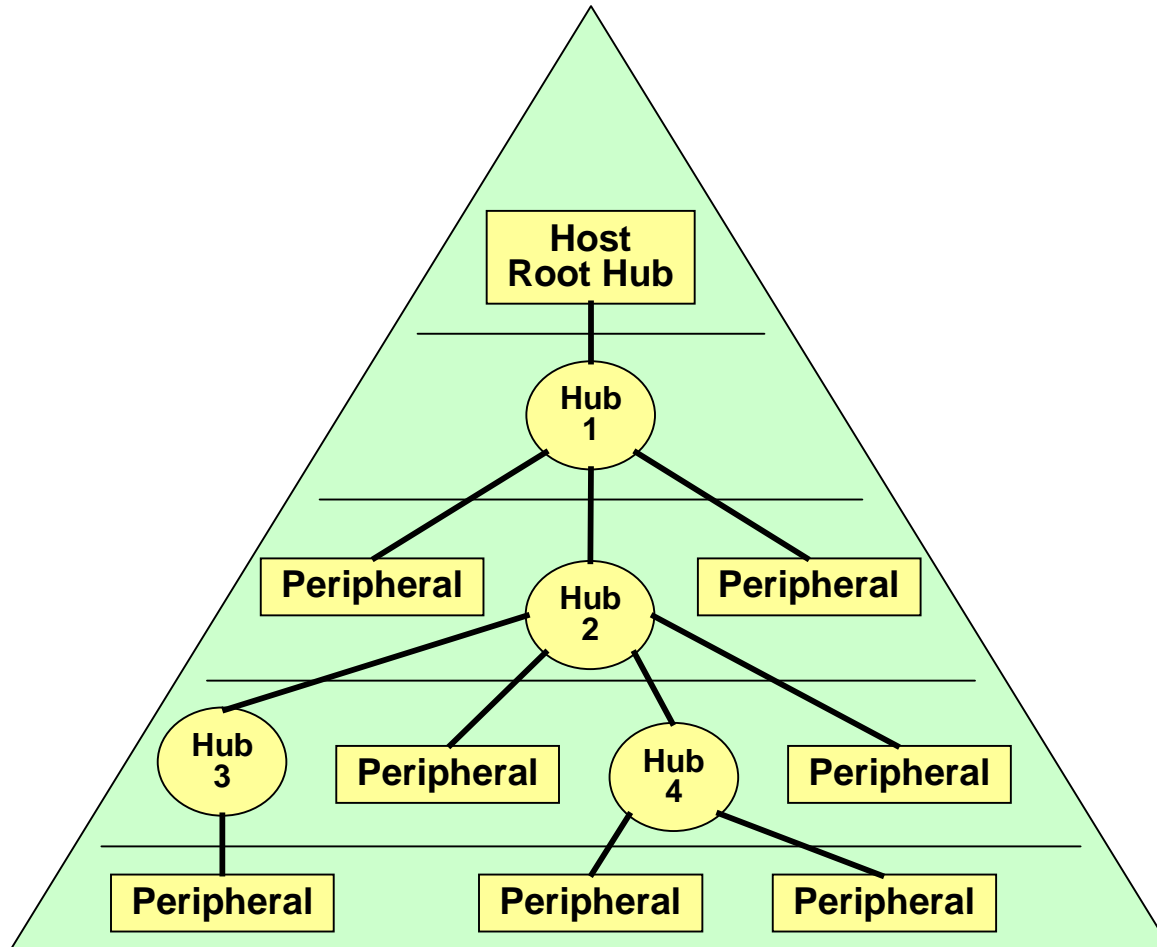


# An Introduction to USB Software

# What is USB?

- Alternative to old-fashioned serial and parallel interfaces
- Minimises number of PC connectors
- Simplifies I/O and offers true plug-n-play
- Supports up to 127 devices
- Multiple data rates
  - USB 1.1: full speed [12Mb/s] and low speed [1.5Mb/s]
  - USB 2.0: high speed [480Mb/s]

