

# A+ Guide to Hardware, 9th Edition

## *Chapter 7* *Supporting I/O Devices*

# Objectives

- Describe the general approach technicians use to install and support I/O devices
- Install and configure several I/O devices, such as barcode readers, biometric devices, digital cameras, webcams, graphic tablets, and touch screens
- Install and configure adapter cards
- Support the video subsystem, including selecting a monitor and video card and supporting dual monitors and video memory
- Troubleshoot common problems with I/O devices

# Basic Principles For Supporting Devices

- I/O devices may be internal or external
- Fundamental principles and concepts:
  - Every device is controlled by software
  - Best guide for installation and support: manufacturer
  - Some devices need application software
  - A device is no faster than the port/slot it is designed for
  - Use an administrator account in Windows
  - Problems are sometimes solved by updating drivers or firmware
  - Install only one device at a time

# Basic Principles for Supporting Devices

- Device Manager (devmgmt.msc)
  - Primary Windows tool for managing hardware
- Using Device Manager you can:
  - Disable or enable a device
  - Update its drivers
  - Uninstall a device
  - Undo a driver update ( called a driver rollback)

# Ports and Wireless Connections Used by Peripheral Devices

Port or Wireless Type	Maximum Speed	Maximum Cable Length or Wireless Range
eSATA Version 3 (eSATA-600)	6.0 Gbps (gigabits per second)	Cable lengths up to 2 meters
SuperSpeed USB (USB 3.0)	5.0 Gbps	Cable lengths up to 3 meters
eSATA Version 2 (eSATA-300)	3.0 Gbps	Cable lengths up to 2 meters
eSATA Version 1 (eSATA-150)	1.5 Gbps or 1500 Mbps (megabits per second)	Cable lengths up to 2 meters
FireWire 800 (also called 1394b)	1.2 Gbps or 800 Mbps	Cable lengths up to 100 meters
Wi-Fi 802.11n RF (radio frequency) of 2.4 GHz or 5.0 GHz	Up to 500 Mbps	Range up to 70 meters
Hi-Speed USB (USB 2.0)	480 Mbps	Cable lengths up to 5 meters
FireWire 400 (also called 1394a)	400 Mbps	Cable lengths up to 4.5 meters
Original USB (USB 1.1)	12 Mbps or 1.5 Mbps	Cable lengths up to 3 meters
Wi-Fi 802.11g RF of 2.4 GHz	Up to 54 Mbps	Range up to 100 meters
Wi-Fi 802.11a RF of 5.0 GHz	Up to 54 Mbps	Range up to 50 meters
Wi-Fi 802.11b RF of 2.4 GHz	Up to 11 Mbps	Range up to 100 meters
Bluetooth wireless RF of 2.4 GHz	Up to 3 Mbps	Range up to 10 meters
Infrared (IR) wireless Invisible light; frequency range of 100 to 400 THz (terahertz or 1 trillion hertz), just above red light	Up to 4 Mbps for fast speed IR; up to 1.15 Mbps for medium speed IR, and up to 115 Kbps (kilobits per second) for slow speed IR	Range up to 5 meters
Near Field Communication (NFC) RF of 13.56 MHz	Up to 424 kbps	Range up to 10 centimeters

**Table 9-1** Data transmission speeds for various port types and wireless connections

# Ports and Wireless Connections Used by Peripheral Devices

- USB Connections:
  - The USB Implementers Forum, Inc. uses the following symbols



Source: USB Forum

**Figure 7-1** SuperSpeed, Hi-Speed, and Original USB logos appear on products certified by the USB forum

# Ports and Wireless Connections Used by Peripheral Devices

- USB Connections (cont'd):
  - As many as 127 USB devices can be daisy chained together
  - USB uses serial transmissions and devices are hot-swappable (plug and unplug without powering down)
  - A USB cable has four wires, two for power and two for communication

