Module 7

Video and Purchasing Components

Objectives

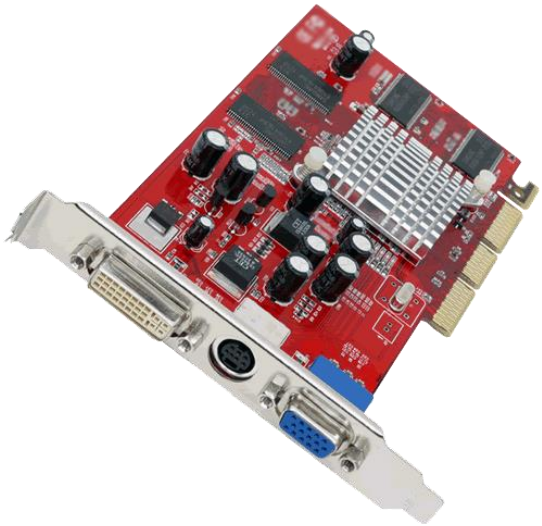
1. PC Hardware
   A. 1.11 Evaluate video components and standards
   B. 1.10 Evaluate monitors
   C. 1.9 Evaluate and select appropriate components for a custom configuration, to meet customer specifications or needs

AUDIO/VIDEO COMPONENTS AND STANDARDS

Audio Card

1. Enables the input and output of audio
2. Needs a driver installed

The Video Card



1. An integrated circuit card
2. Provides digital-to-analog conversion, video RAM, and a video controller
3. Generates text and images
4. Can be built into the motherboard or plugged into an expansion slot
5. Needs a driver installed

The Visual Graphics Array (VGA) Mode

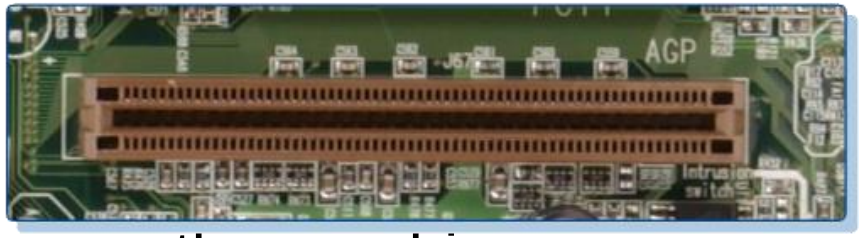
Display Characteristics

Bit Depth	Number of Colors
1	2 (monochrome)
2	4 (CGA)
4	16 (EGA)
8	256 (VGA)
16	65,536 (High Color, XGA)
24	16,777,216 (True Color, SVGA)
32	16,777,216 (True Color + Alpha Channel)

1. Lowest common denominator of display modes
2. Can provide up to 256 colors
3. Bit depth defines the number of colors
4. Higher bit depth requires more processing power
5. Lower bit depth can solve the issues

Advanced Graphics Port (AGP)

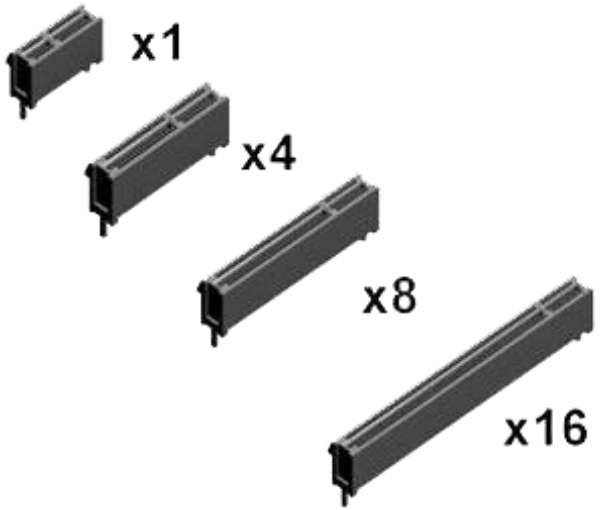
1. Introduced by Intel
2. Provides a 32-bit video channel
3. Runs at 66 MHz in basic 1x video mode
4. Maximum throughput of 266 MBps
5. The standard also supports three high-speed modes:
   A. 2x or 533 MBps
   B. 4x or 1.07 GBps
   C. 8X or 2.14 GBps



6. Provides a direct channel between the graphics controller and the computer system main memory
7. Removes video data traffic from PCI buses