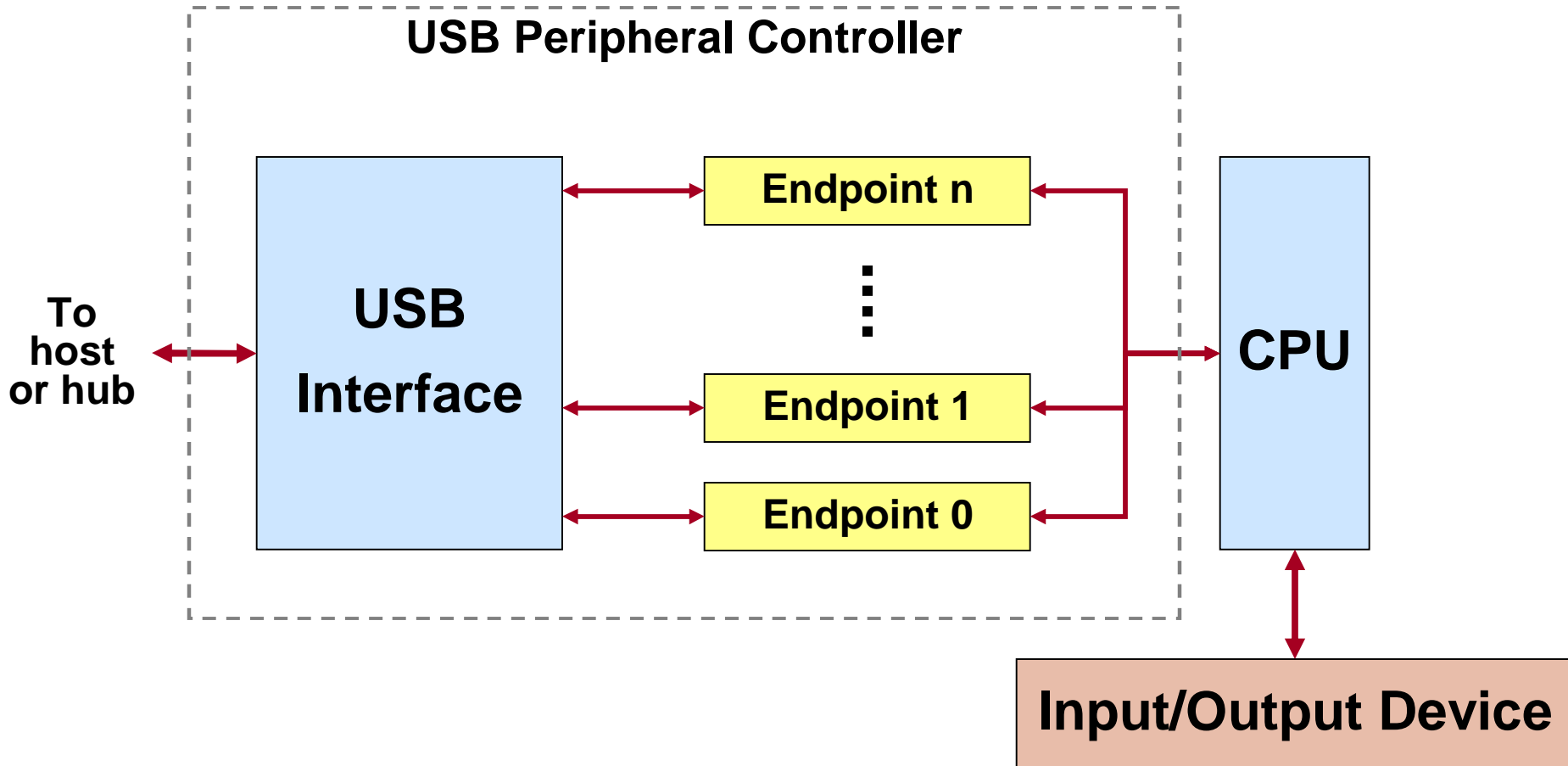
# USB Topology



# A USB Peripheral

- Buffers called “endpoints”
- Use logical channels called “virtual pipes”
- Control pipe is Endpoint 0
- One or more data pipes [Endpoints 1, 2, 3 ...
- Two configurations:
  - IN: device to host
  - OUT: host to device

