



"We now interrupt our regular series of commercials for this special commercial message."

CN
COLLECTION

7. Interrupts

Chapter 3, section 3.2

Sections 3.2 (Interrupts)

- Reading: pp.74-83

Interrupt

- Interrupt - is an external request for service.
- An interrupt causes the microprocessor to stop executing the current procedure (saving the status) and continue on with the routine specified by the interrupt.
- When the interrupt has been fully serviced, control returns to the previously executing routine.

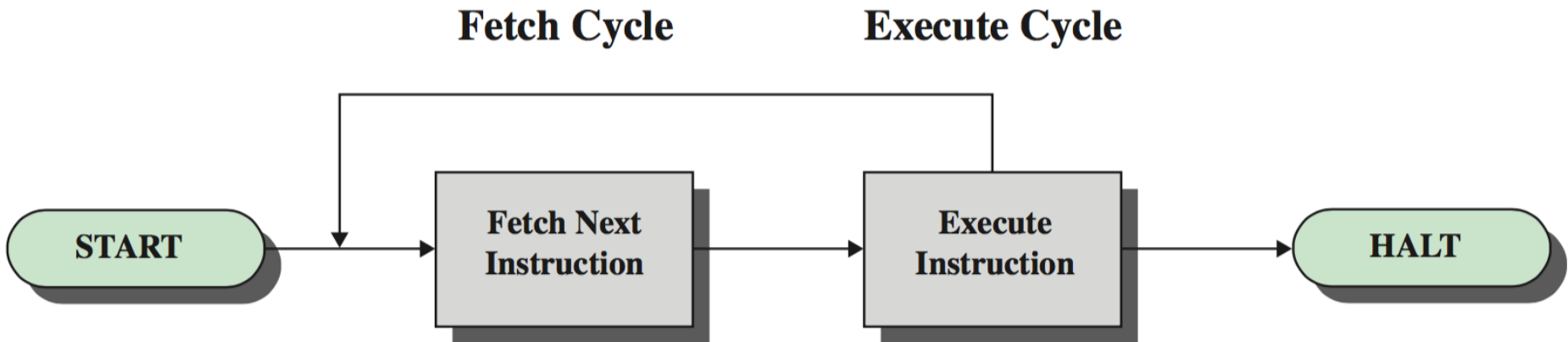
Types of Interrupts

- Two types of interrupts exist:
 1. maskable - depending on the status of the interrupt flag, this interrupt can be ignored by the hardware.
 2. nonmaskable - must be acknowledged by the hardware independent of the interrupt flag.

