Defining Information Technology

Terms of Endearment

fluency4

WITH INFORMATION TECHNOLOGY   skills, concepts, & capabilities

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14th Century – Abacus	1951 – vacuum tubes
17th Century – Slide Rule	1950s – UNIVAC
1642 – Pascal's mechanical calculator	1960s – transistor technology
	1969 – ARPAnet (internet)
1804 – Jacquard programs loom with punch cards	~1970 – Integrated Circuits
	1976 – Apple
1850 – Babbage Difference Engine	~1980 – many "micro" PC vendors, no standards
1939 – Atanasoff-Berry Computer at Iowa State	1986 – networked computers
	1990 – hypertext (WWW)
1946 – ENIAC, first electronic, general purpose computer	1992 – Windows 3.1
	1995 – ISP begin services
	1996 -- PDAs

Defining Information Technology

– Learning the language of IT

- Acronyms
  - WYSIWYG

- Jargon
  - "Boot", "Reboot"

- Metaphors
  - Everyday terms like "window" have special meanings in IT

Why Know Just the Right Word?

- There are many new terms in IT
  - Terms are invented for ideas, concepts and devices that never existed before

- Terminology is essential to learning a new subject
  - Words represent ideas and concepts
    - Precision in word use represents precision in understanding ideas

- Communicating with others
  - To be able to ask questions and receive help
  - To explain a new technology

Two Basic Organizations

- *Component*
  - Desktop PC's with separate components
    - Monitor
    - Tower
    - Speakers
    - Etc.
  - Allows user to mix and match
  - Power switch on unit with disk drives, as well as other components

Two Basic Organizations (cont'd)

- *Monolithic*

  – iMac, iPad, tablet or laptop have all devices bundled together*

  – Simple and convenient

  – Power switch on chassis or keyboard

 *To reduce size and weight, some features, such as CD/DVD, may be omitted

The Monitor

- ## Interactive video screen
  - ### *Bit-mapped*
    - #### Display information stored in computer memory
  - ### Screen displays images from its memory
    - #### *"Virtual Reality"*

Figure 1.2 An enlargement of a monitor's display of the word *bitmap* and the corresponding bits for each pixel.

Cables

- Connect components to computer and to power source
  - Cables need to be plugged in correctly
  - Sockets and plugs labeled with icons and color coded
  - Most are obvious – but don't try to connect network to modem

- Connect everything first, THEN the power cord
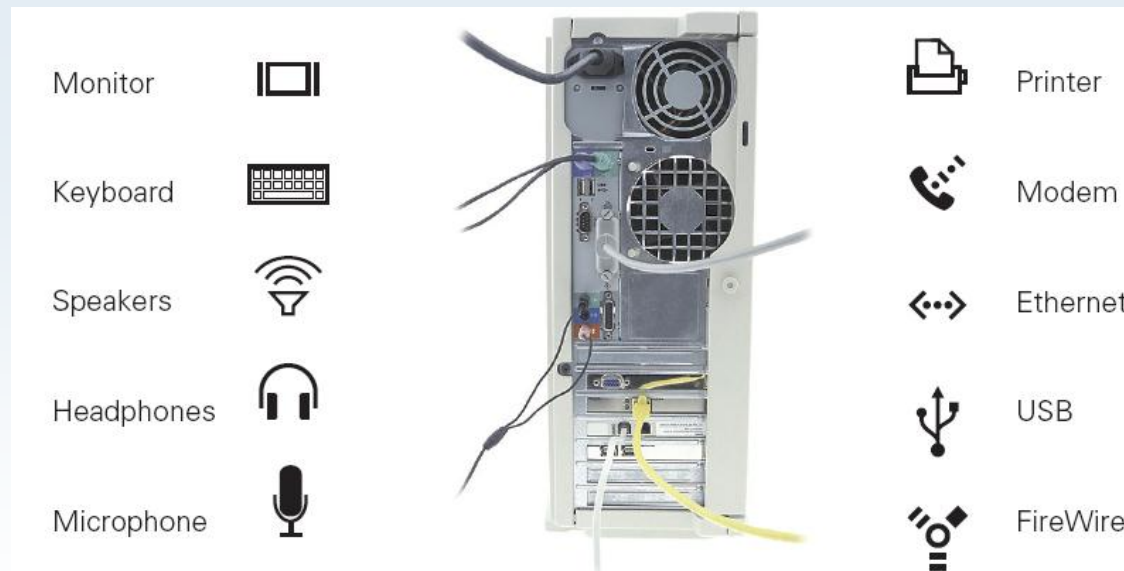
Figure 1.3 Icons commonly displayed on computer cables and sockets.