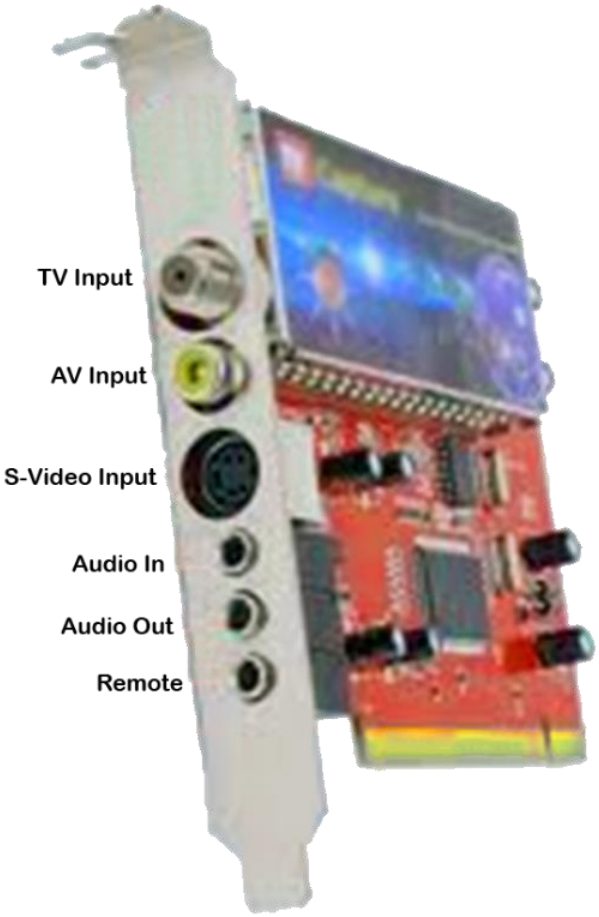
PCI Express (PCIe)

1. High-speed serial bus
2. Designed to replace the older PCI and AGP
3. Four modes:
   A. 1x
   B. 4x
   C. 8x
   D. 16x
4. Fastest graphic performance



Video Capture Cards

1. Responsible for converting video signals
2. Uses an analog-to-digital (A-to-D) converter
3. A TV tuner card



Understanding RAMDAC Chip

1. Reads, converts, and sends
2. Quality impacts
   A. Quality of the image
   B. Refresh rate
   C. Resolution

Understanding Video Memory

1. Video memory renders the image
2. Basic element is a dot or pixel)
3. Location reserved in video memory
4. The number of dots relates to the resolution
5. Resolution expressed as a pair of numbers

KVM Switch

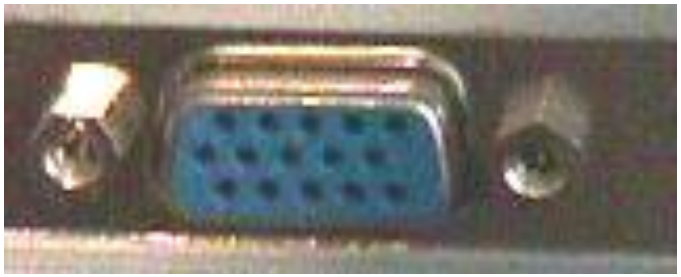
1. Stand for Keyboard, Video and Mouse
2. Hardware device
3. Controls multiple computers from one terminal
4. Only one computer controlled at a time
5. Can share peripherals

MONITORS

Cable Technology

VGA

1. Red, green and blue color signals
2. Two lines for horizontal and vertical sync signals
3. Composite video signal
4. More pixels than a TV
5. Converts Digital signal to Analog
6. Signal degrades as the cable length increases