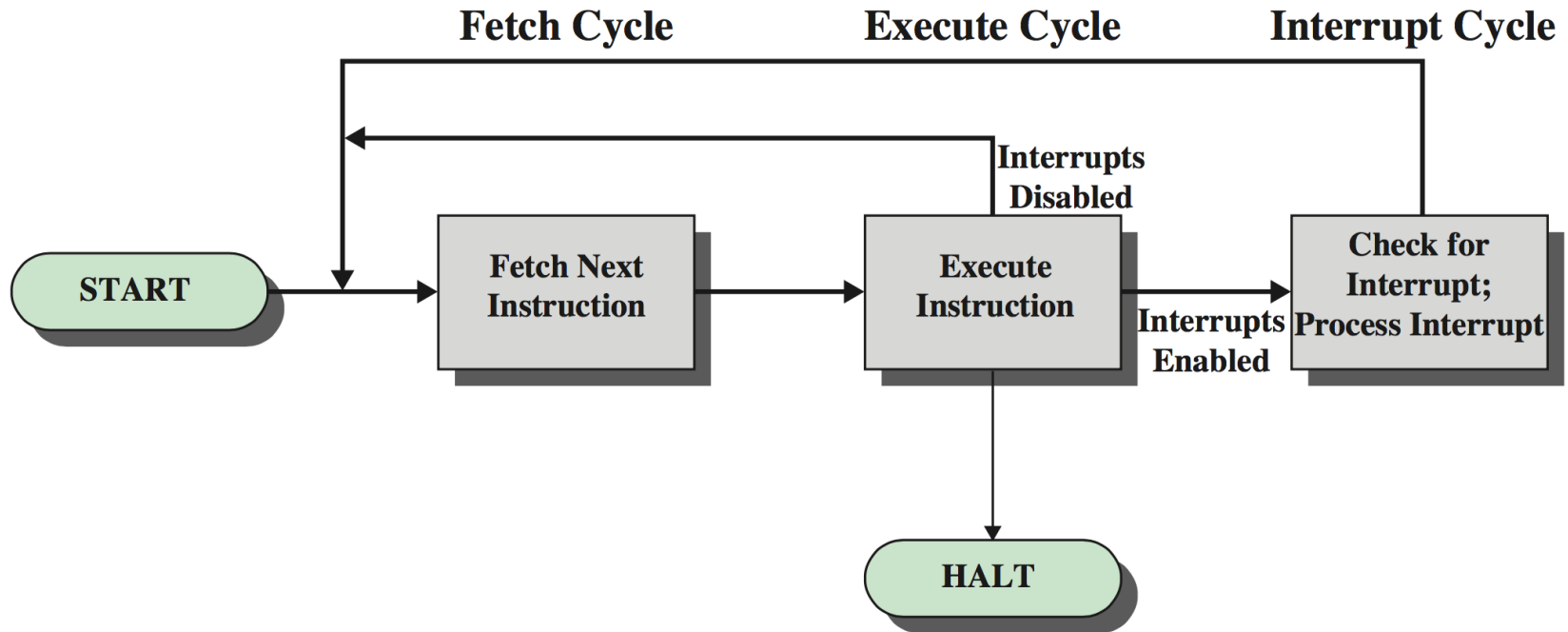
Classes of Interrupts

- Program - generated by some instruction execution
 1. division by zero
 2. attempt to execute illegal opcode
 3. reference outside a user's memory space
- Timer - generated by a timer within the processor for OS
- I/O - generated by an I/O controller to signal normal completion
- Hardware Failure - generated by a power failure or memory parity error

