Input/Output

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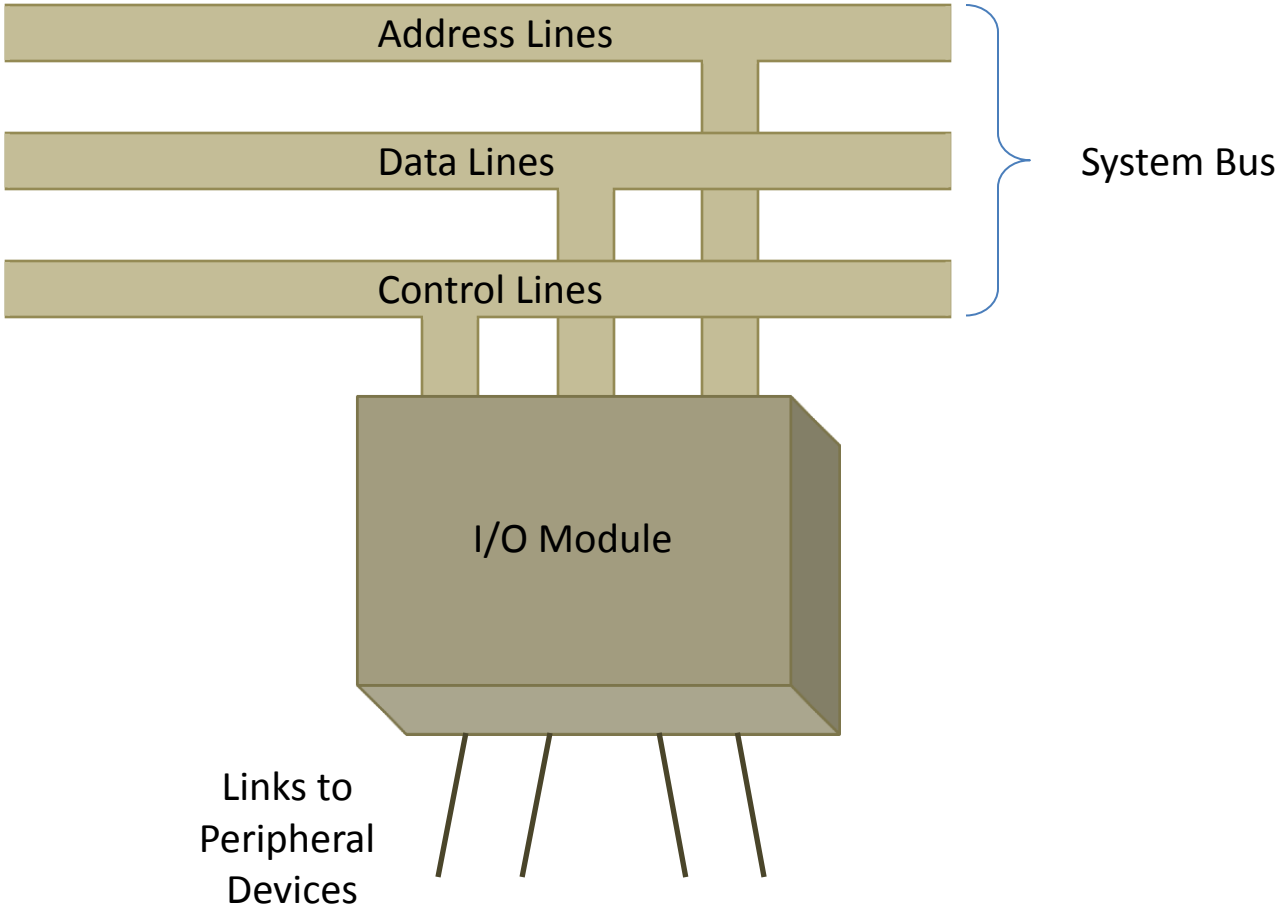
Book Chapter

- “Computer Organization and Architecture”
- Author “William Stallings”
- 8th Edition
- Chapter 7
  - Section 7.1
  - Section 7.2

I/O Problems and Module

- Wide variety of peripherals
  - Delivering different amounts of data
  - At different speeds
  - In different formats
- All slower than CPU
- Need I/O Modules to interact with CPU and Memory
  - Interface to CPU and Memory
  - Interface to one or more peripherals