Colors

- ## RGB - Additive
  - ### Primary colors of light
    - red, green, blue
  - ### Colors on BLACK* screen created by combining different amounts of primary colors

- ## CMYK - Subtractive
  - ### Primary printer colors
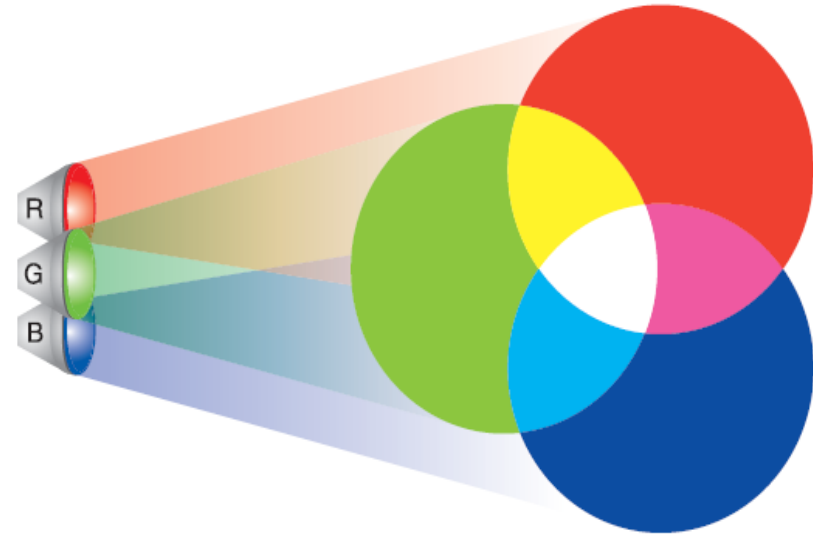   - cyan, magenta, yellow, key/black

Figure 1.4   Mixing of red, green, and blue light.

*Black is the ABSENCE of color, so we "add" colors. White (think paper) is the PRESENCE of <u>all</u> colors so we "subtract" color.

Pixels

- Grid of small units called *pixels* (for picture elements)

- Computer draws each pixel in the designated color for the image or figure

- The more pixels in each row and column, the smoother and crisper the image (*high resolution*)

- Paint.net example

A Virtual Button

- ## Button Motion
  - Reverse black and white colors
  - Move position down and to right

Figure 1.6
Pushing a button.
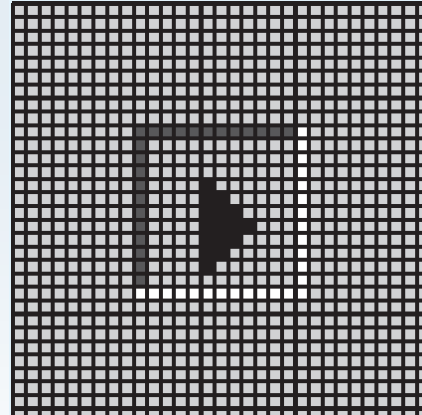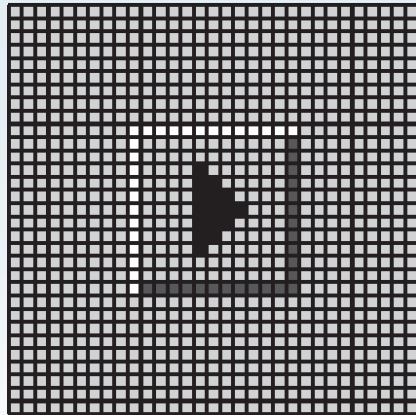
Pressing a Virtual Button

- Moving the mouse pointer
  - Mouse pointer is drawn on screen like any image
  - When mouse moves, computer re-draws in correct direction
  - Fast *refresh rate* (30 times per second) creates illusion of motion
  - Computer keeps track of which pixel is at the point of the arrow

Coordinating the Button and the Mouse

- When mouse is clicked, computer redraws button that mouse is hovering over

  - Computer keeps a list of every button drawn on screen

    - Positions of upper-left and lower-right corners

  - When button is re-drawn in clicked position, software reacts by performing appropriate action (event-driven)

Motherboard

- Printed circuit board inside processor box
  - Contains most of the circuitry of PC system

Motherboard (cont'd)

- Smaller circuit boards, called *daughter boards* or *cards,* plug into motherboard for added functionality

- Motherboard contains the *microprocessor chip* or *central processing unit* (CPU) and the *memory*
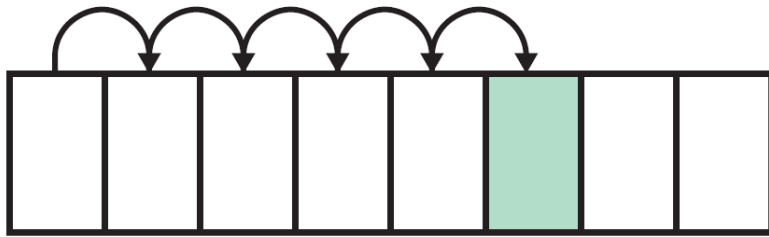
CPU (Microprocessor)