# Ports and Wireless Connections Used by Peripheral Devices

Cable and Connectors	Description
<p>A-Male to B-Male cable</p> 	<p>The <b>A-Male connector</b> on the left is flat and wide and connects to an A-Male USB port on a computer or USB hub.</p> <p>The <b>B-Male connector</b> on the right is square and connects to a USB 1.x or 2.0 device such as a printer.</p>
<p>Mini-B to A-Male cable</p> 	<p>The <b>Mini-B connector</b> has five pins and is often used to connect small electronic devices, such as a digital camera, to a computer.</p>
<p>A-Male to Micro-B cable</p> 	<p>The <b>Micro-B connector</b> has five pins and has a smaller height than the Mini-B connector. It's used on digital cameras, cell phones, and other small electronic devices.</p>
<p>A-Male to Micro-A cable</p> 	<p>The <b>Micro-A connector</b> has five pins and is smaller than the Mini-B connector. It's used on digital cameras, cell phones, and other small electronic devices.</p>
<p>USB 3.0 A-Male to USB 3.0 B-Male cable</p> 	<p>This USB 3.0 B-Male connector is used by SuperSpeed USB 3.0 devices such as printers or scanners. Devices that have this connection can also use regular B-Male connectors, but this USB 3.0 B-Male connector will not fit the connection on a USB 1.1 or 2.0 device. USB 3.0 A-Male and B-Male connectors and ports are blue.</p>
<p>USB 3.0 A-Male to USB 3.0 Micro-B cable</p> 	<p>The <b>USB 3.0 Micro-B connector</b> is used by SuperSpeed USB 3.0 devices. The connectors are not compatible with regular Micro-B connectors.</p>

Table 9-2 USB connectors



# Ports and Wireless Connections Used by Peripheral Devices

- FireWire (IEEE 1394) Connections
  - Hardly used in new devices
  - Uses serial transmissions and devices are hot-swappable
  - FireWire 800 allows for up to 63 devices and FireWire 400 allows for up to 16 devices to be daisy chained together
  - FireWire 400 supports two connector types
  - FireWire 800 uses a 9-pin rectangular connector

# Ports and Wireless Connections Used by Peripheral Devices

- Infrared (IR) Connections
  - Outdated wireless technology mostly replaced by Bluetooth
  - Most common use of IR is by remote controls



**Figure 7-4** This remote control is an infrared device that uses an IR transceiver connected to a laptop by way of USB port

# Installing I/O Peripheral Devices

- Simple input devices (mouse and keyboard)
  - Can be controlled by the UEFI/BIOS or have embedded drivers built into the OS
- General procedures to install any peripheral device:
  - 1. Read the manufacturer's directions
  - 2. Make sure the drivers are written for the proper OS
  - 3. Make sure the motherboard port you are using is enabled
  - 4. Install drivers or plug in the device
  - 5. Install the application software to use the device

# Installing I/O Peripheral Devices

- Mouse or Keyboard
  - Plug into a USB and OS should automatically recognize it and install generic drivers
    - Older PS/2 ports are not hot-pluggable, so you must restart Windows after plugging into this type of port
  - For keyboards with special features:
    - Install drivers that came with the keyboard
  - Use Device Manager to uninstall, disable, or enable most devices
    - USB devices are managed through **Programs and Features**

# Installing I/O Peripheral Devices

- Replacing the Keyboard and Touchpad in a Laptop
  - Power down and remove AC adapter and battery pack
  - Remove screws on bottom of laptop
  - Open lid
    - Push keyboard toward lid while pulling it up to release it from the case
  - Bring keyboard out of the case and forward
    - Expose keyboard ribbon cable
    - Use screwdriver to lift cable connector up and out
  - Replace keyboard following steps in reverse order
  - If touchpad is part of keyboard bezel, remove keyboard before removing the keyboard bezel

# Installing I/O Peripheral Devices

- Barcode Readers
  - Scans barcodes on products
    - Used to maintain inventory or at point of sale (POS)
  - Several interface methods
    - Wireless connection, serial port, USB port, keyboard port



