Chapter 12 Objectives

Questions may be asked in class, on quizzes, and on exams

Students will be able to:

* + describe a bus on a computer and how any of the various buses work

Bus is is a set of wires and a rigidly defined protocol that specifies a set of messages that can be sent on the wires

A **PCIe bus** (the common PC system bus) connects the processor–memory subsystem to fast devices, and

an **expansion bus** connects relatively slow devices, such as the keyboard and

serial and USB ports.

* + describe the difference between polling and interrupting, and provide examples from either computer or non-computer situations
* in **interrupt**, the device notifies the CPU that it requires attention while, in **polling**, the CPU continuously checks the status **of** the devices to find whether they require attention. In brief, an **interrupt is** asynchronous whereas **polling is** synchronous.
  + describe how DMA works and what “cycle stealing” means
* 1. The peripheral can issue A DMA request to the CPU through the DMA controller;
* 2. CPU responds to DMA request, the system changes to DMA working mode, and gives the bus control to THE DMA controller;
* 3. DMA controller sends the memory address and determines the length of the transmitted data block;
* 4. Perform DMA transfer;
* 5. DMA operation is finished, and the bus control is returned to CPU.

When the DMA controller seizes the

memory bus, the CPU is momentarily prevented from accessing main mem

ory, although it can still access data items in its caches. Although this **cycle**

**stealing** can slow down the CPU computation, offloading the data-transfer

work to a DMA controller generally improves the total system performance

* Cycle stealing is a way to access computer memory (RAM) or the bus without interfering with the CPU.
* It is similar to direct memory access (DMA) and allows an I/O controller to read or write RAM without CPU intervention.
  + explain the value and/o use of a device driver
* If the hardware lacks the "driver" of the driver, then the hardware with very strong performance cannot work according to the instructions issued by the software, and the hardware has nothing to do with the ability
* Interface of I/O side, it communicate with
  + explain the value and/o use of a device controller
* It can Receive and recognize commands, Data interchange, Identify and report the status of the device, Address recognition, The data buffer, Error control
* A device controller is an entity in a computer whose primary responsibility is to control one or more I/O devices for data exchange between The I/O devices and the computer.
* It is the interface between the CPU and the I/O device. It receives commands from the CPU and controls the Work of the I/O device, freeing the processor from the cumbersome device control transactions.

A **controller** is a collection of electronics that can operate a port, a bus, or

a device.

* + explain the difference between a block device interface and a character device interface
* A **Character Device is** a **device** whose driver communicates by sending and receiving single **characters** (bytes, octets). Example - serial ports, parallel ports, sound cards, keyboard. A **Block Device is** a **device** whose driver communicates by sending entire **blocks of** data. Example - hard disks, USB cameras, Disk-On-Key
  + End of Chapter 12

 Exercises: 12.1, 12.3, 12.5, 12.6, 12.10, 12.12

 Programming Problem: none