



# *Technology in Action*

Alan Evans • Kendall Martin

Mary Anne Poatsy

Ninth Edition

# *Technology in Action*

## Chapter 6

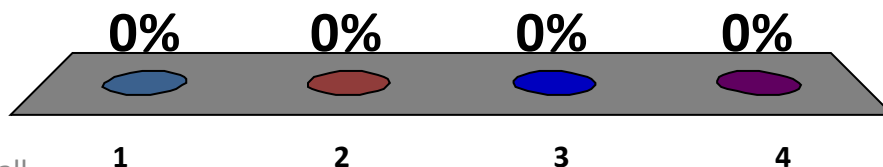
### Understanding and Assessing Hardware: Evaluating Your System

# Chapter Topics

- Your ideal computer
- Evaluating the CPU subsystem
- Evaluating the storage subsystem
- Evaluating the video subsystem
- Evaluating the audio subsystem
- Evaluating system reliability
- Making the final decision

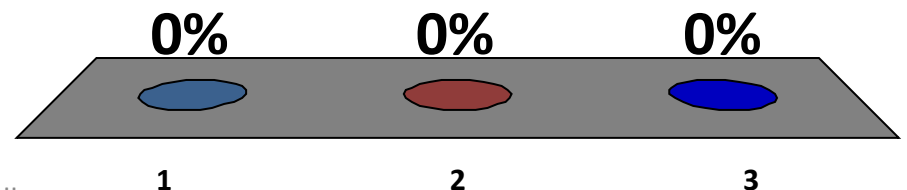
Moore's Law predicts that the number of transistors inside a CPU increases so fast that CPU capacity will double every:

1. 6 Months
2. 12 Months
3. 18 Months
4. 24 Months



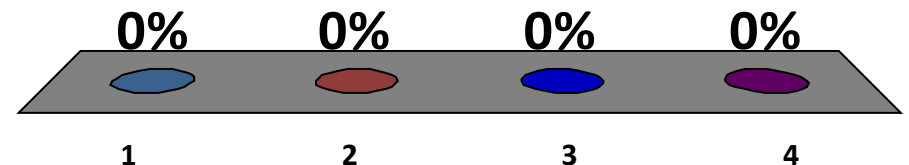
# Which of the following transfers data faster?

1. Serial ATA
2. IDE
3. Both are equally fast



RAID is a set of strategies for using more than one hard drive in a system.

1. Multi-drive
2. Blu-ray
3. RAID
4. Both 1 & 3



# Your Ideal Computer

- New technologies emerge so quickly that it is hard to decide if expensive extras are tools you would use
- Should you upgrade your system?
- Should you buy a new computer?



# To Upgrade or Buy New?

- Things to consider
  - CPUs are becoming faster
  - Capacity of memory chips increases about 60 percent every year
  - Hard drives are growing in storage capacity about 50 percent each year
  - Consider time it would take to transfer files and reinstall software on a new system
  - Costly upgrades might not make much difference on current computer



# Notebook or Desktop?

## Notebook

- Portable, light-weight, thin
- Take up less physical space
- Easier to transport
- Smaller displays
- Shorter lifespan

## Desktop

- Best value
- More difficult to steal
- Easier to expand and upgrade
- Difficult to ship
- Larger monitors

# Evaluating the CPU Subsystem

- CPU processes instructions, performs calculations, and manages flow of information through a computer system
- Located on motherboard
  - Intel processors
    - Core family and the Centrino line
  - AMD processors
    - Athlon II and Phenom X4



# How Does the CPU Work?

- CPU is composed of two units
  - Control unit coordinates activities of all other computer components
  - Arithmetic logic unit (ALU) performs arithmetic calculations
- Machine cycle is series of steps performed to process a program instruction
  - Fetch data or instruction from RAM
  - Decode instruction that computer understands
  - Execute instruction
  - Store result in RAM

