

Part 2: Using Information Technology

Chapter 4

Hardware and Software

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Running Case

- Marlo Jenkins found an excellent apartment and roommate by using her connections on Facebook
- She talked with her parents using Skype
- Marlo was asked to investigate an upgrade of the computer technology for her workplace – The 1881
- Marlo felt strongly that the strategy should begin with an inventory of existing hardware and software
- She recommended that the software be upgraded to newest version, that is, from version 2.0 to 12.0
- Her new recommendations of software requires new technology
- Marlo was thinking of how to sell her ideas the owners of The 1881

Study Questions

1. Why do you need to know about information technology?
2. Where did all of this information technology stuff come from?
3. What does a manager need to know about computer hardware?
4. What is the difference between a client and a server, and what is cloud computing?
5. What does a manager need to know about software?
6. What buying decisions do you need to make?
7. What are viruses, worms, and zombies?

Why do you need to know about information technology?

- At your next family gathering, ask your older relatives about the technologies that existed back then
- Depending on their ages, socioeconomic status, and where they grew up, their answers will vary
- Technologies such as mobile phones, tablets, MP3 players, and Internet-enabled services that include Youtube, Facebook, Foursquare and Google are now current
- Your grandparents grew up being familiar with cars, the telephone, the television, and air travel

Where did all of this information technology stuff come from?

Early Computers: 1939–1952

- ENIAC
- large, complex and expensive
- single user
- one program run at a time
- housed at universities

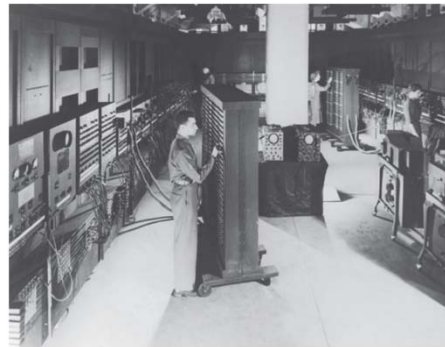


Figure 4-1

The ENIAC Computer

Source: Courtesy of the Collections of the University of Pennsylvania Archives.

Mainframes

- Mainframes: 1952–Present
 - First digital computers - large, room-sized devices
 - Mainly used by business and government
 - 1st generation
 - vacuum tube technology
 - 2nd generation
 - transistors
 - 3rd generation
 - operating system
 - multiprocessing

Figure 4-2

The IBM 360

Source: Reprint Courtesy of
International Business Machines
Corporation.



Microcomputers

- Microcomputers: 1975–Present
 - integrated circuits
 - small microprocessors
 - monitors
 - keyboards
 - portable floppy disks
 - software

Figure 4-3

The Altair 8800

Source: Courtesy of Getty Images.



Networking Personal Computers

- Networking Personal Computers: 1985–Present
 - Local Area Networks (LANs)
 - linking many personal computers together
 - shared access to data, printers, and other peripheral devices
 - Wide Area Networks (WANs)
 - the Internet
 - email
 - web browsing

Information Technology Principles

- Price and performance advances
- Small is powerful
- The Network is the thing

What does a manager need to know about computer hardware?

- **Hardware** consists of electronic components and related gadgetry that input, process, output, and store data according to instructions encoded in computer programs or software
- Basic hardware categories:
 - Input
 - Processing
 - Output
 - Storage