- "Smart" part of system
- Performs actual computing
- "Micro" was adopted around 1980 to distinguish single chip circuitry from larger mainframes of the day.
- Now, more appropriately known as the CPU (Central Processing Unit)
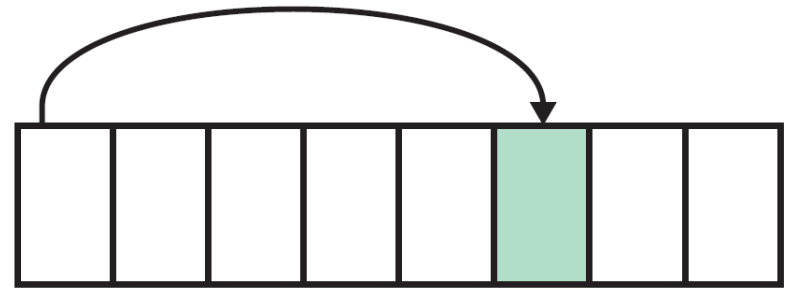- Multi-Cores

Memory (Primary/Main Memory)

- Where program and data are located while program runs

- RAM: Random Access Memory
    - volatile

- PC Contains millions/billions of bytes of RAM
    - Megabytes (MB) / Gigabytes (GB)

- What Random Access means

    – Memory location and contents are indexed
    – Any item can be retrieved directly, unlike sequential access (ex. tapes)

Figure 1.10 Sequential versus random access.

Hard Disk (Secondary Memory)

- High-Capacity, persistent peripheral storage device

    – Stores programs and data not in immediate use by computer

    – Made from magnetized iron compound

        • Information remains whether PC is on or off

        • Called *permanent* or *persistent* storage

            – non-volatile

Hard Disk (cont'd)

- Small stack of bright metal washers with arm that sweeps across

Figure 1.11 Top view of a 36 GB, 10,000 RPM, IBM SCSI server hard disk, with its top cover removed. Note the height of the drive and the 10 stacked platters. (The IBM Ultrastar 36ZX.)

Saving from RAM to Hard Disk

- *Saving* moves information from RAM to hard disk
  - Prudent user saves frequently

- RAM is *volatile*
  - Information is lost when power turns off
  - If computer fails or power-cycles, only data on disk will survive

How Soft is Software?

- *Hardware* is old term for metal items used in construction
  - Refers to physical parts of computer
  - Functions implemented directly with wires and transistors

- *Software* is a term created for computers
  - Means *programs* or instructions the computer follows to implement functions

Algorithms and Programs

- ## Algorithm

  - Precise and systematic method for solving a problem (steps to accomplish a task)

  - Examples:
    - Arithmetic operations
    - Sending a greeting card
    - Searching for a phone number
    - Determining when a mouse pointer hovers over a button

  - Algorithms need to be precise

Algorithms and Programs (cont'd)

- Translating the steps of an algorithm into a computer language is called *programming*

- Running a Program
  - Click on program icon (ex. Firefox browser)
  - We instruct computer to *run* or *execute* or *interpret* the program from Mozilla company that browses Internet.

Boot

- *Booting:* Start computer

- *Rebooting:* Re-start computer

- Boot instructions are stored in a microchip called the **boot ROM (Read Only Memory)**

- Term comes from "bootstrapping"

The Words for Ideas

- *Abstract:* Remove the basic concept, idea, or process from a situation

- Abstraction: is a more succinct and generalized form of the removed concept.
  - e.g., parables and fables (moral is abstracted from story)
  - Decide which details are relevant
  - <u>Understand and convey the same point to apply to many situations</u>

"Generalize"

- Recognize common idea in two or more situations

- Summarize expression of idea, concept, or process that applies to many situations
  - e.g., faucet handles usually turn left for on and right for off
  - Caps usually twist left to loosen, right to tighten

- Remember that generalizations will not apply in every single situation

"Operationally Attuned"

- Being aware of how a gadget works

- Apply what we know about how device or system works to simplify use
  - e.g., cap lids usually twist to the left to loosen, so we are confident about which way to twist if unsure

- Thinking about how IT works makes it simpler to use technology

"Mnemonic"

- Memory aid
  - How to pronounce words and phrases
  - e.g., 5 Great Lakes are HOMES (Huron, Ontario, Michigan, Eerie, Superior)
  - PILPOF - Plug in last, pull out first
  - Spring ahead; Fall back

- Helps simplify use of technology
  - Easy memorization of infrequently used details

Defining WYSIWYG

- First acronym in this chapter

  - "What you see is what you get"

  - Text is stored in memory as long line of letters, numbers, punctuation, etc.

  - Original text editing software could not display formatting; users had to guess what it would look like when printed

  - WYSIWYG applications, like word processors, display data as formatted page

Summary

- Focus on IT terms in context. We learned to:

  - Know and use the right word because as we learn words, we learn ideas; knowing the right words helps us communicate

  - Ask questions to review basic and familiar terms, such as monitor, screen saver, RAM, and software

  - Understand a few new terms, such as sequential access, volatile, and motherboard

  - Consider a brief list of "idea" words, such as abstract and generalize

- Save your work regularly