# Determining Processing Power

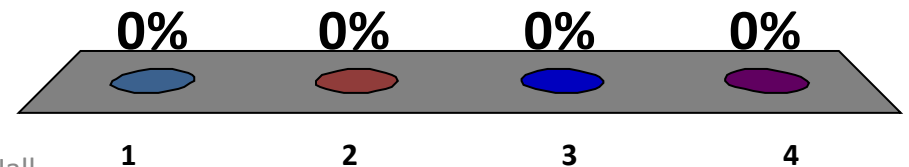
- Number of cores
  - CPU processing section embedded in one chip
- Clock speed
  - Instructions CPU can finish in one second
- Cache memory
  - Provides access to data without going to RAM
- Front side bus
  - Main path for data movement within system

# Hyperthreading and Multi-Core Processing

- Hyperthreading allows a new set of instructions to start before previous set has finished
- Multiple cores used on one CPU chip enable execution of two sets of instructions at the same time
- Possible to design CPU to have multiple cores *and* hyperthreading

A core is a complete processing section of a CPU embedded into one physical chip.

1. Cache
2. Core
3. Kernel
4. Control unit



# Clock Speed

- Each CPU runs at a specific processing speed
- The faster the clock speed, the quicker instructions are processed
  - Current speeds run between 2.1 GHz & 4 GHz
- Overclocking runs the CPU at faster speed than manufacturer recommends
  - Usually voids any warranty

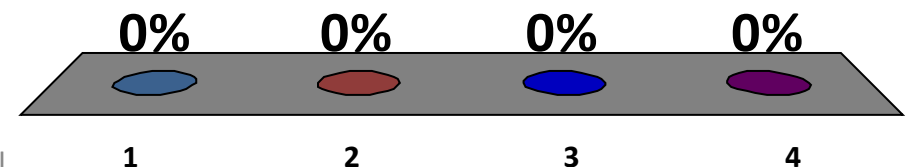
# Cache Memory

- Allows immediate access to data and instructions without having to go to RAM
- Cache memory levels
  - Level 1 cache is memory built onto CPU chip for storage of data or commands just used
  - Level 2 and Level 3 cache are slightly farther away, take longer to access, and contain more storage space



# Which is faster, accessing data from the cache memory, or from the RAM?

1. RAM
2. Cache memory
3. They are equally as fast
4. RAM and Cache memory do not store data



# Front Side Bus

- Connects the processor (CPU) to system memory
- Throughput of FSB depends on how much data it transfers per cycle (bytes) and its clock frequency (Hz)
- The faster the FSB, the faster you get data to the processor

# Assessing Your CPU

- Identify your current CPU type and speed
- Check manufacturer's Web site for more detailed information
- Watch how busy the CPU is as you work
  - Workload will vary considerably during day depending on what programs are running
  - CPU usage is the percentage of time CPU is working

# Evaluating the Memory Subsystem

- Random Access memory (RAM) is computer's temporary storage space
  - Short-term memory
  - Available only when computer is on
  - Volatile storage
- ROM memory
  - Holds critical startup instructions
  - Nonvolatile storage

# I know how to determine the amount of RAM in my computer.

1. Yes
2. No



# Types of RAM

- Memory modules are small circuit boards that hold a series of RAM chips
- Dual inline memory modules (DIMMs)
- Types:
  - Double data rate 3 (DDR3)
  - Double data rate 5 (DDR5)

# Sample RAM Allocation

<b>Application</b>	<b>RAM Recommended</b>
Windows 7 (64 bit)	2 GB
Microsoft Office Professional 2010	512 MB
Internet Explorer 9	512 MB
iTunes 10	1 GB
Adobe Photoshop Elements 9	2 GB
Total RAM required to run all programs simultaneously	6 GB

# Adding RAM

- Motherboard has specific number of slots for memory cards
- Each slot has limit on amount of RAM it can hold
- Operating system imposes own RAM limit
  - Windows 7 (32 bit) maximum is 4 GB
  - Windows 7 (64 bit) maximum is 192 GB



# Evaluating the Storage Subsystem

- Temporary storage
  - RAM
- Permanent storage
  - Hard drives
  - USB flash drives
  - Optical drives
  - SSD drives (solid state drives)
  - External hard drives

