PETER NORTON'S®

Introduction to Computers

- Web integrated activities
- Self-assessments to reinforce main concepts
- Online Resource: www.mhhe.com/peternorton

Technology Education

Chapter 5A

Transforming Data Into Information

McGraw-Hill Technology Education

How Computers Represent Data

- Number systems
  - A manner of counting
  - Several different number systems exist
- Decimal number system
  - Used by humans to count
  - Contains ten distinct digits
  - Digits combine to make larger numbers

How Computers Represent Data

- Binary number system
  - Used by computers to count
  - Two distinct digits, 0 and 1
  - 0 and 1 combine to make numbers

How Computers Represent Data

- Bits and bytes
  - Binary numbers are made of bits
  - Bit represents a switch
  - A byte is 8 bits
  - Byte represents one character

How Computers Represent Data

- Text codes
  - Converts letters into binary
  - Standard codes necessary for data transfer
  - ASCII
    - American English symbols
  - Extended ASCII
    - Graphics and other symbols
  - Unicode
    - All languages on the planet

How Computers Process Data

- The CPU
  - Central Processing Unit
  - Brain of the computer
  - Control unit
    - Controls resources in computer
    - Instruction set
  - Arithmetic logic unit
    - Simple math operations
    - Registers

How Computers Process Data

- Machine cycles
  - Steps by CPU to process data
  - Instruction cycle
    - CPU gets the instruction
  - Execution cycle
    - CPU performs the instruction
  - Billions of cycles per second
  - Pipelining processes more data
  - Multitasking allows multiple instructions

How Computers Process Data

- Memory
  - Stores open programs and data
  - Small chips on the motherboard
  - More memory makes a computer faster

How Computers Process Data

- Nonvolatile memory
  - Holds data when power is off
  - Read Only Memory (ROM)
  - Basic Input Output System (BIOS)
  - Power On Self Test (POST)