Courtesy of Intermec Technologies

**Figure 7-12** Handheld or hands-free Barcode scanner by Intermec Technologies

# Installing I/O Peripheral Devices

- Biometric Devices - inputs a person's biological data
  - Additional authentication to control access to sensitive data
- Fingerprint reader types may:
  - Look like a mouse
  - Use wireless or USB connection
  - Be embedded on side of keyboard, flash drive or laptop
- Read documentation to know if you should install drivers before plugging in device

# Installing I/O Peripheral Devices

- Digital Cameras and Camcorders
  - Two ways to transfer images to PC
    - Connect camera to the PC using a cable
    - Install the memory card in the PC



**Figure 7-14** This laptop has two flash memory card slots



# Installing I/O Peripheral Devices

- Webcams
  - Embedded on most laptops
  - Can be installed using a USB port or other port
  - Comes with built-in microphone



© iStockphoto/Eric Ferfuson

**Figure 7-17** This personal web camera clips to the top of your laptop and has a built-in microphone

# Installing I/O Peripheral Devices

- Graphics Tablets (also called digitizing tablet)
  - Likely to connect by a USB port
  - Comes with stylus that works like a pencil
  - Install the same way as other USB devices



**Figure 7-19** A graphics tablet and Stylus are used to digitize a hand drawing

# Installing I/O Peripheral Devices

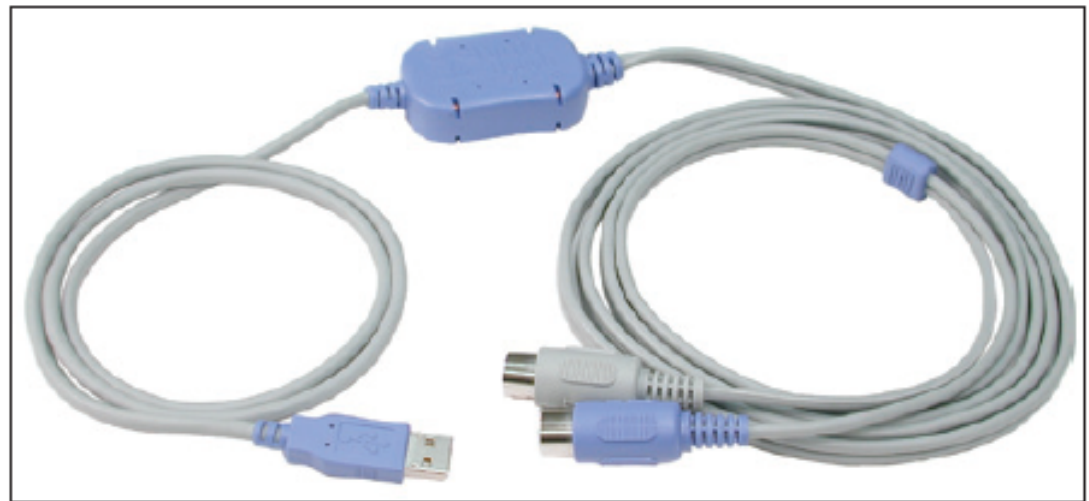
- Motion Controllers (also called motion sensor)
  - Provides input to the computer by sensing the motion of your fingers and hands
  - Commonly used with gaming consoles
  - May be used by graphic designers or engineers who work with 3D images
  - Most connect using a USB connection
  - Read documentation to know if you should install drivers first or the device first

# Installing I/O Peripheral Devices

- MIDI Devices
  - MIDI (Musical instrument digital interface) – set of standards used to represent music in digital form
  - MIDI standards are used to connect musical equipment such as musical keyboards and mixers
  - Most sound cards can play MIDI files
  - MIDI port is a 5-pin DIN port that looks like PS/2 keyboard port (only larger)

# Installing I/O Peripheral Devices

- MIDI Devices (cont'd)
  - Way to connect a musical instrument to PC
    - MIDI to MIDI, MIDI to USB, USB to USB, and USB to MIDI



