• BIOS
  • Configuration
  • Security
  • Monitoring
• BIOS CMOS RAM Battery
• POST
• Configure BIOS
• Peripheral Component Interface (PCI)
  • Mini PCI
  • PCI- Extended (PCI-X)
  • PCI Express (PCI-e)
• Accelerated Graphics Port
• CNR
• Expansion Cards
  • Sound Cards
  • Audio Connectors
  • Video Cards
  • Network Interface Cards
  • Serial Port Cards
  • Parallel Port Cards
  • USB Cards
  • Firewire Cards
  • Memory Card Reader Cards
  • Modem Cards
  • Wireless Cellular Cards
  • Riser Cards
• Expansion Card Installation
• Device Manager Configuration
• Expansion Card Removal
• Display Devices
  • Selection
  • Adjust Output
  • Installation
• Multimedia Configuration
  • Windows 7
  • Windows XP
• Wireless Bluetooth
• Wireless IrDA
• Basic Input Output System
• Software stored in a ROM
• Settings stored in BIOS RAM Memory
• Sets hardware configuration, settings, environment
• Every computer has a system BIOS
• During BIOS initialization press a predefined key which can vary by manufacturer (usually F2, F8)
• Can configure date, time, enable/disable specific devices such as hard drive controllers, I/O hardware, hardware virtualization, clock speeds, etc.
BIOS Configuration

CMOS Setup Utility - Copyright (C) 1984-1999 Award Software

- Standard CMOS Features
  - Advanced BIOS Features
  - Advanced Chipset Features
  - Integrated Peripherals
  - Power Management Setup
  - PnP/PCI Configurations
  - PC Health Status

- Frequency/Voltage Control
  - Load Fail-Safe Defaults
  - Load Optimized Defaults
  - Set Supervisor Password
  - Set User Password
  - Save & Exit Setup
  - Exit Without Saving

Esc : Quit
F10 : Save & Exit Setup

↑↓→← : Select Item

Time, Date, Hard Disk Type...
• Access to BIOS configuration can be password protected
• HD can be encrypted
• Trusted Platform Module (TPM) - “chip” cryptographic co-processor that stores keys, hardware and platform authentication, digital rights management, and software licensee
• BIOS Lo-Jack – after-market tracking system
• Temperature and Fan Speed – CPU, Motherboard, HD, GPU, etc.
• Intrusion Detection
• Voltage – Motherboard, CPU, GPU
• Clock – time
• Bus Speeds
• BIOS setting stored in BIOS/CMOS (Complementary Metal Oxide Semiconductor) RAM.
• Flat cell lithium ion battery provides power to RAM to retain BIOS settings.
• If BIOS setting reset after every power off, usually the battery needs to be replaced.
• Power On Self Test
• Built in test
• Run every boot cycle
• Checks: power, CPU, BIOS, BIOS memory, RAM, I/O bus, I/O controller
• Actual process, beeps, and error notifications vary from manufacturer to manufacturer
• Screens, options, keys, and interface vary by manufacturer and BIOS version
• General: motherboard and BIOS info, date/time, boot sequence
• Memory: amount and type of RAM
• CPU: performance, virtualization support
• Power: settings and management
• Clock speed: CPU, RAM, bus
• Devices: video card, enable/disable HD controllers, RAID, monitor, USB, Serial/Parallel ports, input devices
• Security: manage passwords, TPM, tracking software
Peripheral Component Interface (PCI)

- Known as PCI
- Created in 1994
- 32bit and 64bit bus width
- Throughput
  - 133 MB/s (32bit 33Mhz)
  - 266 MB/s (32bit 66Mhz, 64bit 33Mhz)
  - 533 MB/s (64bit 66Mhz)
Peripheral Component Interface (PCI)
Mini PCI

- Smaller for laptops
- Wifi, mobile data
PCI extended (PCI-X)

- For servers
- High bandwidth
- 4x clock speed
- 1064 MB/s
PCI Express (PCI-e)