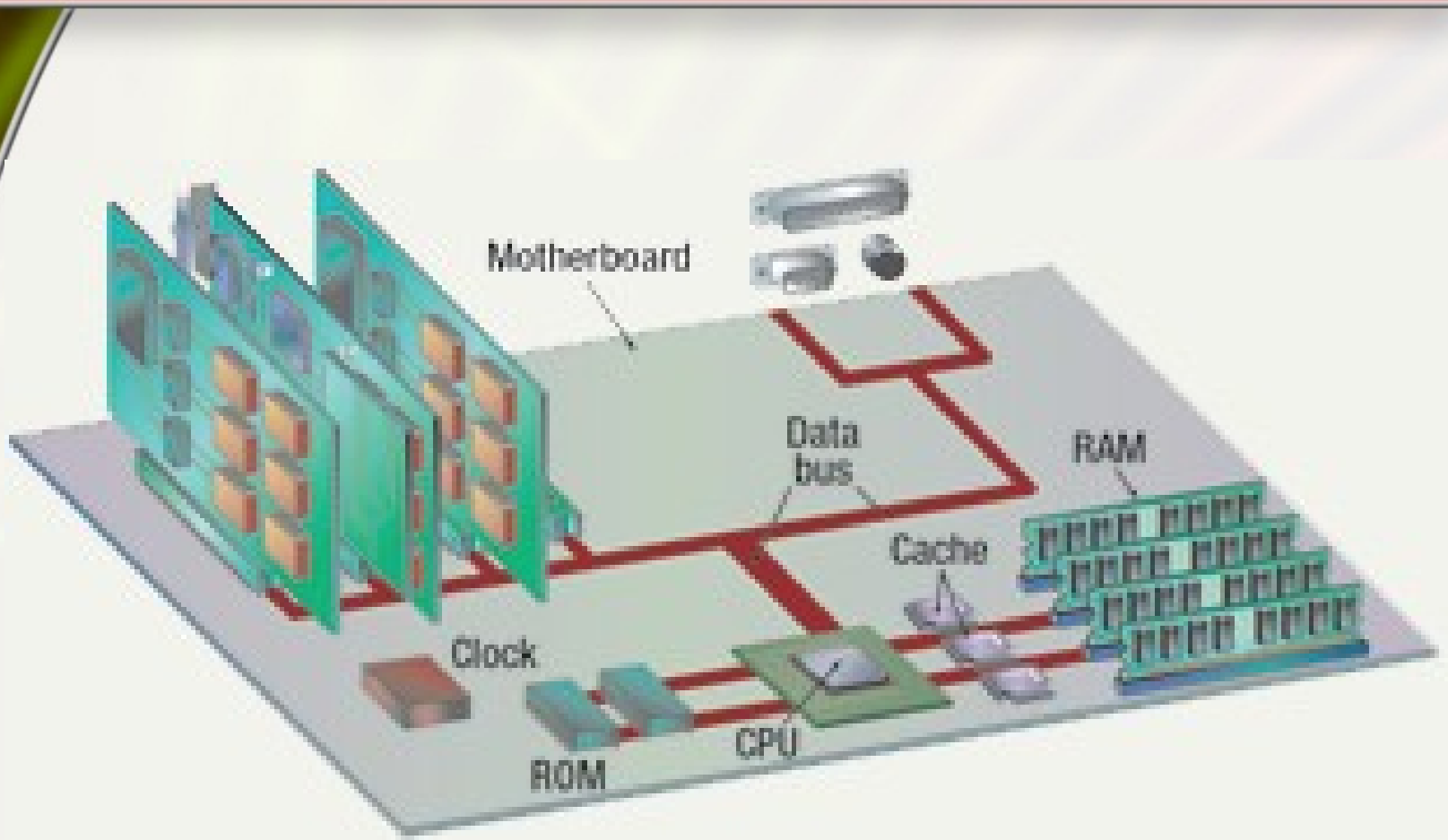
How Computers Process Data

- Flash memory
  - Data is stored using physical switches
  - Special form of nonvolatile memory
  - Camera cards, USB key chains

How Computers Process Data

- Volatile memory
  - Requires power to hold data
  - Random Access Memory (RAM)
  - Data in RAM has an address
  - CPU reads data using the address
  - CPU can read any address

Components affecting Speed



Affecting Processing Speed

- Registers
  - Number of bits processor can handle
  - Word size
  - Larger indicates more powerful computer
  - Increase by purchasing new CPU

Affecting Processing Speed

- Virtual RAM
  - Computer is out of actual RAM
  - File that emulates RAM
  - Computer swaps data to virtual RAM
    - Least recently used data is moved

Affecting Processing Speed

- The computer's internal clock
  - Quartz crystal
  - Every tick causes a cycle
  - Speeds measured in Hertz (Hz)
    - Modern machines use Giga Hertz (GHz)

Affecting Processing Speed

- The bus
  - Electronic pathway between components
  - Expansion bus connects to peripherals
  - System bus connects CPU and RAM
  - Bus width is measured in bits
  - Speed is tied to the clock

Affecting Processing Speed

- External bus standards
  - Industry Standard Architecture (ISA)
  - Local bus
  - Peripheral control interface
  - Accelerated graphics port
  - Universal serial bus
  - IEEE 1394 (FireWire)
  - PC Card

Affecting Processing Speed

- Peripheral control interface (PCI)
  - Connects modems and sound cards
  - Found in most modern computers

Affecting Processing Speed

- Accelerated Graphics Port (AGP)
  - Connects video card to motherboard
  - Extremely fast bus
  - Found in all modern computers

Affecting Processing Speed

- Universal Serial Bus (USB)
  - Connects external devices
  - Hot swappable
  - Allows up to 127 devices
  - Cameras, printers, and scanners

Affecting Processing Speed

- PC Card
  - Used on laptops
  - Hot swappable
  - Devices are the size of a credit card

Affecting Processing Speed

- Cache memory
  - Very fast memory
  - Holds common or recently used data
  - Speeds up computer processing
  - Most computers have several caches
  - L1 holds recently used data
  - L2 holds upcoming data
  - L3 holds possible upcoming data

Chapter 5A

End of Chapter