**Figure 7-22** MIDI-to-USB cable lets you connect an electronic musical instrument to your computer

# Installing I/O Peripheral Devices

- Touch Screens
  - Input device that uses a monitor or LCD panel as the backdrop for input options
  - Some laptops and monitors for desktops have built-in touch screens
  - Can be installed as an add-on
  - For most installations, install drivers before connecting by way of a USB port
  - Use management software that came with the device to control and calibrate

# Installing I/O Peripheral Devices

- KVM Switches
  - Keyboard, Video, and Mouse (KVM) switch allows the use of one keyboard, mouse, and monitor for multiple computers
  - Useful in a server room or testing lab
  - Does not require device drivers, just plug in cables from each computer to the device
  - Switch between computers by using a hot key on the keyboard, buttons on KVM switch, or a wired remote

# Installing and Configuring Adapter Cards

- When preparing to install a adapter card:
  - Verify card fits an empty expansion slot
  - Verify device drivers for the OS are available
  - Back up important data not already backed up
  - Know your starting point



# Installing and Configuring Adapter Cards

- General directions to install an adapter card
  - Read the documentation
  - If replacing an onboard port, disable port in UEFI/BIOS setup
  - Wear ESD strap, shut down system, unplug power cords and cables, and drain power
  - Locate slot and prepare for installation
  - Insert card into expansion slot
  - Anchor card to top of the slot with screws
  - Connect any power cords or data cables

# Installing and Configuring Adapter Cards

- General directions to install an adapter card (cont'd)
  - Replace the case cover, plug in any essential peripherals
  - Start the system – Windows should detect a new hardware device and attempt to automatically install the drivers
  - If a CD came with device, insert and run the setup program
  - May have to restart the system
    - If any problems with installation, turn to Device Manager to troubleshoot

# Installing and Configuring Adapter Cards

- Sound Cards and Onboard Sound
  - Can play and record sound and save it in a file
  - Speaker ports are color-coded



Courtesy of Creative Technology Ltd.

**Figure 7-30** Sound Blaster X-Fi Titanium sound card by Creative uses a PCIe x1 slot

# Installing and Configuring Adapter Cards

- TV Tuner and Video Capture Cards
  - TV tuner card can turn a computer into a television
  - Video capture card enables capturing video input and saving it to a file
  - Some cards are a combination of the two cards above
  - When installing you will most likely:
    - Install the drivers, install the card, and then install the application software that comes bundled with card

# Installing and Configuring Adapter Cards

- Replacing Expansion Cards in a Laptop
  - Newer notebook use Mini PCI Express slots (Mini PCIe)
    - Uses 52 pins on the edge connector
  - Older notebooks use a Mini PCI slot
  - For many laptops, remove a cover on the bottom of the laptop to expose expansion cards
    - For cards that have antenna, be sure to remove the antenna wires before replacing card
  - Use Device Manager to ensure the device is working properly after install

# Supporting the Video Subsystem

- Monitor: primary output device of a computer
- Two necessary components for video output:
  - Monitor
  - Video card (also called video adapter or graphics card) or video port on motherboard

# Monitor Technologies and Features

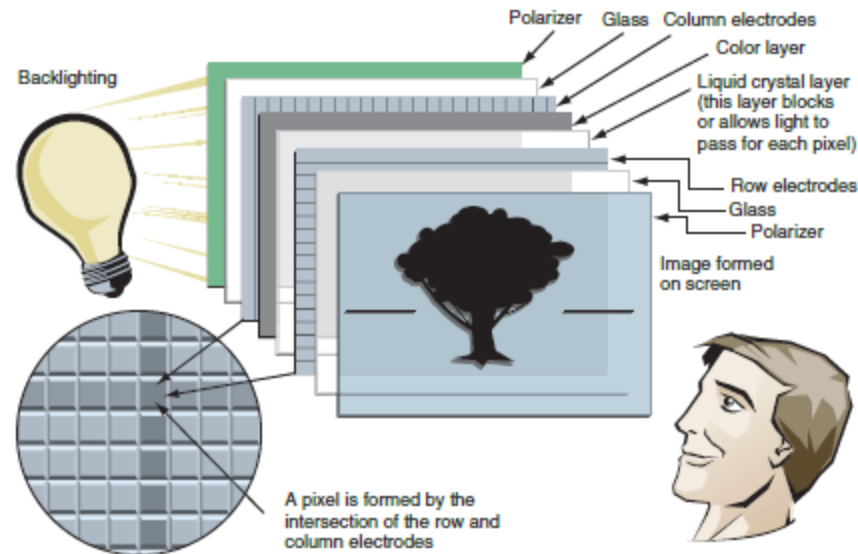
- Types of monitors
  - LCD (liquid crystal display) - also called flat panel
    - First used in laptops
    - At the center of layers is liquid crystal material
    - Layers are sandwiched between two grids of electrodes forming columns and rows
    - Each intersection of row and column forms a pixel
    - Two classes of LCD monitors:
      - Twisted Nematic (TN)
      - In-Plane Switching (IPS)