Input, Process, Output, and Storage Hardware

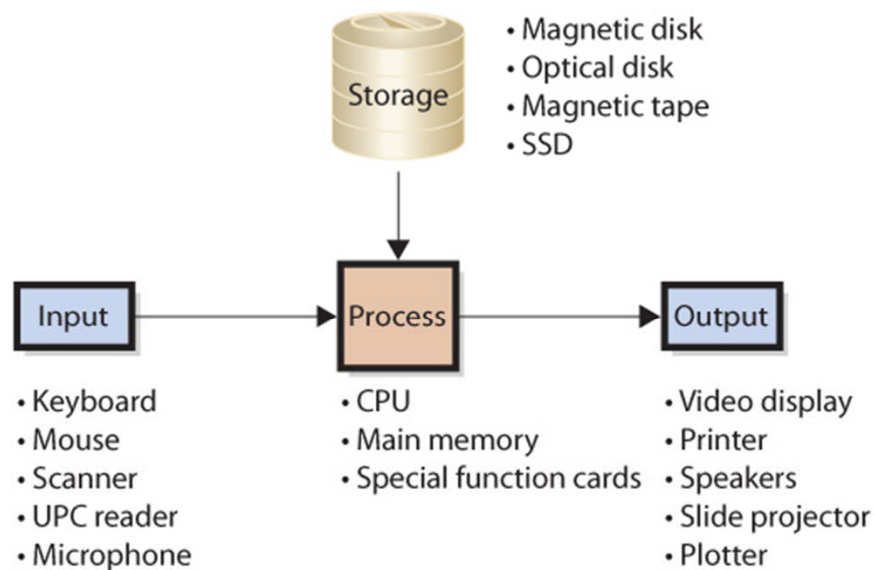


Figure 4-4

Input, Process, Output,
and Storage Hardware

Computer Data

■ Binary Digits (bits)

- Used to represent data
 - Represented as either zero or one

■ Sizing Computer Data

- Computer data are represented in bits
- Bits grouped in 8-bit chunks
- Specifications for size of memory
 - K kilobyte 1024 bytes
 - MB megabyte 1024 K
 - GB gigabyte 1024 MB
 - TB terabyte 1024 GB

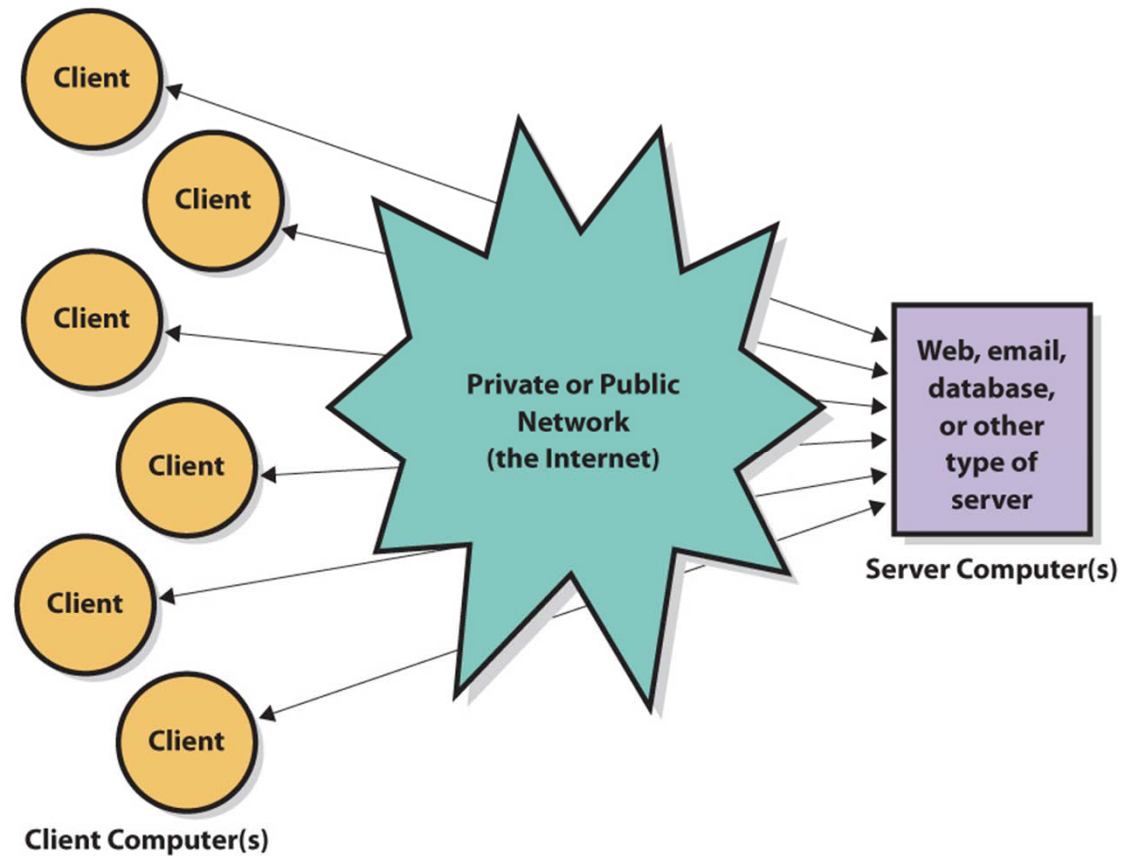
How Does a Computer Work?