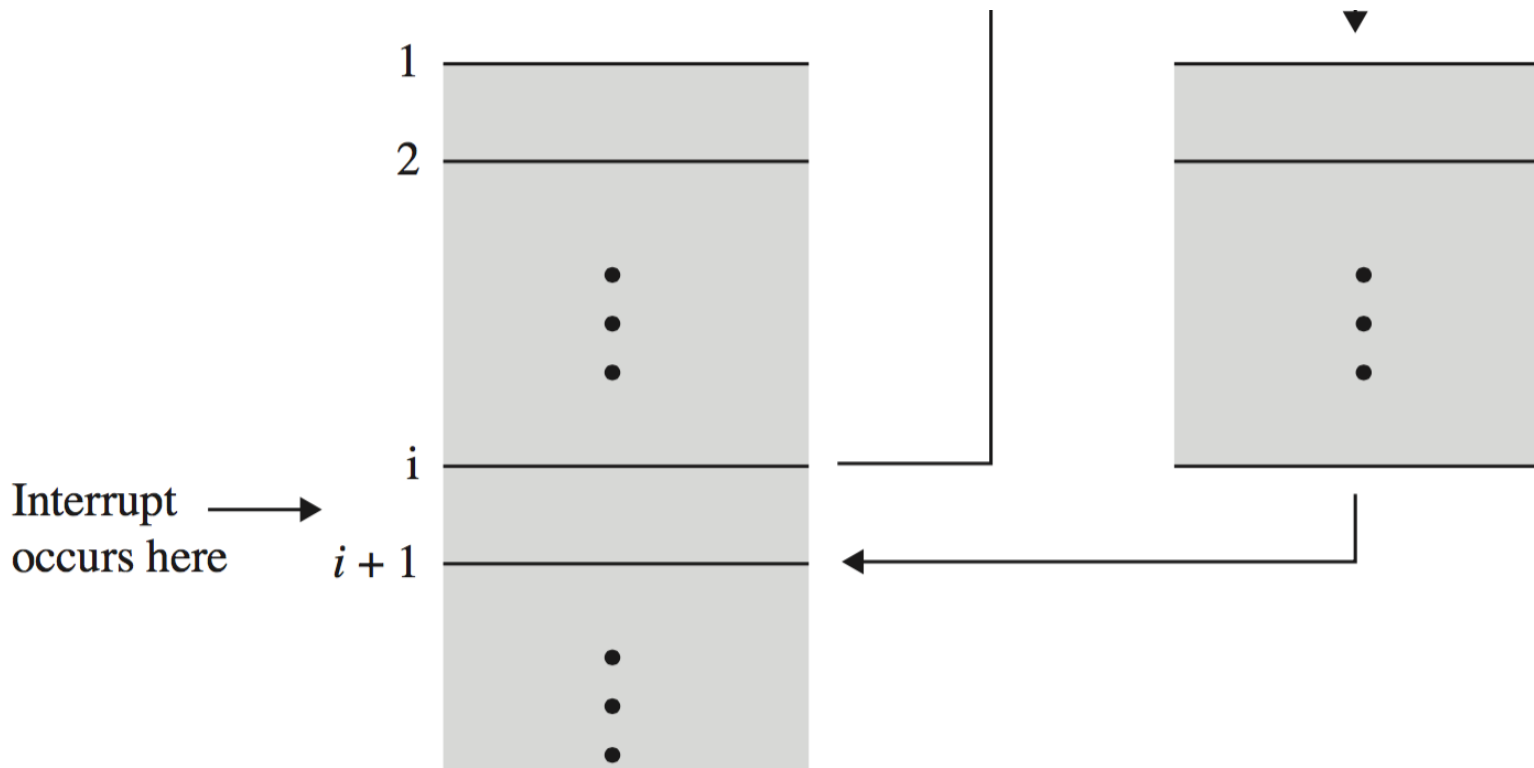
Basic Instruction Cycle



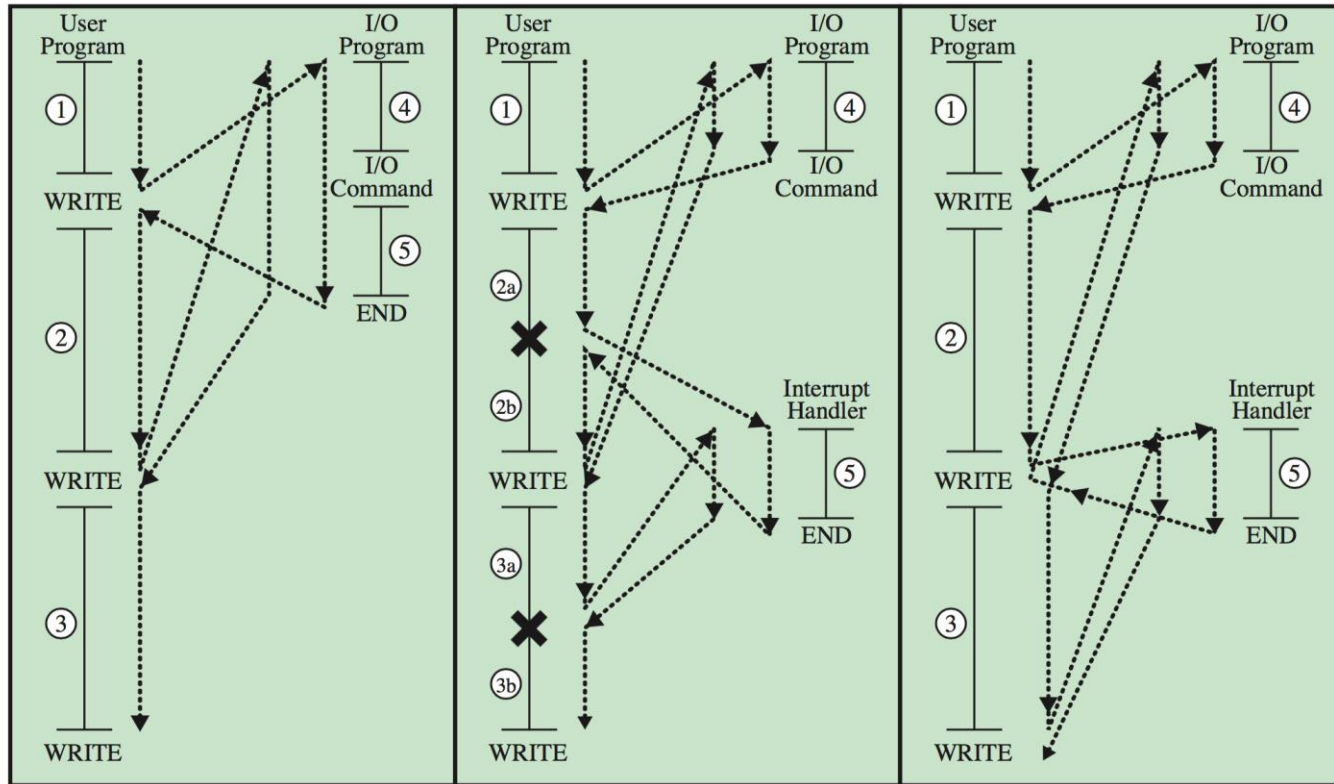