# Monitor Technologies and Features

- Types of monitors
  - LCD (cont'd)
    - LCD panel does not produce any light, so it needs a source of light, called backlighting
    - Two common types of backlighting:
      - Cold Cathode Fluorescent Lamp (CCFL) – older technology first used in laptop monitors
      - LED (Light-Emitting Diode) – receives its DC power directly from the motherboard and doesn't use an inverter



# Monitor Technologies and Features



**Figure 7-39** Layers of an LCD panel

# Monitor Technologies and Features

- Types of monitors (cont'd)
  - Plasma monitor – provides high contrast with better color than LCD monitors
    - Expensive and heavy
  - Projector – used to shine a light that projects a transparent image onto a large screen
  - OLED (organic light-emitting Diode) monitor uses a thin LED layer or film between two grids of electrodes
    - Does not use backlighting

# Monitor Technologies and Features

Monitor Characteristic	Description
Screen size	The screen size is the diagonal length of the screen surface in inches.
Aspect ratio	The aspect ratio is the proportional relationship between width and height. Common aspect ratios are 4:3, 16:9, and 16:10. Sometimes, an image must be converted from one aspect ratio to another. Three ways to convert a standard 4:3 image to a wide screen 16:9 is to add black bars to either side of the image to fill in the space; stretch the image horizontally, which creates distortion; or zoom without distorting the image until the image touches the sides, which will crop the top and bottom of the image.
Refresh rate	The <b>refresh rate</b> is the number of times a monitor screen is built or refreshed in one second, measured in Hz (cycles per second). The ad in Figure 9-41 shows the monitor refresh rate as 60 Hz (60 frames per second)—the higher, the better. Related to refresh rate, the <b>response time</b> is the time it takes to build one frame, measured in ms (milliseconds)—the lower, the better. The ad in Figure 9-41 shows a response time of 8 ms (time to build one frame).
Pixel pitch	A pixel is a spot or dot on the screen that can be addressed by software. The pixel pitch is the distance between adjacent pixels on the screen—the smaller the number, the better. An example of a <b>pixel pitch</b> is .283mm.
Resolution	The <b>resolution</b> is the number of spots or pixels on a screen that can be addressed by software. Values can range from 640 × 480 up to 4096 × 2160 for high-end monitors. Popular resolutions are 1920 × 1080 and 1366 × 768.
Native resolution	The <b>native resolution</b> is the number of pixels built into the LCD monitor. Using the native resolution usually gives the highest-quality image.
Contrast ratio	Contrast ratio is the contrast between true black and true white on the screen—the higher the <b>contrast ratio</b> , the better. 1000:1 is better than 700:1. An advertised dynamic contrast ratio is much higher than the contrast ratio, but is not a true measurement of contrast. Dynamic contrast adjusts the backlighting to give the effect of an overall brighter or darker image. For example, in Figure 9-41, the contrast ratio is 1000:1, and the dynamic ratio is 20,000,000:1. When comparing quality of monitors, pay attention to the contrast ratio, more so than the dynamic ratio.
Viewing angle	The viewing angle is the angle of view when a monitor becomes difficult to see. A viewing angle of 170 degrees is better than 140 degrees.
Backlighting or brightness	Brightness is measured in cd/m <sup>2</sup> (candela per square meter), which is the same as lumens/m <sup>2</sup> (lumens per square meter). In addition, the best LED backlighting for viewing photography is class IPS, which provides the most accurate color.
Connectors	Options for connectors are VGA, DVI-I, DVI-D, HDMI, DisplayPort, and Apple's Thunderbolt. Some monitors offer more than one connector (see Figure 9-42). These and other connectors used by video cards and monitors are discussed later in the chapter.
Other features	LCD monitors can also provide a privacy or antiglare surface, tilt screens, microphone input, speakers, USB ports, adjustable stands, and perhaps even a port for your iPod. Some monitors are also touch screens, so they can be used with a stylus or finger touch.

