE INTERRUPT

- An **input change** on PORTB<7:4> sets flag bit RBIF (INTCON<0>). Only pins configured as inputs can cause this interrupt to occur.

INTCON REGISTER (ADDRESS 0Bh, 8Bh, 10Bh, 18Bh)

R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-x
GIE	PEIE	TOIE	INTE	RBIE	TOIF	INTF	RBIF
bit 7							bit 0
				ENABLE BIT		FLAG BIT	

- How to clear RBIF?
 - 1- Make a read or write operation of PORTB to end the mismatch condition.
 - 2- Clear flag bit RBIF

You can not clear RBIF without before making any read or write operation of PORTB.

HOW TO DISABLE & ENABLE GIE?

```
LOOP                                ; GIE is enabled before
    BCF    INTCON, GIE              ; Disable Global Interrupt
    BTFSC  INTCON, GIE              ; Global Interrupt Disabled?
    GOTO   LOOP                    ; NO, try again
    :                                ; YES, continue with program flow
    :                                ; without interrupt
    :
    BSF    INTCON, GIE              ; Re-enable Global Interrupt
```


ANY QUESTION?