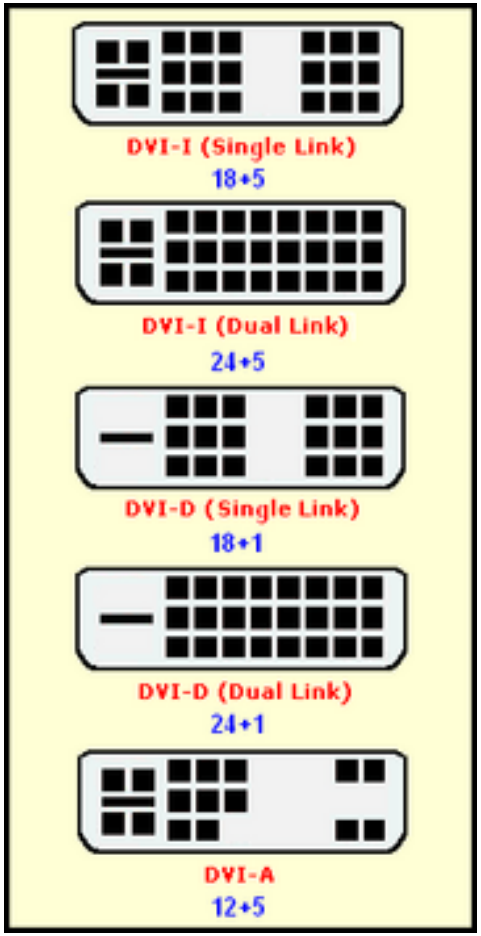
Cable Technology

Digital Video Interface (DVI)

1. Designed for Digital
2. Does not degrade

DVI Connectors

1. Connector on computer is female
2. Uses DVI-native digital video signals
3. Dual-link systems
4. Can pass legacy analog signals (VGA)
5. DVI is universal
6. Three types of connectors:
   A. DVI-I (digital and analog)
   B. DVI-D (digital only)
   C. DVI-A (analog only)



Cable Technology

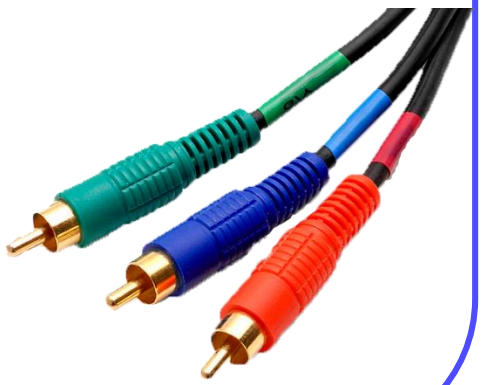
High-Definition Multimedia Interface (HDMI)

1. Compact audio/video interface
2. Transferring uncompressed video and audio data
   A. Several types of cable connectors
   B. Video formats
   C. Standard
   D. Enhanced
   E. High definition
   F. 3D video
3. Up to 8 channels of compressed or uncompressed digital audio
4. Devices can control each other
5. Backward compatible

Component Video

Component video

1. Signal split into three separate component channels
   A. Red, Green, and Blue
2. Does not carry audio
3. Better quality that VGA but less than DVI and HDMI



Refresh Rate

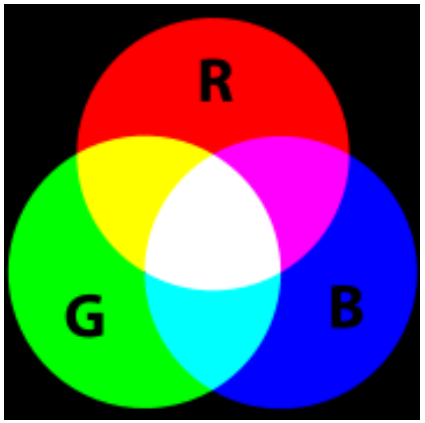
1. Number of times an image is drawn each second
2. Control flicker
3. Set as high as possible
4. Low rate causes flickering
5. Rates:
    A. 60 Hz – minimum
    B. 72 Hz – better
    C. 120 Hz
    D. 240 Hz

Painting the Picture

1. **Interlacing**
   A. Paints every other line
   B. Second pass fills in
   C. Alternates back and forth
2. **Progressive**
   A. Paints every line
   B. Significantly reduces flicker