**Table 9-3** Important features of a monitor

# Video Cards and Connectors

- Video cards
  - Graphic adapters, graphics cards, display cards
  - Most motherboards have integrated video controller
  - Can use PCI or PCI Express motherboard slot
- Ports provided by video cards
  - VGA: red, green, blue video using VGA port (DB-15)
  - DVI (Digital Visual Interface) - variations of DVI:
    - DVI-D – only transmits digital data
    - DVI-I – supports analog and digital signals
    - DVI-A – only transmits analog data

# Video Cards and Connectors

- Ports provided by video cards (cont'd):
  - Composite video: also called RGB port
    - Red, green, and blue are mixed together in the same signal and uses a round RCA connector
    - Does not produce as sharp an image as VGA or S-Video
  - S-Video (Super-Video): used by some TVs and video equipment
    - Connector is called a MiniDin-6 and looks like PS/2
  - Component video: has been split into different components and carried as separate signals

# Video Cards and Connectors

- Ports provided by video cards (cont'd):
  - Display Port: designed to replace DVI
    - Can transmit digital and audio data
    - Uses data packet transmissions similar to Ethernet, USB, and PCI Express
    - Expected to replace VGA, DVI, and HDMI on desktop and laptop computers
  - HDMI: transmits both digital video and audio
    - Allows for several types of HDMI connectors (best known is Type A 19-pin)
    - Only works on DVI-D ports (does not transmit analog)

# Video Cards and Connectors



**Figure 7-51** DisplayPort to Mini DisplayPort cable



**Figure 7-52** HDMI to miniHDMI cable

# Video Cards and Connectors

- Digital Rights Management (DRM)
  - Meant to protect digital content and prevent piracy
  - Involves both software and hardware
  - HDMI and DVI allow for protected content to stay encrypted until it is on the presentation device
  - Also limits quality of content based on its authorization



# Changing Monitor Settings

- Monitor buttons
  - Can adjust horizontal and vertical position of the screen
  - Can change the brightness and contrast settings
  - On laptops, function keys are usually used instead of buttons
- Windows utilities can also be used to change monitor settings

# Video Memory and Windows

- Graphics processing unit (GPU) – also called visual processing unit (VPU)
  - Uses graphics RAM installed on the card
- Most video cards use:
  - DDR2, DDR3, Graphics DDR3 (GDDR3), GDDR4, GDDR5 memory
- Some video cards have as much as 2 GB of graphics memory

# Video Memory and Windows

- Windows7/Vista Aero requirements
  - 128 MB video memory, DirectX 9 or higher, Windows Display Driver Model (WDDM)
- DirectX – developmental tool developers can use to write multimedia applications
  - DirectX diagnostics program: dxdiag.exe
    - Displays information about hardware
    - Helps diagnose problems with DirectX
- Graphics memory can be embedded on video card, system memory, or a combination of both
  - Use **Advanced settings** on the **Screen Resolution** window to see available video memory

# Troubleshooting I/O Devices

- When troubleshooting peripheral devices:
  - Always try the least invasive and least expensive solutions first
- This section covers how to handle some of the errors or problems you might encounter

# NumLock Indicator Light

- When users complain that they cannot sign in to Windows even when entering the correct password:
  - Have them make sure the NumLock key is set correctly
  - Laptops use this key to toggle between the keys interpreted as letters and numbers
  - Most laptops have a NumLock indicator light near the keyboard