Modified Instruction Cycle



Flow of Control



Flow of Control



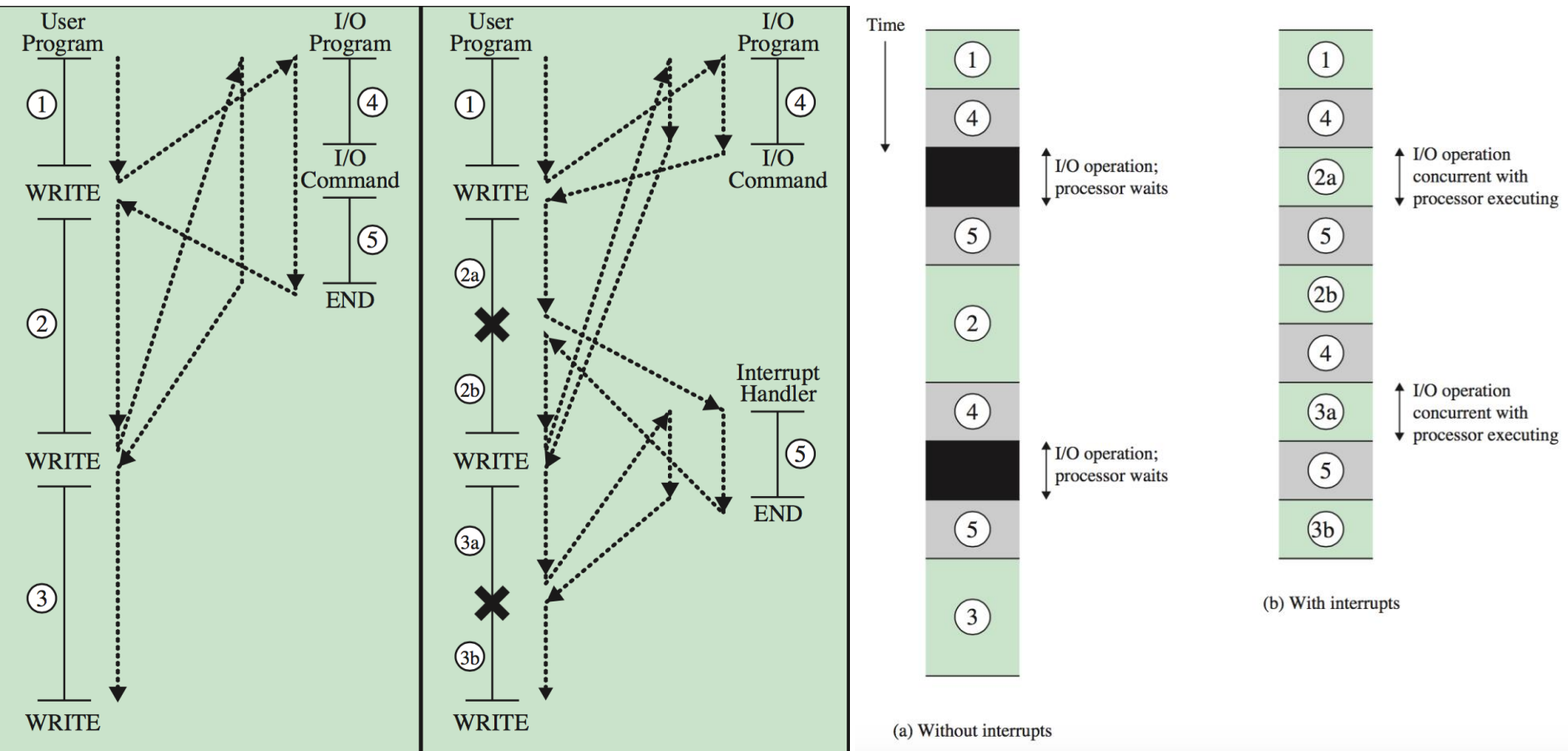
