SOLUTIONS MANUAL

NEW PERSPECTIVES

COMPREHENSIVE

COMPUTER CONCEPTS

2010

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PARSONS • OJA

New Perspectives on Computer Concepts 2010

Chapter 02 Solutions: Computer Hardware

In this document, you will find the Solutions to the Chapter QuickChecks, Lab Assignments, Interactive Summary, Interactive Situation Questions, Projects, Learning Objectives Checkpoints, and Concept Map.

QuickChecks

QuickCheck A (page 66)
1. peripheral
2. desktop, desk top
3. tablet
4. media, entertainment
5. compatible

QuickCheck B (page 75)
1. clock
2. processor
3. bus
4. core
5. volatile, temporary
6. virtual
7. EEPROMs, EEPROM, ROM

QuickCheck C (page 87)
1. Access, seek
2a. random, direct
2b. sequential
3. density, storage density
4. head, head mechanism
5. crashes, crash
6. lands
7. True, T
8. state

QuickCheck D (page 97)
1. pointing, input
2. refresh, vertical scan
3. resolution, dot pitch
4. duplex
5. slots, cards
6. USB, Universal Serial Bus, expansion

QuickCheck E (page 105)
1. Slot
2. surge, spike
3. battery, power
4. death
5. Safe

Lab Assignments

Lab 2-A: Benchmarking
1. Start the interactive part of the lab. Insert your Tracking Disk if you want to save your QuickCheck results. Perform each of the lab steps as directed, and answer all of the lab QuickCheck questions. When you exit the lab, your answers are automatically graded and your results are displayed.

   Student answers are stored in their Tracking files.

2. Use the System Information utility to analyze the computer that you typically use. Provide the results of the analysis along with a brief description of the computer that you tested and its location (at home, at work, in a computer lab, and so on).

Note: the System Information utility is available in Microsoft Vista by typing System Information in the Start button's Search box.
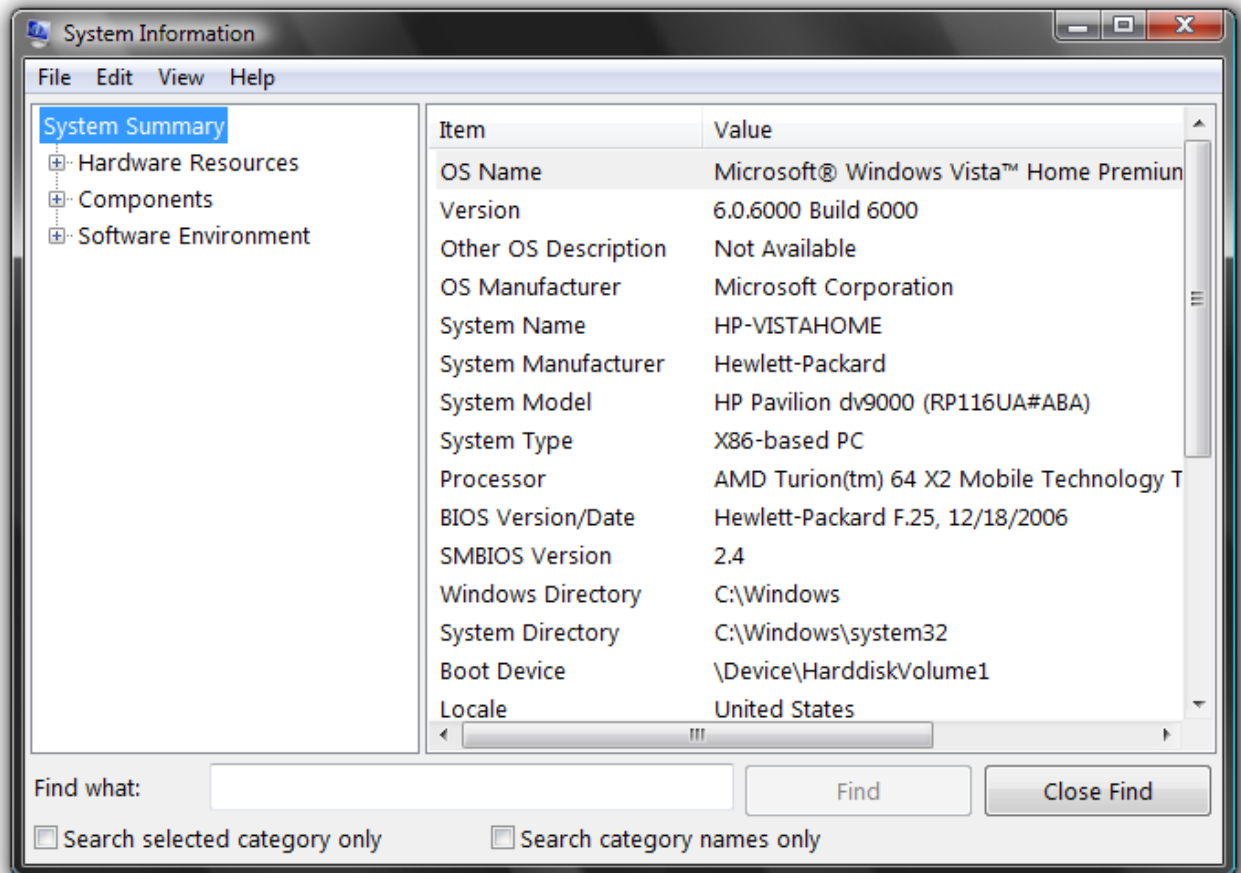
In Windows XP, system information can be accessed using Microsoft Word is or by clicking Start, Control Panel, System and selecting the General tab.