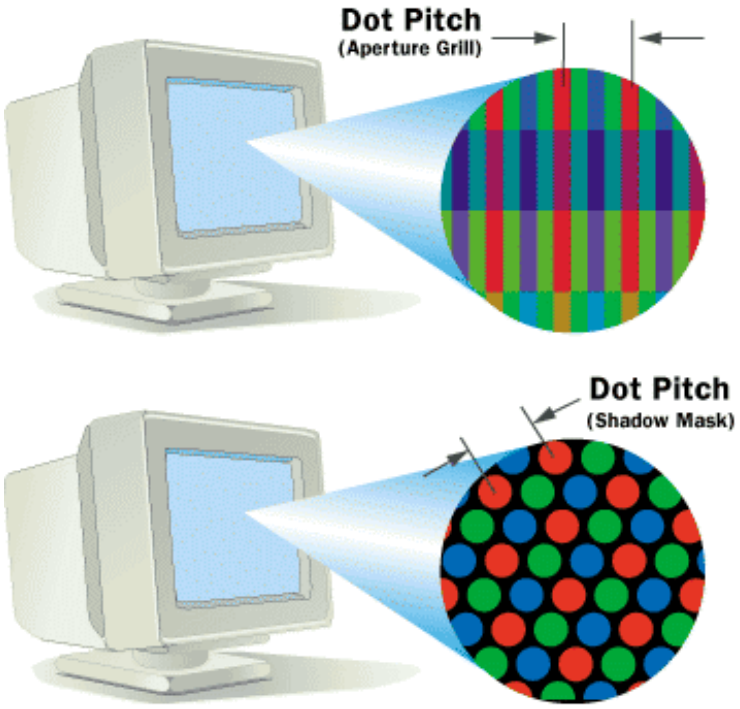
Color or Bit Depth

1. Bits describe color
2. Monitors use **additive color**
3. Displays three primary colors
   A. red, green and blue
4. Bit-depth
   A. 2-bit - **monochrome**
   B. 8-bit - **VGA** (256 colors)
   C. 16-bit - **high color** (65,536 colors)
   D. 24-bit - **true color** (16,777, 216 colors)
      - Greater computing performance
   E. 32-bit - **true color + alpha channel**



Dot Pitch

1. Diagonal distance between the same color phosphor dots (pixels)
2. Smaller dot pitch = sharpness
3. Usually .28mm or smaller
4. **Dots-per-inch** (dpi)
   A. Combination and physical screen size
5. **Native** resolution provides best quality display



Aspect Ratio

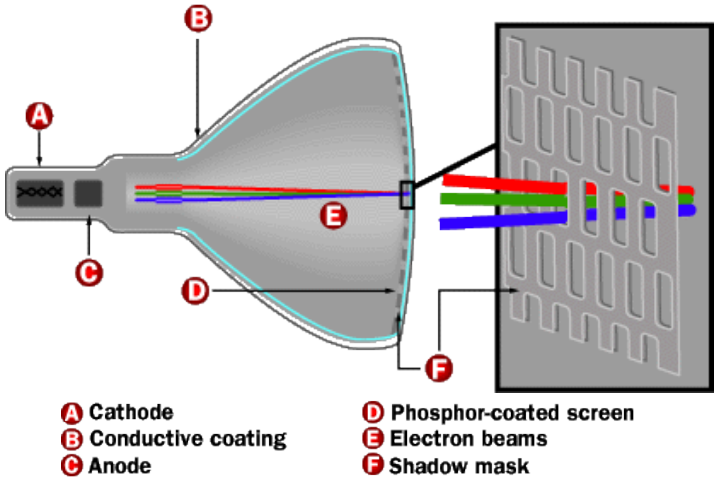
1. Screen width relative to height
2. Standardized at 4 to 3 (4:3).
3. Newest is 16:9
    A. Adapted from film
4. Measured diagonally

Display Technology

1. The monitor, video card, and CPU all work together
2. Types of monitors:
   A. Cathode Ray Tube (CTR)
   B. Liquid Crystal Display (LCD)
   C. Light-Emitting Diode(LED)
   D. Plasma

Cathode Ray Tube (CRT) Displays

1. Older projection technology
2. Used in older television sets and monitors
3. Bulky
4. Contain hazardous voltages



Liquid Crystal Display (LCD) Displays

1. Utilize two sheets of polarizing material with a liquid crystal solution between them
2. Electric current causes the crystals to align
3. Uses a back light to make the image
4. Techniques for producing color:
   A. **Passive matrix**
   B. **Active-matrix**
5. Used in desktop, laptop and notebook computers
6. Take up less space
7. Lighter

Light Emitting Diode (LED) Displays

1. Also known as Organic Light Emitting Diode (OLED)
2. Sandwiches carbon-based films between two charged electrodes
3. Voltage creates light
4. Red, green, and blue diodes
5. Small LED panels are combined to make larger displays
6. Typically used outdoors
7. Largest at Cowboys Stadium - 160 ft × 72 ft

Plasma Displays

1. Sandwiches neon/xenon gas mixture between two sealed glass plates
2. Uses parallel electrodes that form right angles
3. Plates are sealed
4. Produces ionized plasma which emits UV radiation
5. Radiation activates color phosphors and visible light is emitted from each pixel
6. Highest power consumption
7. Capable of producing deeper blacks
8. Superior contrast ratio
9. Wider viewing angles
10. Less visible motion blur
11. High refresh rates
12. Faster response time
13. Used for larger monitors and TVs