(a) No interrupts

(b) Interrupts; short I/O wait

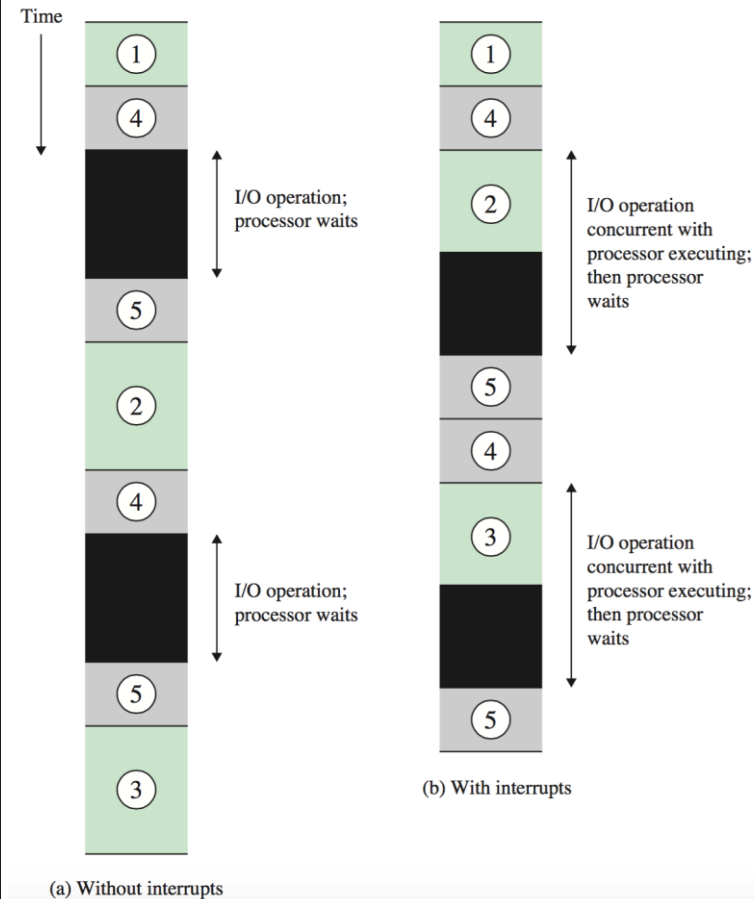