On the Mac, system information is accessible by clicking the Apple icon on the menu bar, and then selecting About this Mac.

3. From the Processor Benchmarks table shown, which processor appears to be faster at graphics processing? Which processor appears to be better at overall processing tasks?

The Supernova EE processor appears to have faster overall performance as shown by a high rating in the PCMark benchmark.
The Pulsar FX processor has better graphics performance as shown by higher rating for Quake III Arena.

4. Explain why you might perform a benchmark test on your own computer, but get different results from those that you read about in a computer magazine, which tested the same computer with the same benchmark test.

Answers will vary. When students complete the lab and understand how benchmark tests work, they should be able to make educated guesses about why benchmark tests might produce different results when performed on two different computers. Computers that appear to be the same brand and model often contain different components, due to manufacturing and inventory levels. The amount of memory, hard disk size, and available hard disk space might affect benchmark test results. Some benchmark tests might be affected by a computer's configuration or operating system version. The results of a benchmark can also be affected by software settings. For example, higher resolution settings for Quake will produce slower performance on benchmarks.

5. Use a search engine on the Web to find benchmark ratings for Intel's Core Duo processors and one of AMD's Athlon 64 Dual-Core processors. Are the benchmarks different? What would account for the benchmark results?

Students may find either tables or histograms showing benchmarks for these processors. Tom's Hardware is a good source of information: http://www.tomshardware.com/cpu/index.html. The higher the number, the better the rating. Ratings can vary slightly from those given below depending on the exact configuration of test equipment. Sample benchmarks might look like this:

Benchmark	Intel Core 2 Duo E6700	Athlon 64 X2 5000	
PCMark05	6844	5352	
Quake IV	181	153	

To account for the different benchmark results, students might mention the speed of the system clock, the amount a cache or the speed of the front side bus (FSB).

Interactive Summary

Interactive Summary A

The core of a personal computer system is the computer system **unit**, display device, keyboard, and mouse. Personal computers come in a variety of **form** factors. A **desktop** computer fits on a desk, runs on power from an electrical wall outlet, and can be housed in a horizontal case or vertical **tower** case. A **portable** computer (also referred to as a mobile computer) is a small, lightweight personal computer with screen, keyboard, storage, and processing components integrated into a single unit that runs on power supplied by an electrical outlet or a battery. Four categories of these computers include notebook computers, minilaptops, **tablet** computers, and ultra-mobile PCs. Personal computers are sometimes designated as home, media, small business, or game systems to help consumers select the computer that's right for their needs. Although the Mac platform was not previously **compatible** with the PC platform, the situation is changing now that Intel Macs use the same **processor** as PCs. Consumers can sometimes save money by installing upgrades after purchase; however, replacing a **processor** is difficult and not recommended. Some computer owners make unauthorized modifications to their computer systems called **mods**. For information on the latest computers, mods, and prices, consumers can check computer magazines and Web sites.