# The Hard Drive

- Largest capacity of any storage devices
  - Some exceed 4 terabytes (TB)
- More economical than other storage
- Most systems can support more than one internal hard drive
- Access time is measured in milliseconds

# How a Hard Disk Works

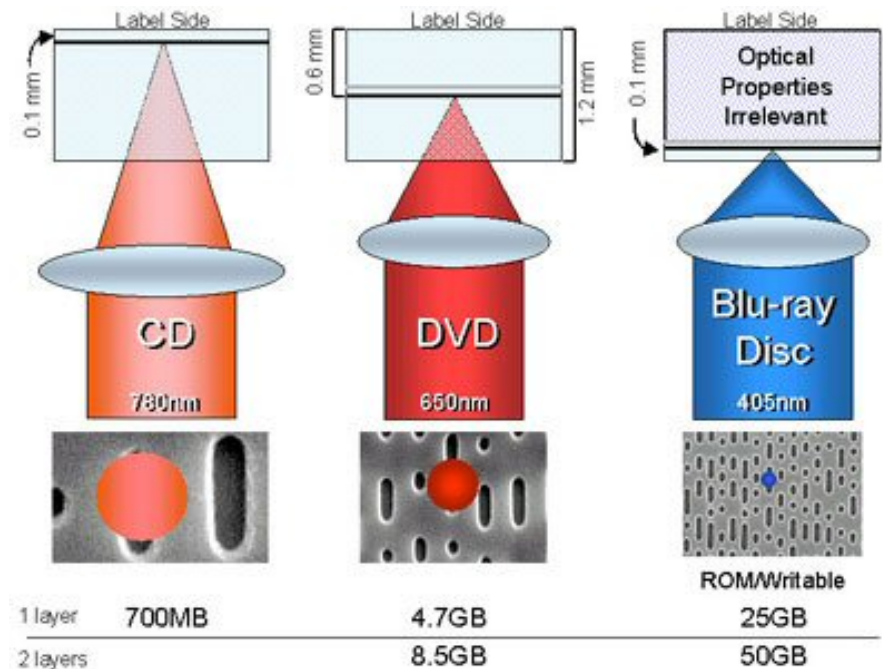
- Composed of coated platters stacked on a spindle
- Data saved as pattern of magnetized spots of 1s and 0s
- When retrieved, patterns of spots are translated into data

# Assessing Storage

- Identify your hard drive's total capacity and how much is being used
- Determine your storage capacity needs
  - Calculate amount of storage required by all type of files you will store on your system
- Consider data transfer rates
  - Internal
  - External

# Optical Storage

- Store data as tiny pits burned into the disc by high-speed laser
- Optical media
  - Compact disc (CD)
  - Digital video disc (DVD)
  - Blu-ray disc (BD)



# A CD is a disc. A magnetic hard drive is a:

1. Disc
2. Disk



# Evaluating the Video Subsystem

- Video display depends on two components:
  - Video card
    - Amount of memory needed depends on what you want to display on monitor
    - Controls number of colors monitor can display
  - Monitor
    - Standard VGA (4-bit video card, 16 colors)
    - True color (24-bit video card, over 16 million colors)

