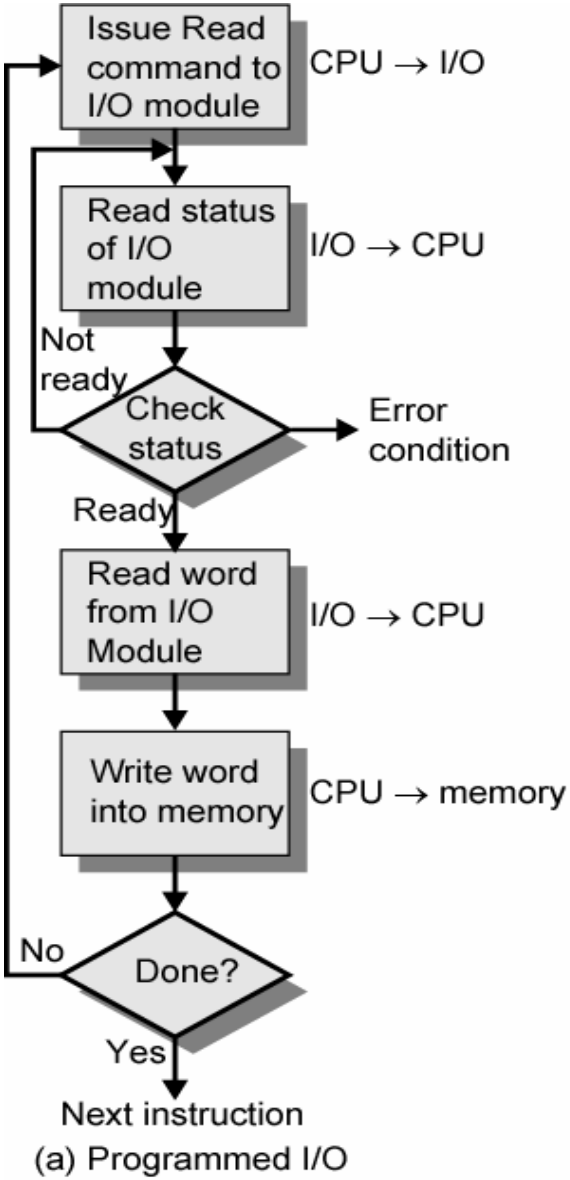
I/O Techniques

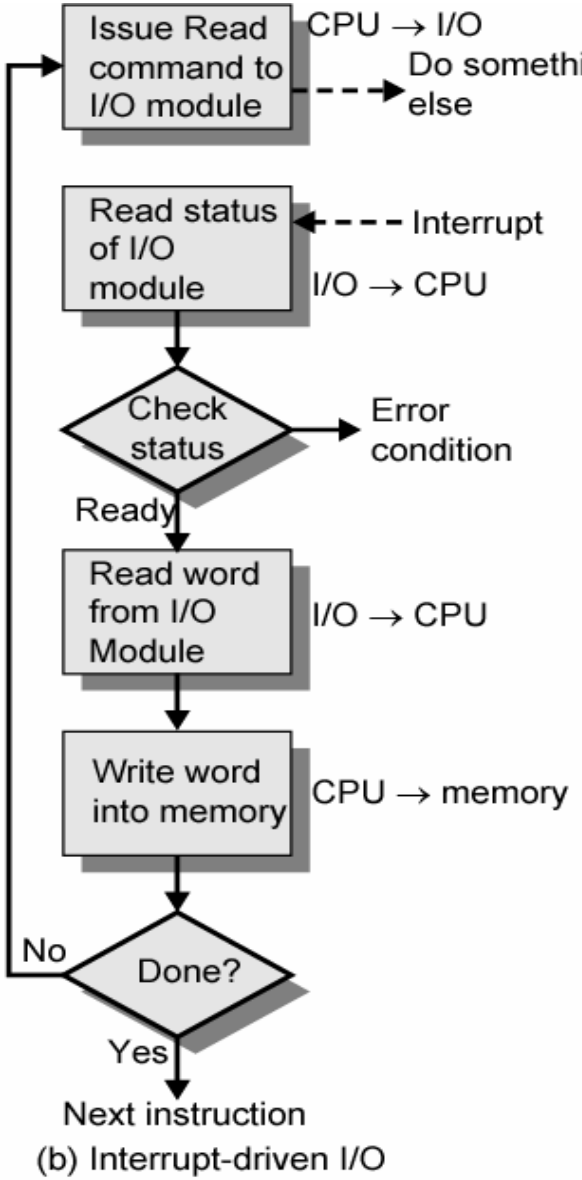
Input Output Techniques

- Programmed I/O
- Interrupt driven I/O
- Direct Memory Access (DMA)

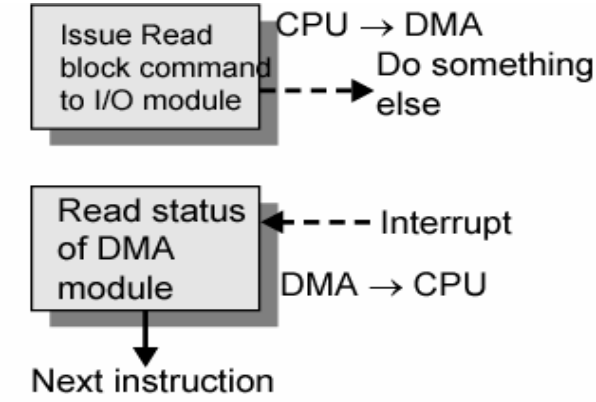
Input Output Techniques



(a) Programmed I/O



(b) Interrupt-driven I/O



(c) Direct memory access

Programmed I/O

- CPU has direct control over I/O
  - Sensing status
  - Read/write commands
  - Transferring data