1. unit
2. form
3. desktop, desk top
4. tower
5. portable
6. tablet
7. compatible
8. processor, microprocessor
9. microprocessor, processor
10. mods

Interactive Summary B

The microprocessor and memory are two of the most important components in a computer. The microprocessor is an **integrated** circuit, which is designed to process data based on a set of instructions. In most of today's personal computers, microprocessor performance is measured by the speed of the microprocessor **clock**. A specification such as 3.2 GHz means that the microprocessor's clock operates at a speed of 3.2 **billion** cycles per second. Other factors affecting overall processing speed include word size, cache size, instruction set complexity, parallel processing, and pipelining. Most personal computers only contain one main microprocessor, but many of today's dual **core** processors contain the circuitry for two microprocessors. Computers contain various kinds of memory. Random **access** memory is a special holding area for data, program instructions, and the **operating** system. It stores data on a temporary basis until the processor makes a data request. The speed of RAM circuitry is measured in **nanoseconds** or in megahertz (MHz). RAM is different from disk storage because it is **volatile**, which means that it can hold data only when the computer power is turned on. Computers also contain Read **only** memory, which is a type of memory that provides a set of "hard-wired" instructions that a computer uses to boot up. A third type of

memory, called by its acronym **EEPROM**, is a non-volatile chip that contains configuration settings, such as hard disk size and RAM capacity.

1. integrated
2. clock
3. billion
4. core
5. access
6. operating
7. nanoseconds, ns
8. volatile, temporary
9. only
10. EEPROM

Interactive Summary C

Today's personal computers use a variety of storage technologies. **Magnetic** storage technologies, such as hard disks, floppy disks, and tapes, store data as magnetized particles. A hard disk provides multiple **platters** for data storage that are sealed inside the drive case or cartridge to prevent airborne contaminants from interfering with the read-write heads. Hard disks are less durable than floppy disks, so it is important to make a copy of the data they contain. **Optical** storage technologies store data as a series of **pits** and lands on the surface of a CD or DVD. Storage technologies, such as CD-**ROM**, provide good data storage capacity, but do not allow you to alter the disk's contents. **Recordable** technology allows you to write data on a CD or DVD, but you cannot delete or change that data. **Rewritable** technology allows you to write and rewrite data on a CD or DVD. **Solid** state storage technologies, such as USB flash drives, store data by activating electrons in a microscopic grid of circuitry.

1. Magnetic
2. platters, hard disk platters
3. Optical
4. pits
5. ROM
6. Recordable
7. Rewritable, Re-writable
8. Solid

Interactive Summary D

Most computer systems include a keyboard and some type of **pointing** device for basic data **input**. For output, most computers include a display device. A **CRT** produces an image by spraying electrons toward the screen. **LCD** technology produces an image by manipulating light within a layer of liquid crystal cells. **Plasma** screen technology creates an on-screen image by illuminating miniature fluorescent lights arrayed in a panel-like screen. Image quality for a display device is a factor of screen size, dot **pitch**, viewing angle width, resolution, refresh **rate**, and color **depth**. A typical computer display system consists of the display device and a **graphics** card. For printed output, most PC owners turn to **ink** jet printers, although **laser** printers are a popular option when low operating costs and high duty cycle are important. A **dot** matrix printer is sometimes used for back-office applications and printing multipart forms. Installing a peripheral device is not difficult when you remember that it uses the **expansion** bus to make a connection between the computer and peripheral device. Many of today's peripherals connect to a **USB** port. If the right type of port is not available, you might have to add an **expansion** card.

1. pointing, input
2. input, entry
3. CRT, cathode ray tube
4. LCD, Liquid crystal display
5. Plasma
6. pitch
7. rate
8. depth
9. graphics, video
10. ink, ink-
11. laser
12. dot, dot-
13. expansion, I/O
14. USB, Universal Serial Bus
15. expansion

Interactive Summary E

For trouble-free computer use, it is important to secure and regularly **maintain** your computer equipment. Anti-theft devices include computer locks and tiedown brackets. Computers can be protected from power surges and **spikes** by connecting to a surge strip. An **uninterruptible** power supply can also protect against surges, plus it can

supply backup power in case of a power outage. Keeping your computer's **fan** vents free of dust can help to keep its operating temperature within operational levels. You can also clean off the screen and shake dirt out of the keyboard. Problems such as the black screen of **death** require troubleshooting. Windows offers interactive troubleshooting tools formatted as a series of simple questions, answers, and recommendations. Booting into **Safe** Mode can also be a helpful step in the troubleshooting process.