# Video Cards

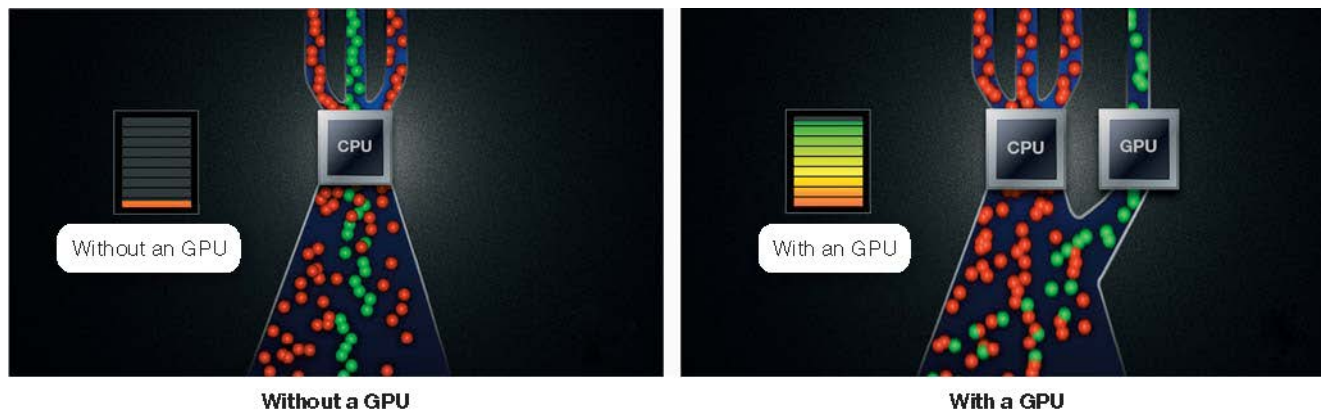
- Expansion card installed inside system
- Translates binary data into images
- Ports that allow you to connect to different video equipment
- Include own RAM (video memory) and GPU (graphics processing unit)





# Graphics Processing Unit

- GPU performs computational work like CPU
- Specialized to handle
  - 3D graphics
  - Image and video processing
- CPU runs more efficiently when a GPU does all graphics computation



# Assessing Video

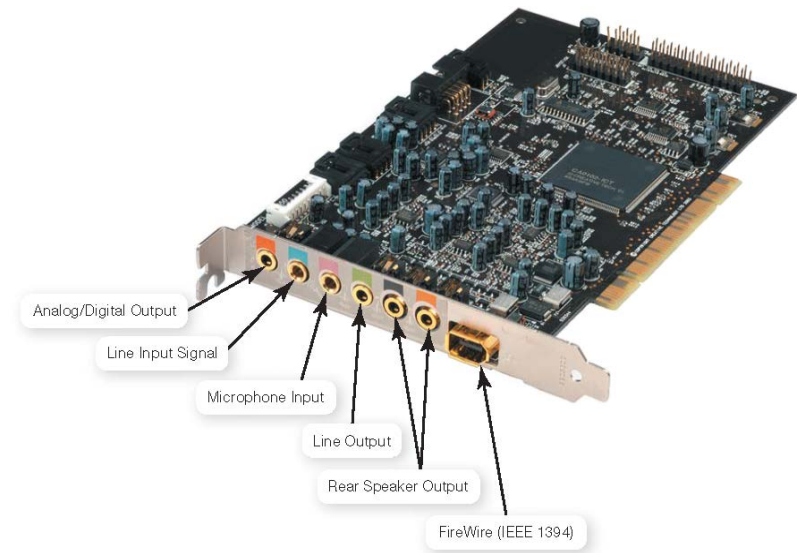
- Identify the amount of video memory on your video card
- Amount of memory depends on needs
  - 256 MB for general use
  - 512 MB or more for serious gaming
- High-end visualization software may need two or three video cards

# Evaluating the Audio Subsystem

- Computers output sound with speakers and a sound card
- May want to upgrade speakers or sound card for:
  - Listening to music
  - Viewing HD movies
  - Hooking into stereo system
  - Playing games

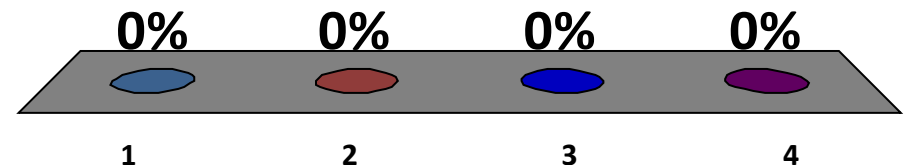
# Sound Card

- Expansion card that attaches to motherboard
- Enables computer to drive speaker system
- 3D sound cards
- Surround sound
- Input and output jacks



# All of the following are examples of expansion cards *EXCEPT*:

1. Processor card
2. Video card
3. Sound card
4. Wireless card



# Evaluating System Reliability

- Performance problems
  - Slow performance
  - Freezes
  - Crashes
- Try to fix problem before buying a new machine
- Proper upkeep and maintenance may postpone upgrade or replacement