- CPU waits for I/O module to complete operation
- Wastes CPU time

Programmed I/O

- CPU requests I/O operation.
- I/O module performs operation and sets status bits after completion.
- CPU checks status bits periodically.
- I/O module does not inform CPU directly that is it does not interrupt CPU.
- CPU must wait.

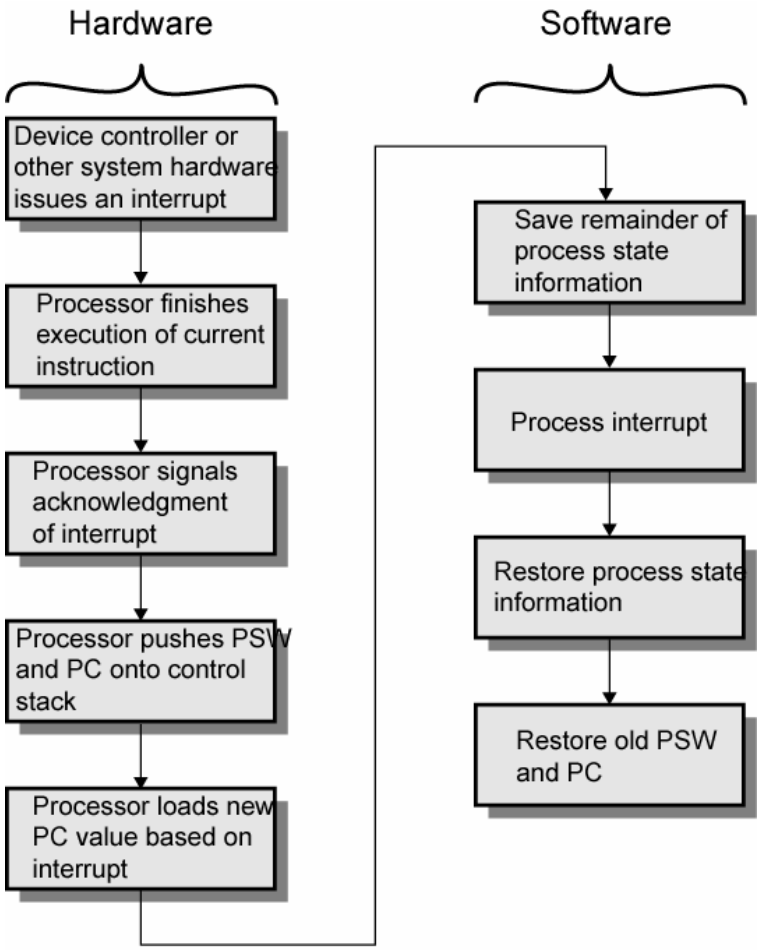
Interrupt Driven I/O

- Overcomes CPU waiting
- No repeated CPU checking of device
- I/O module interrupts when ready