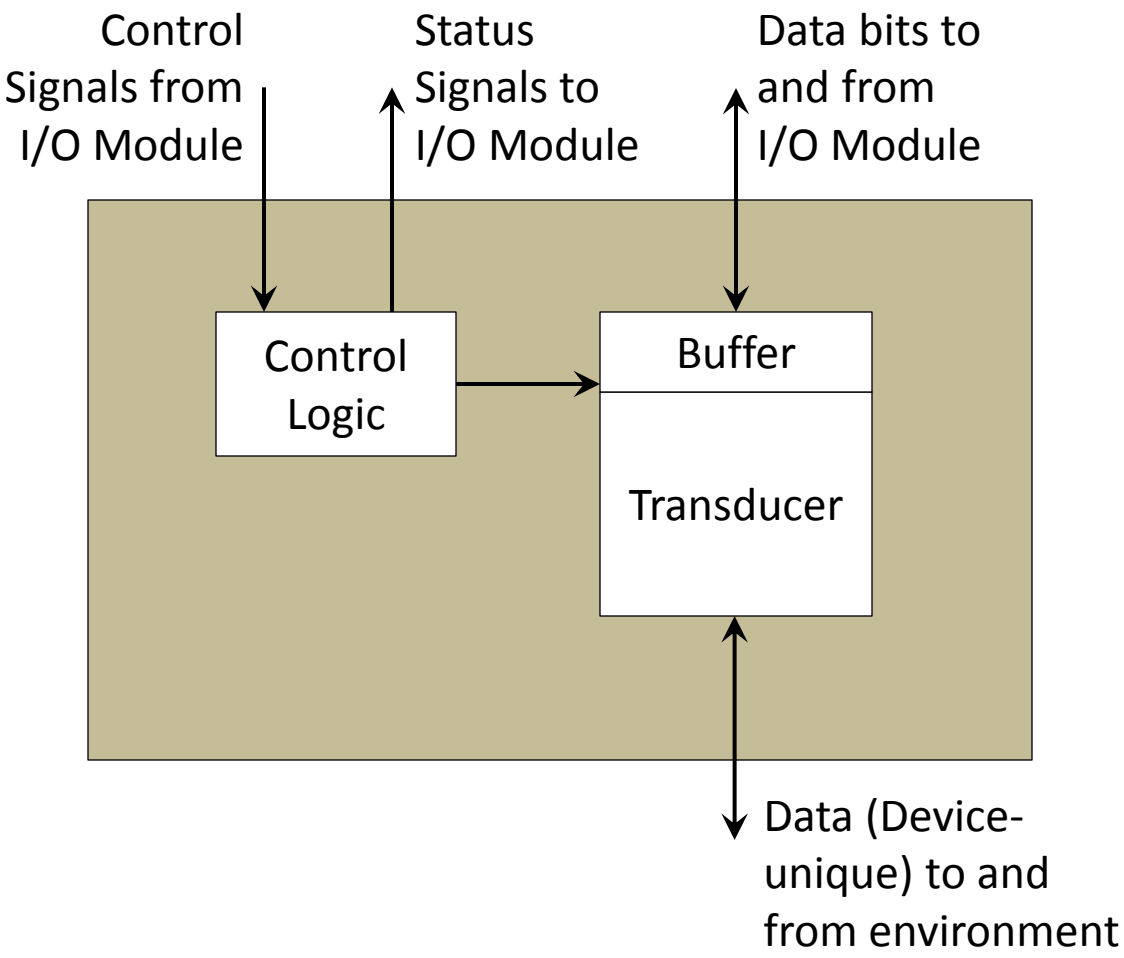
Generic Model of I/O Module



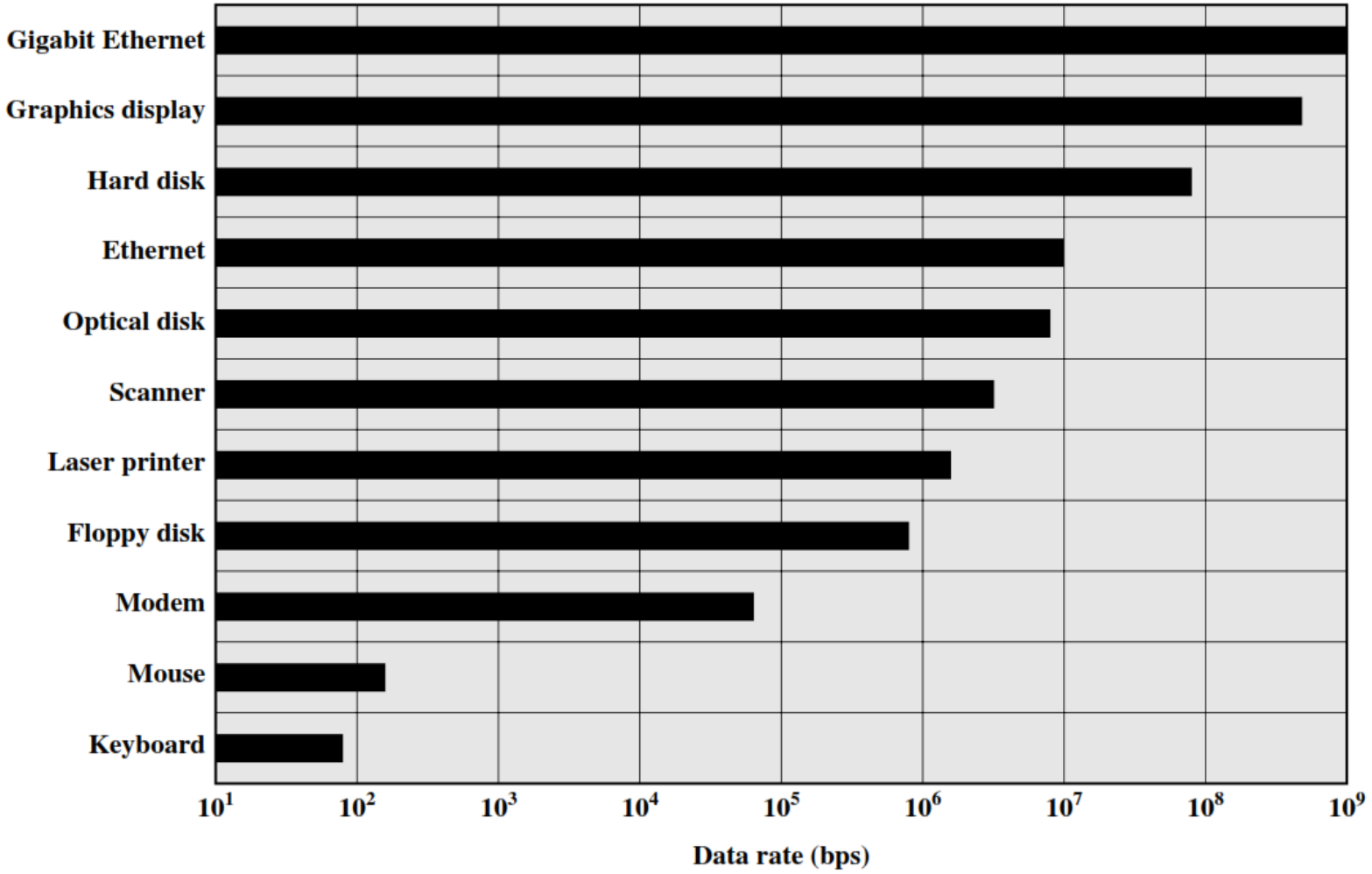
External Devices

- Human-readable
  - Screen, Printer, Keyboard
- Machine-readable
  - Monitoring and control
  - Magnetic disks and Tape drives
- Communication
  - Modem
  - Network Interface Card (NIC)

External Devices Block Diagram



Typical I/O Device Data Rates



I/O Module Function

- Control and timing
  - To coordinate the flow of traffic between internal resources and external devices
- Processor communication
  - Communication between processor and I/O module
- Device communication
  - Communication between device and I/O module
- Data buffering
  - Necessary because of different data rates of processor and peripheral
- Error detection
  - Unintentional changes to the bit pattern are detected

I/O Steps

- CPU checks the status of peripheral by I/O module
- I/O module returns status of external device
- If ready, CPU requests the data transfer
- I/O module obtains a unit of data from external device
- Data are transferred from I/O module to the processor

Block Diagram of an I/O Module