■ CPU (Central Processing Unit)

- Transfers program or data from disk to *main memory*
- Moves instruction from main memory via *data channel* or *bus*
- Has small amount of very fast memory called *cache*
 - Keeps frequently used instructions
 - Large cache makes computer fast, but is expensive

Computer Components

Figure 4-9
Client and Server
Computers



Memory

■ Main Memory

- Contains program instructions
- Contains *operating system (OS)* instructions

■ Memory Swapping

- Main memory is too small to hold all data
- CPU loads programs into memory in chunks
 - Places new program into unused memory
 - If none available, the operating system will remove chunk being used and replace with requested data

Why Should a Manager Care How a Computer Works?

- Main memory
 - Too little means constant memory swapping
 - Slows processing
 - Needs more memory if processing many programs
- CPU
 - Expressed in hertz
 - Needs more CPU if handling complex tasks
- Cache and main memory are volatile
 - Contents lost when power is off
- Magnetic and optical disks are nonvolatile
 - Saved contents survive after power is turned off

What's the difference between a client and a server, and what is cloud computing?

- Client computers used for word processing, spreadsheets, database access
 - Connect to servers for Web, e-mail, database
- Servers provide service
 - Faster, larger, more powerful than client computers
 - May or may not have video display
- Cloud computing
 - Similar to the concept of servers that supply applications and data

Client and Server Computers

Category	Operating System (OS)	Instruction Set	Common Applications	Typical User
Client	Windows	Intel	Microsoft Office: Word, Excel, Access, PowerPoint, many other applications	Business Home
	Mac OS (pre-2006)	Power PC	Macintosh applications plus Word and Excel	Graphic artists Arts community
	Mac OS (post-2006)	Intel	Macintosh applications plus Word and Excel Can also run Windows on Macintosh hardware	Education Business Home Affluent users
	Unix	Sun and others	Engineering, computer-assisted design, architecture	Difficult for the typical client, but popular with some engineers and computer scientists
	Linux	Just about anything	Open Office (Microsoft Office look-alike)	Rare—used where budget is very limited
Server	Windows	Intel	Windows server applications	Business with commitment to Microsoft
	Unix	Sun and others	Unix server applications	Fading ... Linux taking its market
	Linux	Just about anything	Linux and Unix server applications	Very popular—promulgated by IBM

Figure 4-10

What a Manager Needs to Know About Software

Cloud Computing

- Customers do not own the computers
- Hardware, software, and applications are provided as a service, through a web browser
- The cloud is a metaphor for the Internet, which makes software and data services available from any location at any time
- It builds upon the concept of **grid computing**
- *Grid Computing* - several computers are used to address a single problem at the same time

What does a manager need to know about software?

- Computer Software are of two types:
 - Operating System (OS)
 - program that controls computer's resources
 - Application Programs
 - perform specific user tasks
- Constraints
 - a particular version of an operating system is written for a particular type of hardware
 - application programs are written to use a particular operating system

What a Manager Needs to Know about Software



Figure 4-11

Locarna Eye-Tracking System

Source: Courtesy of Locarna Systems.

Four Major Operating Systems

■ Windows

- Used by 85% of the world's desktops
- 95% of business users
- Microsoft developed
- Many different versions
- Current version is Windows Vista

■ Mac OS

- Apple Computer, Inc. developed for Macintosh computers
- Easy-to-use interfaces
- Used primarily by graphic artists and art community
- Current version is Mac OS X

Four Major Operating Systems, continued

■ Unix

- Developed by Bell Labs
- Workhorse of scientific and engineering community
- Sun Microsystems is a major vendor of computers employing this operating system

■ Linux

- A version of Unix
- Developed by open-source community
- This community is a loosely coupled group of programmers
- Volunteers - contribute code to develop and maintain Linux
- IBM is a primary proponent

Owning Versus Licensing

- Users buy license to use program
- Ownership remains with development company
- Linux owned by open-source community
 - No license fee
 - Companies make money by offering support

Types of Application software and How Organizations Obtain Them

- **Application Software** consists of programs that perform a business function
 - Some are general purpose – e.g., Excel or Word
 - Some are specific – e.g., QuickBooks
 - QuickBooks is an application program that provides general ledger and other accounting functions