Interrupt Driven I/O Basic Operation

- CPU issues read command
- I/O module gets data from peripheral while CPU does other work
- I/O module interrupts CPU after completion
- CPU requests data
- I/O module transfers data

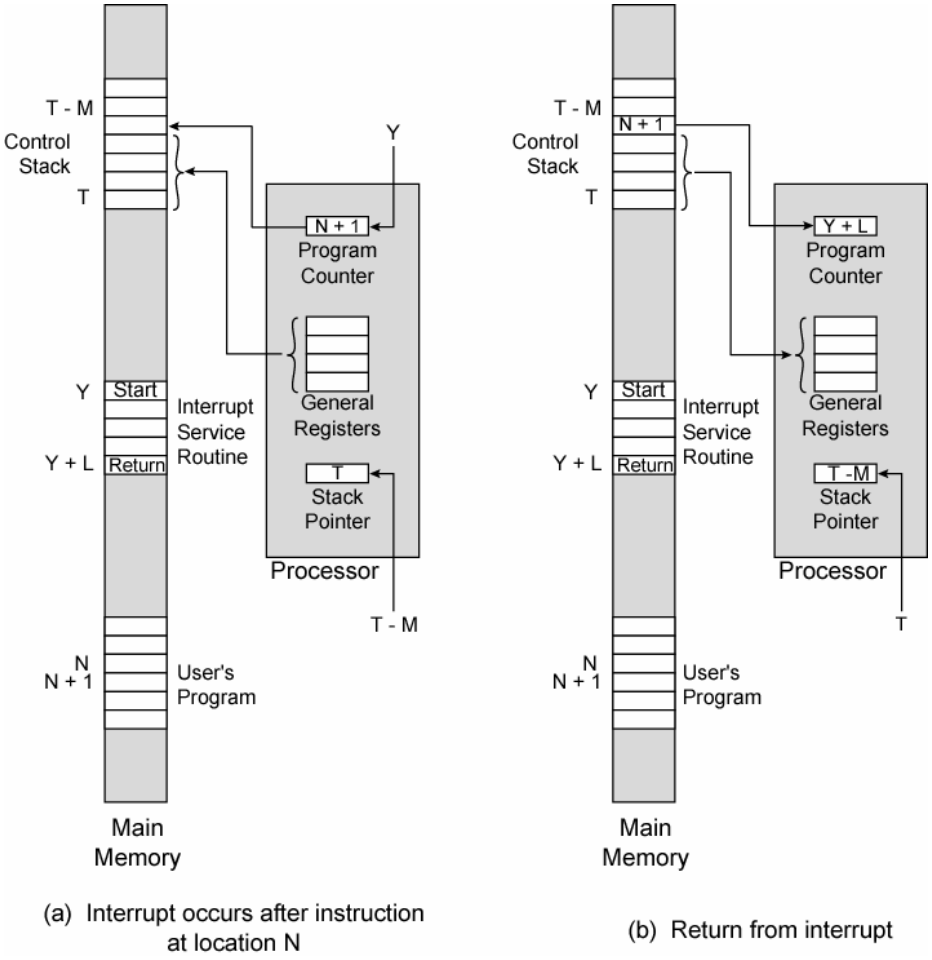
Simple Interrupt Processing



CPU Viewpoint

- • Issue read command
- • Do other work
- • Check for interrupt at end of each instruction cycle
- • If interrupted:-
  - – Save context (registers)
  - – Process interrupt
- • Fetch data & store

Changes in Memory and Registers for an Interrupt



DMA