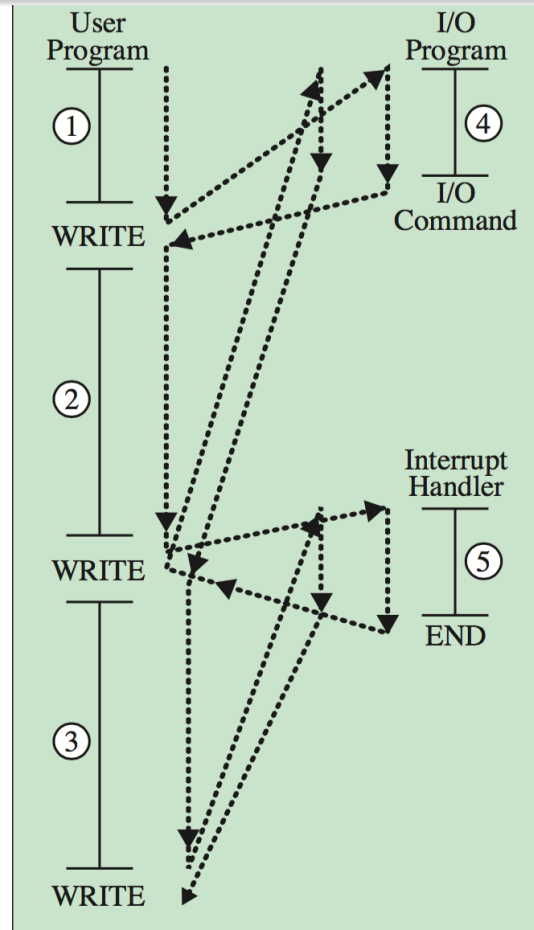
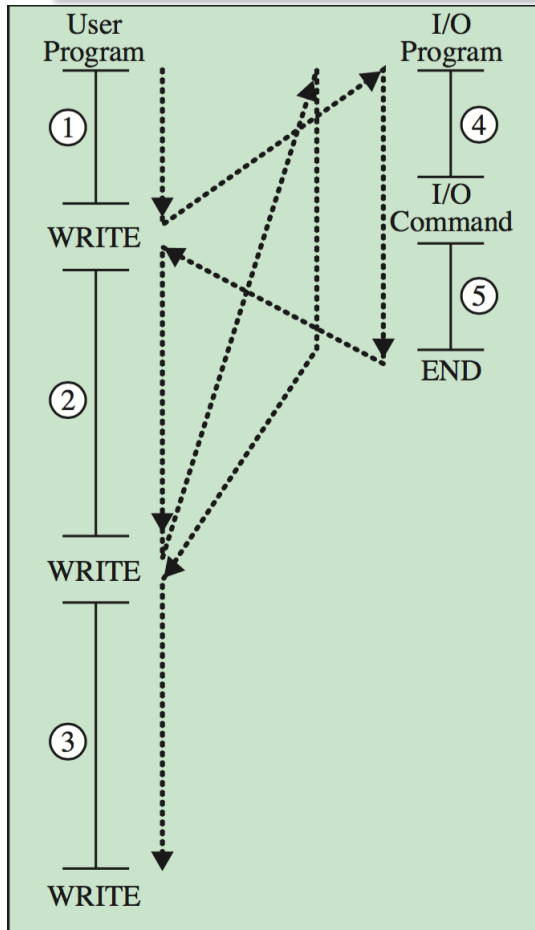
(c) Interrupts; long I/O wait