1. maintain
2. spikes, power spikes
3. uninterruptible
4. fan, cooling fan, cooling
5. death
6. Safe

Interactive Situation Questions

1. AMD, Advanced Micro Devices
2a. 160
2b. 4, four
3. Ultra ATA, Ultra-ATA, UltraATA
4. no, n
5. EEPROM
6. flash, U3
7. True, T
8a. CRT, Cathode Ray Tube, CRT screen, plasma, plasma screen
8b. LCD, Liquid Crystal Display, LCD screen
9. laser

Learning Objectives Checkpoints

Study Tip: Make sure you can use your own words to correctly answer each of the red focus questions that appear throughout the chapter.

> The first Study Tip is designed for the student's own review and is quite lengthy. It is not recommended that instructors assign or grade it.

1. Draw a set of quick sketches that show each of the following form factors: desktop tower, desktop horizontal, small form factor desktop, notebook, slate tablet, convertible tablet, UMPC.

> Sketches should look similar to computers featured on pages 58 and 59.

2. Create a short consumer brochure that lists five characteristics that would help consumers choose among a home, media, game, or small business computer system.

> The contents of brochures will vary depending on student layout skills. Characteristics to help consumers choose could be any of the following:

	Home System	Media System	Game System	Business System
Basic productivity	Yes	Yes	Yes	Yes
Low budget	Yes	No	No	Yes
Serious gaming	No	Yes	Yes	No
Home theater connectivity	Yes	Yes	Yes	No
Video	Yes	Yes	Yes	No
Music	Yes	Yes	Yes	Yes

4. List important factors to consider when shopping for a new computer. Describe the three price points for personal computers and indicate which price point best fits your computing needs.

> Factors: How will the computer be used?
> Do planned uses require high performance hardware such as fast processor, large capacity disk drives, or lots of RAM?
> Does computer need to be compatible with other computers or devices?
> Are the necessary software applications available?
> Is the computer upgradeable?

Where can you get support and service?

Price points:
>$2,000 (luxury model) state-of-the-art processor, lots of RAM and disk space, top-of-the-line graphics card
$800 - $2000 (four-door sedans) fast processor, adequate RAM and disk space, mid-level graphics card
<$800 (compact or budget car) adequate processor, RAM, and disk space for basic productivity and Web browsing

5. Explain how Intel Macs are changing the old idea that PCs and Macs are not compatible.

Windows can be installed on Intel Macs so they can run Windows software. Students might also mention Parallels and Bootcamp, which enable Windows to run on Macs (but this topic is covered in a later chapter).

6. Make sure you can list at least six computer upgrades and rank each as easy, moderate, or difficult for computer owners to perform.

Replacing the processor is the most difficult upgrade.

Easy upgrades include adding an external hard drive, switching to a wireless mouse and keyboard, adding a USB port or digital memory card reader, adding a second display device, adding or replacing speakers (see page 65).

7. Refer to Section D of Chapter 1 and create a sequence of sketches that shows what happens in a microprocessor's ALU and control unit when an instruction is processed.

Refer to pages 32 and 33 to see sample illustrations. Your students should "animate" these illustrations by producing several sequential frames. Student's sketches will differ, but look for the following:
The basic sketch should show RAM, the Control Unit, the ALU, and several registers.
The Control Unit should hold an instruction to be processed, such as Add 8+2 (Alternatively, the student might being with the Control Unit empty and proceed to fetch the instruction.)
The numbers 8 and 2 are loaded into registers.
The Control Unit commands the ALU to "Add"
The numbers are added and the result is placed in the accumulator.

7. List and describe the factors that affect microprocessor performance.

See pages 67-69.

- **Clock speed**: timing device that sets the pace for executing instruction. The faster the clock speed, the more instructions that can be executed during a given time

- **Word size**: number of bits a processor can manipulate at one time. The bigger the word the more "through-put" that is possible

- **Cache size**: special high speed memory used for quick storage of the current data being manipulated

- **Instruction set**: the number of instructions available to the processor. In theory, RISC models with fewer instructions than the CISC work faster. In practice it depends.

- **Processing techniques**: how an instruction gets processed can be sped up by either: (1) using pipelining, a method for starting the next instruction before the previous one is complete, or (2) using multiple CPUs or "parallel processing"

Name two companies that produce microprocessors, and list some of the models that each company produces.