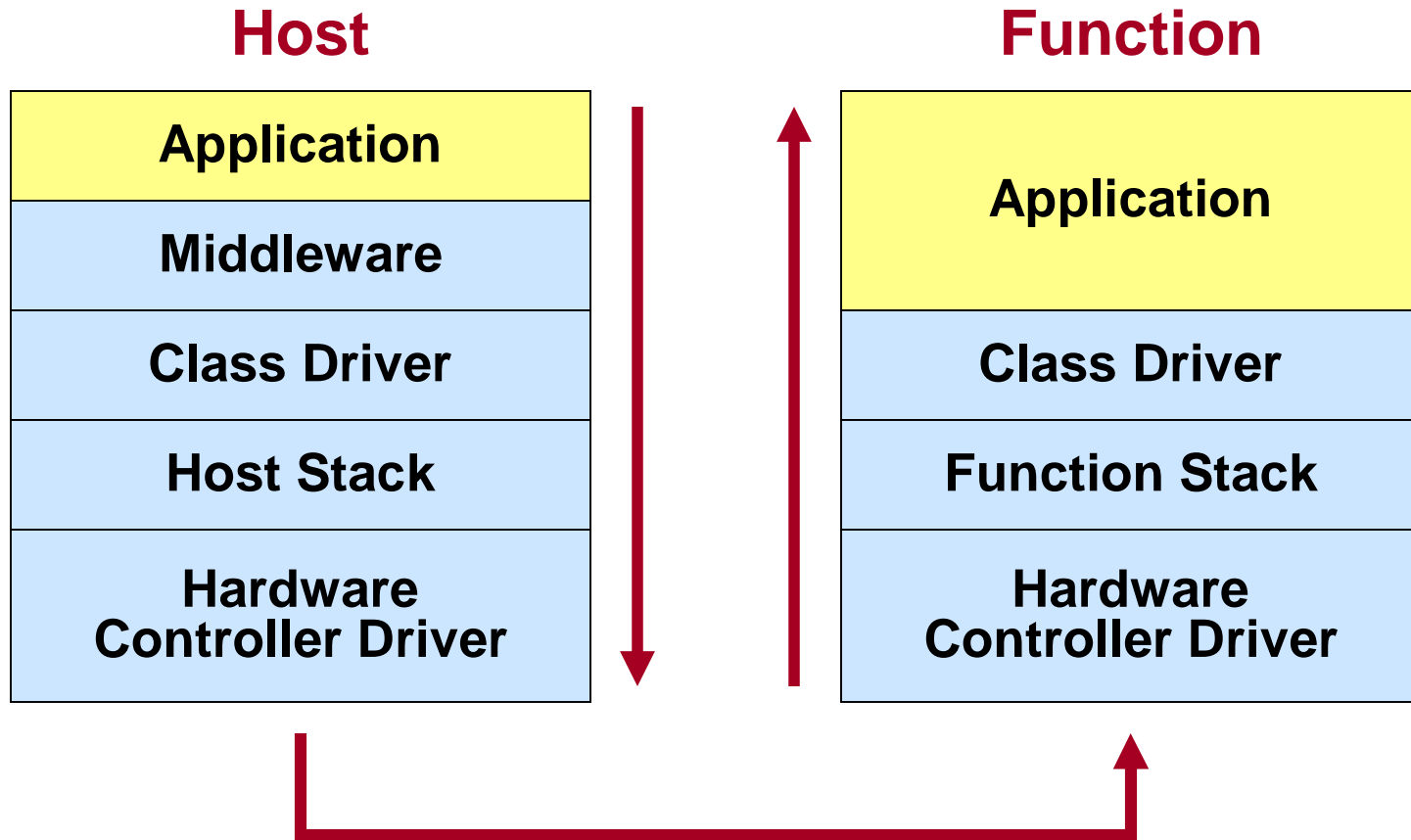
# A USB Peripheral



# USB Communications

- USB is a master/slave protocol
- 4 types of data transfer:
  - Control
  - Bulk
    - volume, non-time-critical data
  - Interrupt
    - polled, low-volume data
  - Isochronous
    - volume, time-critical data

# USB Software Layers



# USB and Embedded Systems

- Usually building a device
  - a USM “Function”
  - need software for that end of the bus
- Could build USB host
  - e.g. set-top box
- Embedded device could be both
  - need both stacks
  - or use USB On-The-Go

# Both Sides of the Bus