✘ = interrupt occurs during course of execution of user program

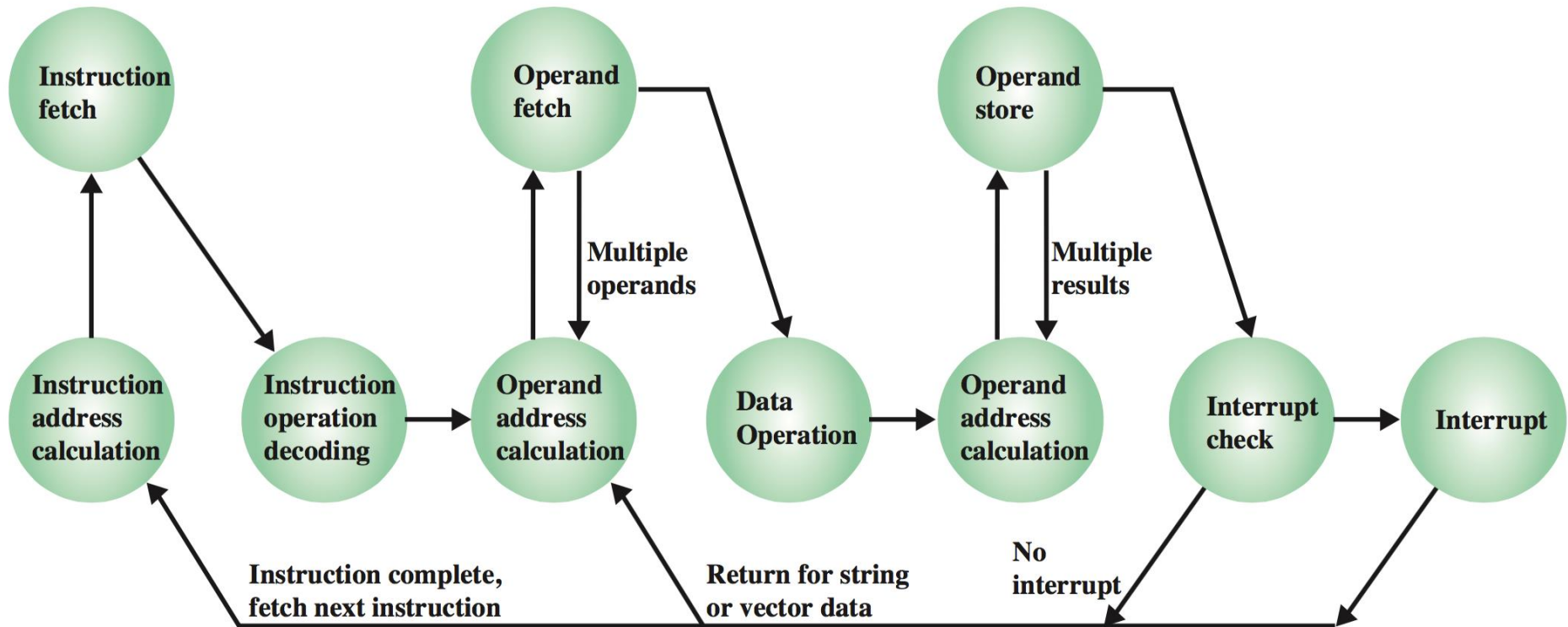
Time Savings using Interrupts



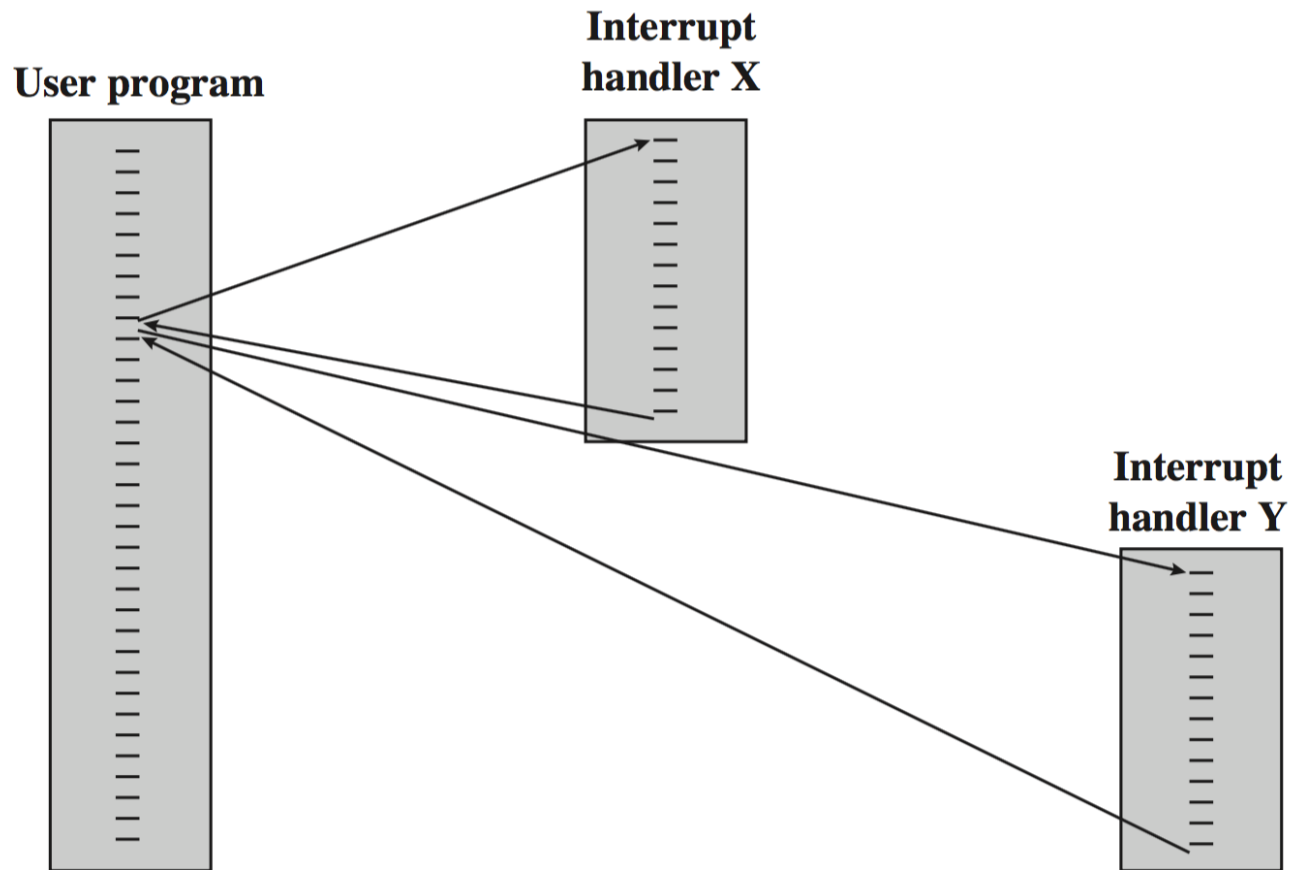