See page 70 where the following are listed:

Intel: Pentium Dual Core, Itanium, Celeron, Celeron M, Pentium M, Mobile Pentium 4, Core2 Extreme, Core 2 Quad, Core 2 Duo, Xeon

AMD: Athlon X2, Athlon X2 Dual-Core, Opteron, Sempron, Turion 64, Mobile Sempron

IBM: RISC-based POWER processors
Transmeta: Produces processors for mobile devices, such as tablet computers.
Motorola: Previously produced POWER processors for Apple

9. List four types of memory and briefly describe how each one works.

See pages 68-74. Students can list any four of the following five:

- **RAM** (Random Access Memory): this memory is temporary storage for data, applications, and the operating system. RAM is volatile.

- **ROM** (Read Only Memory): this memory holds the computer's startup routine. ROM is permanent and non-volatile.

- **EEPROM** (Electrically Erasable Programmable Read-Only Memory): this non-volatile chip requires no power to hold data and has replaced CMOS technology. Holds computer configuration settings, such as date and time, hard disk capacity, number of floppy disk drives, and RAM capacity.

- **Cache**: high speed memory that allows a microprocessor fast access to data that is about to be manipulated

- **Virtual memory**: allows the computer to use disk storage to simulate RAM

10. Describe the advantages and disadvantages of magnetic storage, optical storage, and solid state storage using criteria such as versatility, durability, capacity, access time, and transfer rate.

See pages 78-85.

	Advantages	Disadvantages
Magnetic Storage	Can be easily changed or deleted, thus very flexible; fast transfer rate and access time	Susceptible to environmental factors such as dust, heat and magnetic fields; not very durable
Optical Storage	Less susceptible to environmental damage, so more durable than magnetic storage	Relatively slow when making changes. Perhaps slightly more expensive; capacity is typically lower than magnetic storage; access time and transfer rate somewhat slower than for magnetic media
Solid-state Storage	Potentially faster access to data than magnetic or optical storage, durable, versatile as it can be easily plugged into any computer with a USB port	Lower capacity than hard disks and DVDs; more costly than other storage types

11. Summarize what you know about how a graphics card can affect a monitor's resolution.

See page 90-91.

The graphics card sends an image to the monitor at a specific resolution. At low resolutions, images on the screen appear larger, but less of the image is shown. At higher resolutions, images and text appear smaller, but more of the image is displayed.

12. Compare and contrast the technologies and applications for ink jet, laser, and dot matrix printers.

Ink jet printers:

Spray ink from a series of nozzles.
Color or black & white.
Inexpensive printers; ink cartridges are costly.
Popular for home printing and photo printing.

Laser printers:
Work similar to a photocopier by transferring ink to paper and fixing with toner.
Printers are more expensive than ink-jet.
Color lasers are more expensive than black & white.
Toner and ink are relatively expensive.
Faster than ink jet printers.
Higher duty cycles support higher output capacity.
Most popular for business and professional applications.

Dot matrix:
Wires from the printhead matrix strike an inked ribbon to transfer printing to paper.
Printers are moderately expensive.
Used for back-office applications and in situations where carbon copies are required.

13. Create your own diagram to illustrate how the data bus connects RAM, the microprocessor, and peripheral devices. Explain the hardware compatibility considerations, device drivers, and procedures involved in installing a peripheral device.

See pages 94-95.
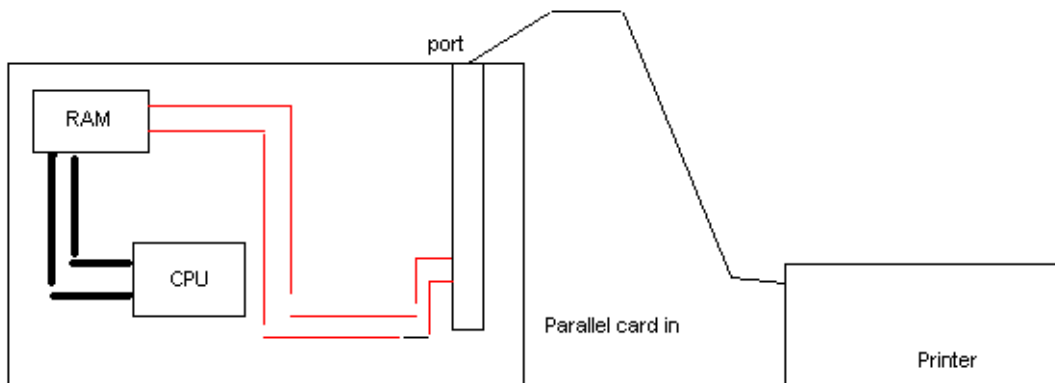
Thick lines represent system buses. There are also system buses inside the CPU chip set, for example from cache to the control unit, from the control unit to the ALU, etc.
Thin lines represent expansion buses.

