

CRT Monitors

- Have a **Cathode Ray Tube**
 - one end is a cylinder that consists of 3 electron guns
 - The wide end is the Display Screen
- **Refresh rate - Typical VRR** (60 , 72, 75, 85, 100) Hz
 - **Horizontal Refresh Rate (HRR)**
 - Speed at which the electron beam moves across the screen
 - **Vertical Refresh Rate (VRR)**
 - The amount of time taken by the monitor to draw the entire screen and get the electron beam back to the start
 - **Multisync** monitors support different VRRs
- **Shadow Mask**
 - Screen that enables proper use of phosphors, lighting the proper phosphor
 - Electron guns sweep across the phosphors as a group
- **Resolution**
 - CRTs change resolution by changing the size of the beam
 - The wider = The lower
 - **Common (4:3) :**
 - 640x480
 - 800x600
 - 1024x768
 - 1280x960
 - 1600x1200
 - **RAMDAC chip** : Converts digital signal to an analog signal



CRT Monitor

LCD Monitors (Liquid Crystal Display)

- Thinner and lighter
- Less power
- Flicker-free
- No radiation
- **Types :**
 - **Passive matrix**
 - Three matrices produce color
 - Above the intersections of the wires, glass covers tiny red, green and blue dots
 - Tends to create overlap
 - Blurred effect
 - **Dual-scan passive matrix**
 - 2 lines at the time
 - Used in :
 - Fuel pumps
 - Kiosks
 - Replaced with **TFT (Thin Film Transistor)**

- **Thin film transistor (active matrix)**
 - Tiny transistors control color dots
 - Brighter, better contrast
 - Wider viewing area
 - **Twisted Nematic (TN)**
 - Not the best color reproduction
 - **IPS (In-Plane Switching)**
 - Better color reproduction
 - Better viewing angle
- LCD monitors use liquid crystal molecules
 - Polarization
- **Components:**
 - **Backlights (CCFLs)** : Illuminate the image
 - **Inverters** : Power the backlights (AC)
 - **Board uses DC**
 - **LED Monitors (Light-Emitting Diode)**
 - Directly illuminate pixels from behind
 - More costly
 - Better colors and contrast
 - **Resolution:**
 - Native resolution (sharpest and best)
 - **Brightness :**
 - Determined by backlight
 - Measured in nits (avg. 300)
 - **Response Rate :**
 - Similar concept as refresh rate
 - Lower = Better
 - **Refresh Rate** is locked at 60Hz or 120Hz
 - **Contrast Ratio :**
 - Difference between lightest and darkest
 - Low end (250:1) to high end (1000:1)



LCD Monitor

Projectors :

- Rear-view
- Front-view
- **Lumens** : amount of light provided (More = Brighter)
- **Throw** : size of an image at a certain distance
- **Lamps** : Expensive (XXX\$)

Plasma Display Panels (PDP)

- Wider viewing angle and higher-quality
- Cost less
- Heavy
- Consumer more energy
- **Burn-In** : Tendency to leave a ghost image
- **Overscan** : TV blows up the image, cropping off the edges

DVI:

- Digital Visual Interface
- **DVI-D (digital)**
- **DVI-A (analog)**
- **DVI A/D or DVI-I (interchangeable)**
- **Single Link (Only DVI-D/I):**
 - 1920 x 1080 @ 60 Hz
 - 1280 x 1024 @ 85 Hz
- **Dual-link DVI (Only DVI-D/I):**
 - 2048 x 1536 @ 60 Hz

Video Memory Minimums

- **Resolution x color depth = memory needed**
- **PCI slots :**
 - 800x600 @70HZ
8-bit → Requires
33.6 MBps
 - 24 bits requires
100.8 MBps
- **AGP (accelerated graphics port) :**
 - Own data bus
 - Pipelining support
 - Sidebanding (send and receive at the same time)
- **PCIe :**
 - Replaces AGP and PCI
 - Sidebanding
 - System memory access

Video Mode	Resolution	Aspect Ratio
SVGA	800 × 600	4:3
HDTV 720p	1280 × 720	16:9
SXGA	1280 × 1024	5:4
WXGA	1366 × 768	16:9
WSXGA	1440 × 900	16:10
SXGA+	1400 × 1050	4:3
UXGA	1600 × 1200	4:3
HDTV 1080p	1920 × 1080	16:9
WUXGA	1920 × 1200	16:10
QWXGA	2048 × 1152	16:9
WQXGA	2560 × 1600	16:10
WQUXGA	3840 × 2400	16:10

References :

- Mike Meyers - CompTIA A+ Certification All-In-One Exam Guide 8th edition
- CRT monitor image :
http://img.bhs4.com/65/7/657a347a811ee9a4e735f2dd83054e5daefbd17b_la_rge.jpg

- LCD Monitor Image :

<http://www.gadgetreview.com/wp-content/uploads/2010/07/acer-s1-lcd-monitor.jpg>