Time Savings using Interrupts



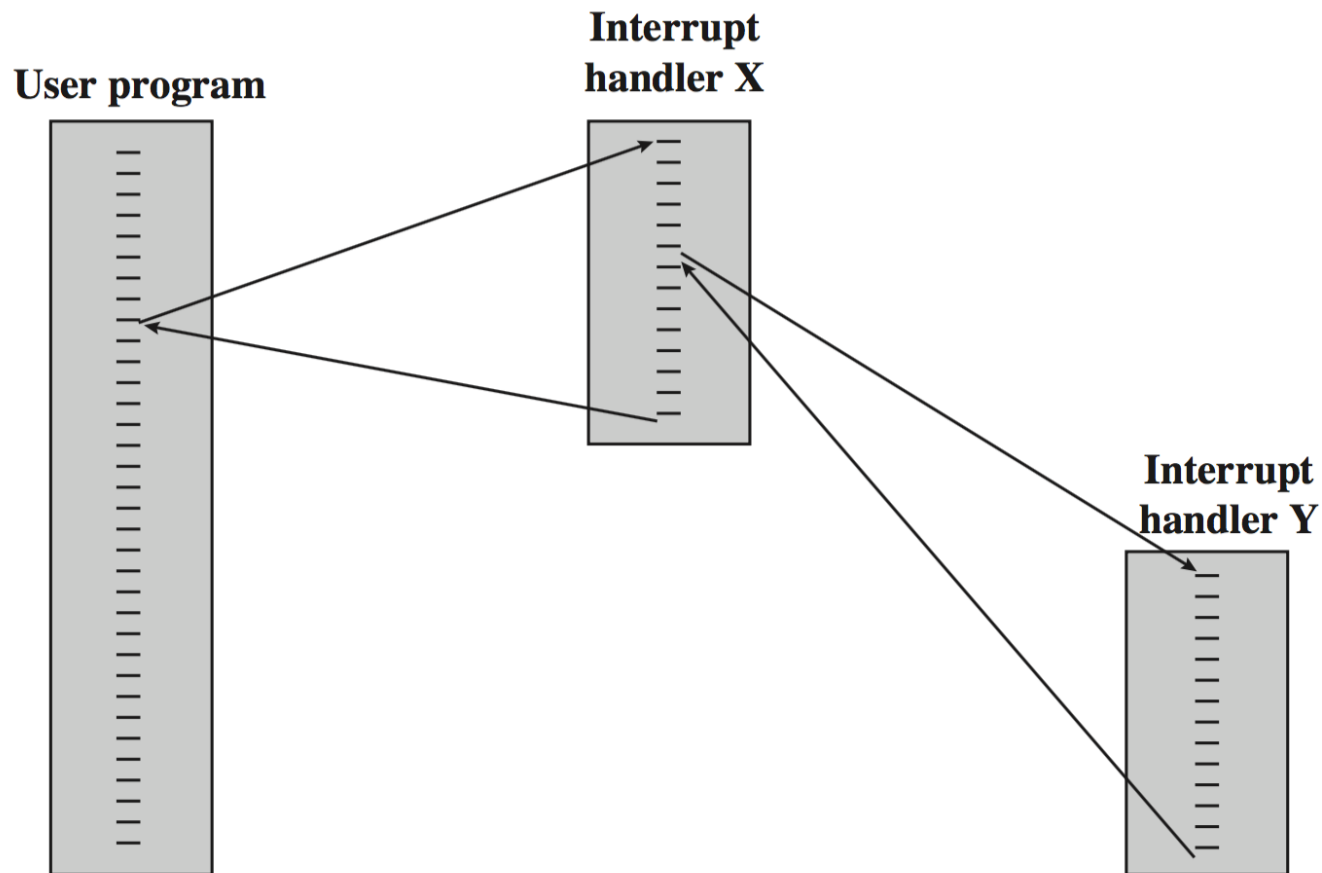
Instruction Cycle with Interrupts



Sequential Interrupt Processing



Nested Interrupt Processing



Multiple Inputs with Priorities