The expansion bus is used to make a connection between the system board and a peripheral device.
The cable used must match the peripheral device and a port on the computer.
If the right type of port is not available, it might be possible to add an expansion card.
Once the connection is made, the computer should recognize the new device.
If a new device is not recognized, a device driver might need to be installed.
USB is the most popular type of connection. Others include IEEE 1394 (FireWire), serial, and parallel.
Expansion slots include ISA, PCI, and AGP.
Cards can only be inserted into empty slots.

14. List ways you can protect your computer from theft and damage.

Protect from theft. Students could list any of the following:

Don't leave it unattended

Lock it to a desk

Don't leave in a car where it is visible

Carry your computer in an inconspicuous case

Record make, model, and serial number

Secure your notebook with an anti-theft device

Protect from damage. Students could list any of the following:

Use a surge strip or UPS

Keep the area around the computer's fan clear

Clean the fan area

Dust the keyboard

Dust the screen

Clean mechanical mouse

16. Think about the last time you had a problem with computer hardware or software. Would any of the steps in Figure 2-59 have helped you solve the problem faster? If not, what guidelines would you add to the list in the figure?

Answers will vary.

Concept Map

a. Storage
b. Memory
c. Magnetic
d. Optical
e. AMD

f. ROM, Read-only memory
g. AGP
h. Hard
i. BD, Blu-ray

Projects

CRITICAL THINKING

C2 Steve Jobs, co-founder of Apple Computers, coined the idea that computers should be consumer appliances that could be set up easily, used by anyone, and "democratically priced" so they were affordable to everyone. An opposing philosophy, championed by many PC owners, is that computers should be flexible modular systems that can be easily customized, upgraded, and modified by anyone with a moderate degree of technical savvy. Which philosophy do you personally prefer? What do you think is the preference of the majority of computer shoppers? If you were a computer designer, how would you provide your customers with flexibility while making it approachable for non-techies? Incorporate your ideas in a one-page e-mail message or attachment and submit it to your instructor.

Deliverables: Students should submit an e-mail message or attachment that answers the following questions:

Which philosophy of computer design (appliance vs. components) do you prefer?

Which philosophy do you think the majority of PC buyers prefer?

How would you design a computer that provides flexibility without getting too technical?

Grading suggestions:
Pass if the e-mail contains the specified deliverables. No pass if the deliverables are not complete, OR
A if student relates some creative ideas and/or supports arguments with good examples in a well-structured analysis.
B if student offers a thoughtful and well-structured analysis.
C if student offers sketchy ideas.
D if student offers minimal or badly structured ideas.

GROUP

C2 For this project, work in groups of three or four. The group should select a digital device, such as a printer, scanner, digital camera, Web camera, digital video camera, digital music player, video capture card, digitizing tablet, or accelerated 3-D graphics card. If a member of your group owns the device, that's a plus. Create promotional materials for a tradeshow booth featuring your "product." You might include a product photo, list of specifications, and a short instruction manual. If time permits, your instructor might ask your group to present your sales pitch or a demonstration to the rest of the class.

Instructional suggestion: This project works well as a series of class presentations.

Deliverables: Trade show booth materials, such as brochures, posters, product spec sheets

Grading suggestion:
Distribute points based on the following criteria:
   Variety of materials
   Effectiveness of materials
   Accuracy of materials
   Artistic and professional appearance of materials
   Presentation (optional)

CYBER CLASSROOM

C2 E-mail the other members of your team a technical support question based on a hypothetical problem you're having with your computer. They should try to solve the problem using their current expertise and relevant Web sites. At the end of the project, evaluate your team's success rate based on the difficulty of the problems and the efficiency of their troubleshooting.

Deliverables: From each student, a technical support question, responses from team members, and evaluation of responses

Grading suggestion: Pass/No pass

MULTIMEDIA

C2 Search the Web for "modding" and collect ideas for souping up your computer system unit, keyboard, and mouse. Make sure you check out options for clear lexan and metallic cases, along with lighting options. Download photos from the Web and print them out, keeping track of sources. Using ideas from your collection of photos, sketch out plans for your ultimate modded computer. Submit your plan along with a list of the sources you used to get ideas and images.