Touchscreen Monitors

1. LCD monitor with integrated mouse
2. Uses a USB connection
3. Requires special driver
4. Translates touch

HOW TO EVALUATE AND PURCHASE COMPUTER COMPONENTS

Customer Requirements

1. Talk to your customer
2. What are their expected uses?
   A. What is your budget?
   B. How will you use this computer?
   C. Where will you use this computer?
   D. What operating system do you require?
   E. How much storage space do you require?
   F. What applications will you need to run?
   G. Other user requirements
3. Acquire the appropriate parts

Case

What do you look:

1. Does the overall dimensions fit the space you have allotted?
2. Does it have the appropriate number and size of drive bays?
3. Construction of the case itself. Aluminum, metal, or plastic?
4. Does the motherboard fit the case?
5. Does the have the appropriate front panel connectors?
6. Does it already have a power supply installed? Is it the correct wattage?
7. What type of processor cooling does it support? Air cooled or water cooled?
8. Can it maintain positive air pressure?
9. Do you have space the appropriate case fans?

Motherboard

What do you look:

1. Form Factor - Will it fit into the case?
2. CPU Socket Type - Does it match the processor socket type?
3. CPU Type - Is it compatible with the processor manufacturer and socket type?
4. Power - How much power does it need to operate? Is the power supply wattage correct?
5. Memory - What type, pinout and speed will it support?
6. What built in expansion capabilities do you require?
7. What on-board capabilities does it have?
8. What I/O ports are present on the rear panel and for the on-board expansion?

I/O

What do you look:

1. Does the motherboard support all your I/O needs and capabilities?
2. Are there appropriate slots available on the motherboard for expansion?
3. Video - Does the built-in video meet the resolution, frame rate, and connections needed to support the monitor you have and the applications you will run?
4. Sound - Does the sound card meet the speaker configuration and capabilities needed to support the applications and playback?
5. Network - Does the network card meet the connection type, speed, and quantity to support the specifications?
6. Are there any other connections not built-in to the motherboard you need to add?

Processor

What do you look:

1. Model - Does the manufacturer and type match the motherboard?
2. CPU Socket Type - Does the socket and pin-out match the motherboard?
3. Operating Frequency - How fast is the processor?
4. FSB - IS the front side bus compatible with the motherboard?
5. Power - Does the power supply have enough wattage to support this processor?
6. Cache - How much onboard cache memory is available? The more the better.
7. Capabilities - Does it have the capabilities you need to support the operating system and programs you want to run?
8. Cooling - Is cooling provided? Does it meet the operating temperate you want to maintain?

Cooling

What do you look:

1. Determine the cooling needed. Liquid or air?
2. Calculate the cooling efficiency of a processor and heat-sink?
3. Do you have thermal paste?

Memory

What do you:

1. Type - Is it compatible with the motherboard and chipset?
2. Capacity - Is there slots available and does it fit the capacity set by the chipset?
3. Speed - Does the motherboard support the speed?
4. Power - Does the power supply have enough wattage to support this memory?

Storage

What do you look:

1. Type - Does it meet your needs: optical, mechanical, solid state?
2. Capacity - Does it meet you needs?
3. Speed - Does it's read and write speeds meet your specifications?
4. Interface - Does it have an interface of the right speed and type to connect to the motherboard?
5. Form Factor - Are the right size slots available in the case?
6. Power - Does the power supply have enough wattage to support your drives?

Expansion Cards

What do you look:

1. Video Card – Does it support the slot type you have? Does it have the correct interface? Does it have the appropriate frame rate and resolution?
2. Sound Card – Does it support the slot type you have? Does it have the appropriate speaker configurations and connectors?
3. Network Interface Card – Does it support the slot type you have? Does it have the appropriate speed and interface?
4. Other

Power Supply

What do you look:

1. Does it have the right connectors to connect to the motherboard?
2. Does it have the right connectors and amount to connect to all the drives?
3. Does it have the correct wattage to support all the installed components?

Other

What other components do you need?

1. Monitor
2. Keyboard
3. Mouse
4. Printer
5. External drive
6. Scanner
7. Wireless
8. Modem

Summary

In the module we discussed:

1. Audio/Video components and standards
2. VGA mode
3. Bus types
4. Cabling types
5. Monitor standards
6. Display types
7. Customer requirements
8. How to buy components