# Device Manager

- Device Manager is usually a good place to start troubleshooting
- To see a device's properties, right-click the device and click Properties
- Try updating the drivers
  - Click Update Driver on the General tab or Driver tab
  - If driver update creates a problem, roll back the driver update if the previous drivers were working
- Try to uninstall the device and reinstall it
  - Click Uninstall on the Driver tab

# Device Manager

- Updating Port or Slot Drivers on a Laptop
  - If you have a problem with a port or slot on a laptop, use Device Manager to see if errors are reported
    - Also you can update drivers for the port or slot
  - Manufacturers often store backups of the drivers on the hard drive under support tools
    - And on the recovery media, if available
  - Download the latest drivers from the manufacturer's website
  - Still not solved, use Device Manager to uninstall the port or slot drivers and use support tools to reinstall

# Troubleshooting Monitors and Video

- For monitor and video problems:
  - Try easy things first such as:
    - Check cable connections
    - Check contrast/brightness adjustments



# Troubleshooting Monitors and Video

- Problems with Video Card Installations
  - When you install a video card, here is a list of things that can go wrong:
    - When you first power up the system, you hear a whining sound
      - Caused by card not getting enough power (power supply might be inadequate)
    - When you first start the system, you see nothing but a black screen
      - Most likely caused by the onboard video port not being disabled in UEFI/BIOS setup (disable the port)

# Troubleshooting Monitors and Video

- Problems with Video Card Installations (cont'd)
  - When you install a video card, here is a list of things that can go wrong:
    - When you first start up the system, you hear a series of beeps
      - UEFI/BIOS cannot detect video card (try reseating)
    - Error messages about video appear when Windows starts
      - May be a conflict with onboard video port (disable port)
    - Games crash or lock up
      - Try updating the drivers for the motherboard, video card, and the sound card

# Troubleshooting Monitors and Video

- Monitor Indicator Light is Not On; No Image on-screen
  - Ask these questions and try:
    - Is the monitor power cable plugged in?
    - Is the monitor turned on?
    - Is the monitor cable plugged into the video port at the back of the PC?
    - Try a different monitor and a different monitor cable

# Troubleshooting Monitors and Video

- Monitor Indicator Light is On; No Image on-screen
  - Try the following:
    - Ensure video cable is securely connected
    - If monitor displays POST but goes blank when Windows starts to load:
      - Problem is with Windows, not monitor
    - Ensure monitor is set to correct voltage (110 vs. 220)
    - Might be problem with video card
    - Verify video cable connection inside case
    - Check the contrast adjustment
    - Check brightness or backlight adjustment

# Troubleshooting Monitors and Video

- Monitor Indicator Light is On; No Image on-screen
  - Try the following (cont'd):
    - Switch out monitor-to-computer cable
    - Test a monitor you know is good on the computer you suspect is bad
    - Check for loose socketed chips on the card
    - Trade a good video for suspected bad video card
    - Test the RAM on the motherboard
    - Try using a backup PCI video card if using a PCI-Express card
    - Trade the motherboard for one you know is good

# Troubleshooting Monitors and Video

- Screen Goes Blank 30 Seconds or One Minute after the Keyboard is Left Untouched
  - If keyboard is a Green motherboard and is being used with an Energy Saver monitor
    - Monitor can be configured to go into standby or sleep mode after a period of inactivity
    - This feature can also help prevent burn-in (a permanent impression of an image is left on monitor)
  - Use the Power Options applet in Control Panel to configure the sleep settings on a computer

# Troubleshooting Monitors and Video

- Poor Display
  - Solve these problems by using controls on the monitor and Windows settings - Do the following:
    - LCD monitor controls – usually located on front of monitor
    - Windows display settings – use to adjust font size, screen resolution, brightness, color, and Clear Type text
    - Update video drivers
    - Dead pixels – pixels that are not working