Categories of Application Programs

- Horizontal-market application software
 - Provides capabilities common across all organizations and industries
 - Examples: Word, Excel, PowerPoint, Acrobat, Photoshop, Paint Shop Pro
- Vertical-market application software
 - Serves the need of a specific industry
 - Usually altered or customized
 - Examples: appointment scheduling software, tracking system for mechanics

Categories of Application Programs, continued

- One-of-a-kind application software
 - Designed for a specific, unique need
 - Example: IRS software
- Other (dual-category) application software
 - Example: CRM software
- Acquiring Application software
 - Buy off-the-shelf
 - may be a great fit
 - may be a disaster
 - Buy off-the-shelf with alterations
 - Tailor-made - custom-developed software

Categories of Application Programs, continued

- Custom developed software
 - Tailor-made for organization
 - Difficult and risky
 - Staffing and managing teams is challenging
 - May be developed in-house or by outside developer

What Is Firmware?

- Computer software installed into devices
 - Printers, print servers, communication devices
 - Coded like other software
 - Installed into read-only memory
 - becomes part of device's memory
 - Can be changed and upgraded
- Basic Input/Output System (BIOS)
 - Used when a computer is initially booted up
 - Required because all volatile memory is lost when the computer is shut down

Difference between a Thin and Thick Client

- The terms **thin** and **thick** refer to the amount of code that must run on the client computer
- An application that requires nothing more than a browser on the client is called a **thin client**
- An application such as Microsoft Outlook that requires programs other than a browser on the user's computer is called a **thick client**