# Upkeep and Maintenance

- Clean out your Startup folder
- Clear out unnecessary files
- Run spyware and adware removal programs
- Run the Disk Defragmenter utility
- These utilities can be configured to run automatically at any time interval

# The Last Resort

- Upgrade the OS to the latest version
  - Substantial increases in reliability
  - Might require hardware upgrade
- Reinstall the operating system
  - Back up all data files
  - Reinstall software after installation
  - Have original discs, product keys, serial numbers, or activations codes

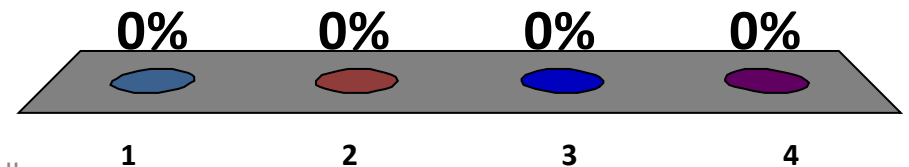


# Making the Final Decision

- How closely does your system meet your needs?
- How much would it cost to upgrade your system?
- How much would it cost to purchase a new system?
- Price both scenarios to determine better value

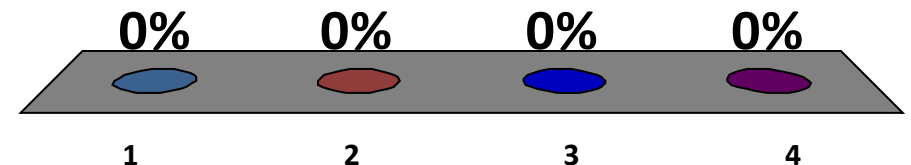
# The processing power of a CPU is determined by all of the following except:

1. Number of cores
2. Clock speed
3. Cache memory
4. RAM capacity



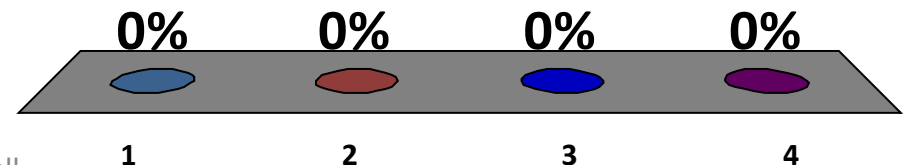
# Which of the following imposes a limit on the amount of RAM that can be installed on a computer?

1. The Motherboard
2. The Operating System
3. Both 1 & 2
4. Neither 1 nor 2



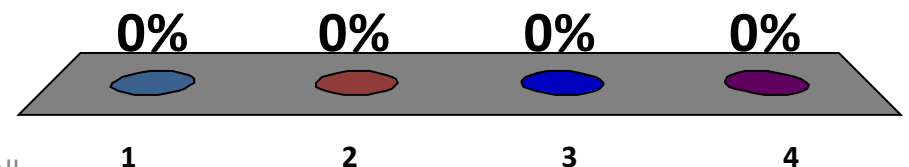
enables a new set of instructions to begin executing before the previous set has finished processing.

1. Hyperthreading
2. Multiple cores
3. Front side bus
4. Cache memory



# Which of the following is a feature of Solid State Drives?

1. Low power consumption
2. Cool and quiet operation
3. Same type of memory used in flash drives
4. All of the above



# Chapter 6 Summary Questions

1. How can I determine whether I should upgrade my existing computer or buy a new one?

# Chapter 6 Summary Questions

2. What does the CPU do, and how can I evaluate its performance?

# Chapter 6 Summary Questions

3. How does memory work in my computer, and how can I evaluate how much memory I need?



# Chapter 6 Summary Questions

4. What are the computer's storage devices, and how can I evaluate whether they match my needs?

# Chapter 6 Summary Questions

5. What components affect the quality of video on my computer, and how do I know if I need better video performance?

# Chapter 6 Summary Questions

6. What components affect my computer's sound quality?

# Chapter 6 Summary Questions

7. How can I improve the reliability of my system?



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