Deliverables: A sketch and/or specifications for a modded computer; photos showing modded computers

Grading suggestion:
20% Depth of research
30% Variety of downloaded computer photos
20% Creativity of "mod" design
30% Viability of specifications

RESUME BUILDER
C2 Use the Web and other resources to learn about the computers and other technologies used in your career field. Develop the information you find into a format similar to the Computers in Context section of each chapter in this textbook. Make sure you select two photos to accompany your narrative and include a list of relevant InfoWebLinks.

Deliverables: A document with photos in a format similar to the 2-column Computers in Context section of the chapter, but focusing on the student's career field

Grading suggestion:
10% Writing style
50% Organization of ideas
30% Accuracy of information
10% Photos

GLOBALIZATION
C2 Computer ownership is growing worldwide and providing access to productivity tools and a global communications infrastructure. For this project, look for statistics and graphs showing the increase in computer ownership over time. How does it compare to telephone, television, and radio ownership? Are any aspects of this data unexpected or surprising? Gather your graphs and analysis into a 2-3 page executive summary.

Instructional tip: You might want to spend a few minutes describing the purpose and format of an executive summary.

Deliverables: A 2-3 page executive summary that focuses on changing computer ownership over time

Grading suggestion:
10% Writing style of summary
20% Accuracy and abundance of statistics
10% Citations and URLs of source data
40% Charting ("over time" usually requires line graphs)
20% Conclusions (i.e., ownership rose rapidly but is now reaching a plateau)

ISSUE
C2 The Issue section of this chapter focused on the potential for discarded computers and other electronic devices to become a significant environmental problem. For this project, write a two-to- five-page paper about recycling computers, based on information you gather from the Internet. To begin this project, consult the Computer Recycling InfoWeb (see page 107) and link to the recommended Web pages to get an in-depth overview of the issue. Next, determine the specific aspect of the issue you will present in your paper. You might, for example, decide to focus on toxic materials that end up in landfills or barriers that discourage shipping old computers across national borders. Whatever aspect of the issue you present, make sure you can back up your discussion with facts and references to authoritative articles and Web pages. Follow your professor's instructions for formatting citations and for submitting your paper by e-mail or as a printed document.

Making the assignment: This project can be assigned to individuals or it can be used as a small-group project. Make sure that you tell your students how they should submit this project: by e-mail, on disk, or as hard copy. If you use the suggested point values for grading, you might explain that to get full credit for the paper: (1) the paper must be clearly worded, (2) it should include an introduction and conclusion, (3) a clear viewpoint must be stated, (4) evidence (facts) must support the viewpoint, and (5) references must be cited.

Deliverables: The paper will be 2-5 pages long in a word processing format or printed.

Subject: Computer Recycling

Grading: The students should understand how the assignment is graded. Below is a sample point system.

15 points = clear introduction

40 points = completeness and accuracy

10 points = spelling and grammar

15 points = clear conclusion

20 points = properly cited sources

COMPUTERS IN CONTEXT

C2 The Computers in Context section of this chapter focused on computer and communication technologies pioneered by the military and then adopted into civilian use. For this project, research one of two topics:

- The use of notebook computers in combat environments and how design innovations for military use might affect the design of your next computer
- Developments in wearable computers and how soldiers and civilians might use them

To begin the project, survey the material in the Computers and the Military InfoWeb (see page 109). Use a Web search engine to locate additional material relevant to the topic you've selected. Then write a two- to four-page paper about your findings and include graphics to illustrate your points. Make sure you cite sources for your material. Follow your professor's instructions for formatting and submitting your paper.

Making the assignment: Students will research ONE of two topics:

- The use of notebook computers in combat environments and how design innovations for military use might affect the design of your next computer
- Developments in wearable computers and how soldiers and civilians might use them

Let your students know how long you expect their final reports to be and how they should be submitted. Provide some guidelines about incorporating graphics—size (if submitting electronically), copyright adherence, and citation procedures.

Deliverables: A 2-4 page paper with graphics

Grading: Look at the overall quality and organization of the paper. Spot check a few of the Web sites listed as sources.

A sample point system:

15 points Writing style—basic grammar and spelling

50 points Coverage and organization

20 points Use of graphics

15 points Number and relevance of citations