Thin and Thick Clients

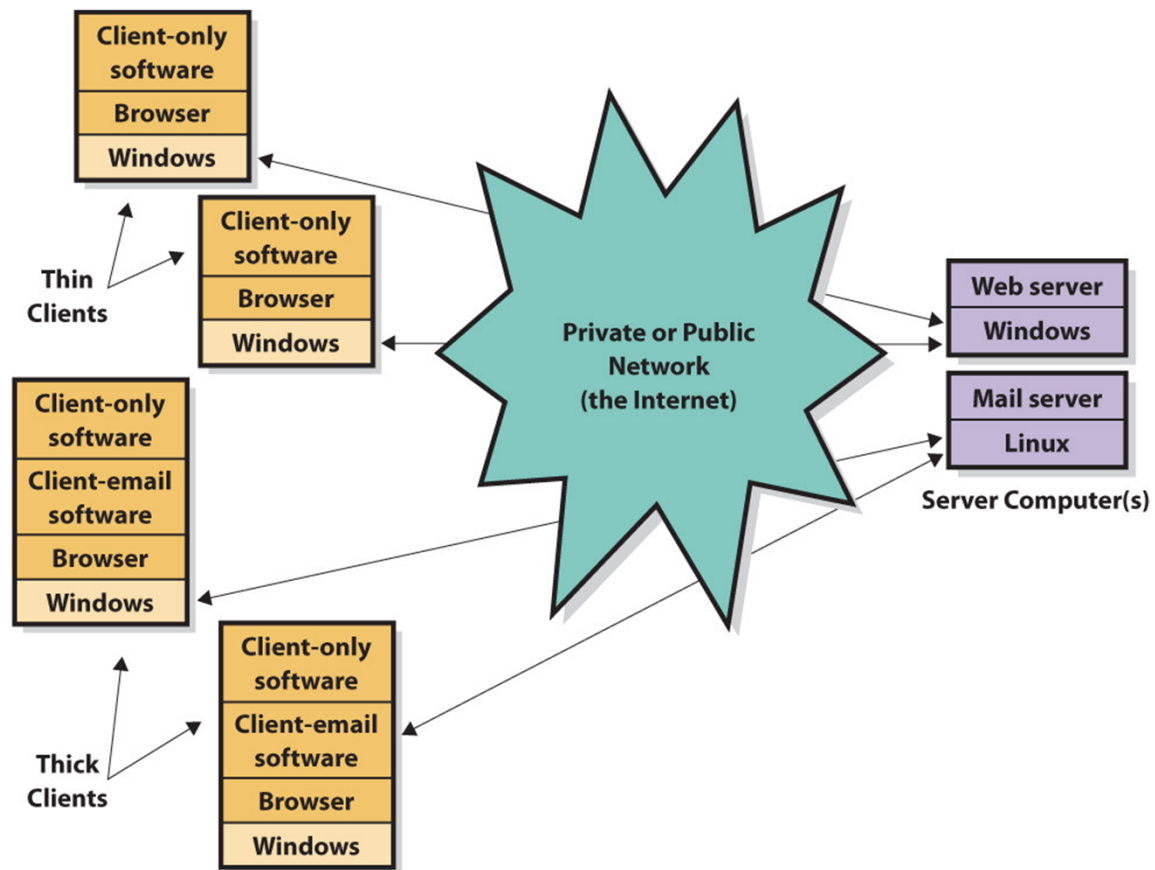


Figure 4-13

Thin and Thick Clients

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MIS in Use

What Are You Looking At? Eye Tracking Hardware and Software

- Eye tracking - concept—identifying what actually captures an individual's attention by tracking the movement of his or her eyes
- Locarna developed a “real world solution”
- Locarna's system consists of two complementary parts: unobtrusive, lightweight camera glasses that can be calibrated in less than a minute and sophisticated yet easy-to-use analytic programs
- Locarna's main markets include security agencies, advertising firms, cognitive scientists

MIS in Use Questions

1. Where are the main markets for Locarna's systems?
2. What problem does Locarna solve?
3. How important are systems such as Locarna's?
4. How have recent technological changes affected or enabled Locarna's business?
5. Are there groups or environments that might resist the type of analysis that Locarna provides? (*Hint: Who might be threatened by Locarna?*)
6. What do you think the future holds for Locarna?

What Buying Decisions Do You Need to Make?

- Manager's role depends on organization's policies
 - Large organizations usually have IS department that sets specifications
 - Medium to small organizations less formal
 - managers take more active role
 - usually standardized to single client operating systems
- Managers and employees may have role in specifying application software
- Usually has no role in server specifications

A Business Manager's Role in Hardware and Software Specifications

Category	Hardware	Software
Client	Specify: <ul style="list-style-type: none">• CPU speed• Size of main memory• Size of magnetic disk• CD or DVD and type• Monitor type and size	Specify: <ul style="list-style-type: none">• Windows, Mac, or Linux OS; may be dictated by organizational standard• PC applications such as Microsoft Office Adobe Acrobat, Photoshop, Paint Shop Pro; may be dictated by organizational standard• Browser such as Internet Explorer, FireFox, or Netscape Navigator• Requirements for the client side of client-server applications• Need for thin or thick client
Server	In most cases, a business manager has no role in the specification of server hardware (except possibly a budgetary one)	<ul style="list-style-type: none">• Specify requirements for the server side of client-server applications• Work with technical personnel to test and accept software

Figure 4-14

A Business Manager's Role in Hardware and Software Specifications

What are Viruses, Worms and Zombies?

■ Virus

- Computer program that replicates itself
- Consumes computer resources
 - *payload* is a program code that causes unwanted activity

■ Macro viruses

- Attached themselves to various types of documents
- When document opened, virus placed in startup files of the application
- After, virus infects every file the application creates or processes

Viruses, Worms, and Zombies, continued

■ Worm

- Virus that propagates using Internet or network
- Spread faster than other viruses
- Specifically programmed to spread
- Actively use the network to spread

■ Zombies

- Subsequent computers infected with worm or virus
- *Botnet*
 - A compromised machine
 - A set of computers and applications that are coordinated through a network and used to perform malicious tasks

Measures to Prevent Virus

- Most viruses take advantage of security holes in computer programs
- Vendors use patches to fix the problems
 - check vendors regularly for patches update
- Viruses and worms are expensive
- Every computer should have and use a copy of an **antivirus program**
- You and your organization cannot afford not to take these precautions

What do YOU think?

Keeping Up to Speed

- Technology change is a fact, and the question is, “What am I going to do about it?”
- Bury your head in the sand or become technophile, or find a middle ground:
 - don't allow yourself to ignore technology
 - pay attention to professional events that combine your specialty with technology
 - get involved as a user representative in technology committees in your organization

What do YOU think?

1. Do you agree that the change of technology is relentless? What do you think that means to most business professionals? To most organizations?
2. Think about the three postures toward technology presented here. Which camp will you join? Why?
3. Write a two-paragraph memo to yourself justifying your choice in question 2. If you chose to ignore technology, explain how you will compensate for the loss of competitive advantage. If you're going to join one of the other two groups, explain why, and describe how you're going to accomplish your goal.
4. Given your answer to question 2, assume that you're in a job interview and the interviewer asks about your knowledge of technology. Write a three-sentence response to the interviewer's question.