# Troubleshooting Monitors and Video

- Poor Display (cont'd)
  - Solve these problems by using controls on the monitor and Windows settings - Do the following:
    - Dim image – laptops dim the LCD screen when the computer is running on battery
      - Brighten the screen using the Windows display settings
    - Artifacts – horizontally torn images on-screen
      - Try updating video drivers
      - Overclocking can cause artifacts
  - Poor display might be caused by inadequate video RAM



# Video System in a Laptop

- If LCD panel shows a black screen but power light is on:
  - Look for an LCD cutoff switch or button on laptop
  - Try to use the video port on the laptop to connect to an external monitor
  - If external monitor does work, problem is with the LCD panel assembly
    - Will need to replace inverter or LCD panel

# Video System in a Laptop

- Cannot Connect to External Monitor
  - Try the following solutions:
    - Make sure the monitor is getting power
    - Use the Function keys to toggle between the laptop display and the external monitor
    - Try using a different cable
    - Try using a different connection if the laptop and monitor have another option available

# Video System in a Laptop

- Touch Screen is Non-responsive
  - Try the following solutions:
    - Wash and thoroughly dry hands
    - If there is a case or screen protector, remove it
    - Clean the screen with an electronic wipe or soft, lint-free cloth
    - Restart the device
    - If a third party app was recently installed, try uninstalling the app
    - Recalibrate the touch screen

# Video System in a Laptop

- Flickering, Dim, or Otherwise Poor Video
  - Tips to solve problems with bad video:
    - Verify Windows display settings
    - Adjust the brightness
    - Update the video drivers
    - A flickering screen can be caused by bad video drivers, a low refresh rate, a bad inverter, or loose connections inside the laptop

# Video System in a Laptop

- Replacing the LCD Panel in a Laptop
  - If LCD display entirely black: replace LCD assembly
  - If LCD display dim: video inverter problem
  - High-end laptops contain video card
    - May need to replace it too
  - General directions to replace an LCD panel:
    - Remove AC adapter and battery pack
    - Remove the keyboard
    - Remove screws holding hinge in place
      - Remove hinge cover

# Video System in a Laptop

- Replacing the LCD Panel in a Laptop
  - General directions to replace an LCD panel (cont'd):
    - Remove screws holding LCD panel to the laptop
    - Remove LCD panel from the laptop
    - Remove screws holding the top cover and LCD panel
    - Disconnect old inverter and install the new one
    - Reattach LCD panel assembly to the laptop

# Speakers in a Laptop

- Laptops and other mobile devices have built-in speakers
- If not getting any sound from speakers, try:
  - Make sure the volume is turned up
  - Update the audio output drivers
  - Run the Playing Audio troubleshooting tool
    - Open Control Panel in classic view and select **Troubleshooting**
    - In Hardware and Sound group, select **Troubleshoot audio playback**

# Summary

- Adding new devices to a computer require installing hardware and software
- Use Device Manager to manage and troubleshoot hardware
- Popular I/O ports on a motherboard include eSATA, FireWire, and USB
- Wireless connections can use Wi-Fi 802.11a/b/g/n, Bluetooth, and Infrared standards
- USB connectors include A-Male, B-Male, Mini-B, Micro-B, Micro-A, USB 3.0 B-Male, USB 3.0 Micro-B



# Summary

- When installing devices, use 32-bit drivers for a 32-bit OS and 64-bit drivers for a 64-bit OS
- Biometric input devices collect biological data in order to authenticate access to a system
- Generally, Windows detects new adapter cards and installs appropriate drivers
- Types of monitors include LCD, plasma, projector, and OLED monitor
- Video ports might be VGA, DVI-I, DVI-D, DVI-A, composite video, S-Video, component video, DisplayPort, HDMI, and HDMI mini ports

# Summary

- Use Device Manager to update drivers on I/O devices giving trouble
- Video problems can be caused by the monitor, video cable, video card, onboard video, video drivers, or Windows display settings
- A few dead pixels on an LCD monitor screen are considered acceptable by the manufacturer
- Artifacts on the monitor screen can be caused by hardware, software, overheating, or overclocking