- Serial communication
- Slower devices don’t slow down the bus
- x1, x2, x4, x8, x16, x32
- V1.x = 250 MB/s
- V2.x = 500 MB/s
- V3 = 1 GB/s
- V4 = 2 GB/s
- AGP
- 1996
- Bridge between PCI and PCI-e
- AGP 1x 266 MB/s
- AGP 2x 522 MB/s
- AGP 4x 1.07 GB/s
- AGP 8x 2.1 GB/s
- AGP Pro—additional pins on cards for electrical power
• Communications and Network Riser – specialized in network, audio, and telephony equipment

• 2 rows of 30 pins, circa 1996

• Phased out in favor of motherboard and embedded components
Expansion Cards

- Printed circuit boards
- Plugs into PCI, AGP, ISA slots on motherboard
- Examples: video, sound, network, serial, parallel, USB, Firewire, storage, modem, wireless, cellular, TV tuner, video capture, and riser cards.
Sound Cards

- Creates sound and music primarily from software programs such as games, audio/video players/editors, presentations, etc.
- Has connections to external speakers, headphones, microphones, music devices (MIDI)
• Modern motherboards have sound card capability integrated

• External sound cards generally improve quality, features, or connections to external audio devices
Audio Connectors

- 3.5mm minijacks
- Pink mic
- Light blue audio in
- Lime green headphone, front speakers
- Brown surround R/L
- Black surround rear
- Orange surround center, subwoofer
- 15 pin D - Game port MIDI
• Creates 2D/3D graphics, video decoding for video displays
• Many video cards have an onboard GPU – Graphics Processing Unit to significantly improve 2D and 3D graphic quality and speed
• Modern motherboards and CPUs have integrated video cards
Network Interface Cards

- NIC – connects a computer to a network (usually by RJ45/UTP/Ethernet cabling)
- Typically support 10, 100, 1,000, 10,000 Mb/s
- IEEE 802.3
- OSI Layer 1 and 2
- Modern motherboards and have integrated NIC cards
• Serial – 1 bit at a time
  • RS-232, DE-9, 9 pin port
  • Mini DIN-8
  • Speed: 75, 110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bit/s
  • Typical setting: 8 data bits, no parity, 1 stop bit
Parallel Port Cards

- Parallel – multiple bits at a time
  - DB-25, 25 pin port on the computer
  - 36 pin female port on printers
  - IEEE 1284
  - Speed: PP: 12,000 Kb/s EPP: 2 MB/s
Parallel Port Cards

- Commonly used with older printers, scanners, external modems, sound cards, webcams, gamepads, joysticks, external hard disk drives, and CD-ROM drives
- Mostly replaced by USB and network technology
• Adds USB connection capability to a computer
• Nearly every modern motherboards have USB connectivity integrated
• Modern use would be to add USB 3.0 ports to a computer
FireWire Cards

- Adds FireWire connection capability to a computer
- Some modern motherboards have FireWire connectivity integrated especially with Apple computers
- Modern use would be to add FireWire capability to a computer
• Adds memory card connection capability to a computer
• Some modern motherboards have memory card reader connectivity integrated, especially laptop and portables
• Modern use would be to add memory card reader capability to a computer
• Usually connection is made using an external USB device
• Modem – modulate demodulate
• Enabled data communication over PSTN – public switched telephone network
• v.21, v.22, v.26, v.27, v.32, v.34, v.90, v.92
• Speed: 0.1 – 56 Kb/s
• Currently rare, largely replaced by broadband connections (DSL, cable, FiOS, wireless)
Wireless/Cellular Cards

- Wireless modem
- Enabled data communication over wireless networks (802.11, 3G, 4G)
- Speed:
  - 3G: 0.03 – 5.7 Mb/s
  - 4G: 0.1 – 1 Gb/s
- Use case: 802.11 capability to a desktop/server, expand wireless data capability of laptop, mobile devices
- Can also use USB connections
An expansion card that allows at least 1, usually multiple, expansion cards to connect to a motherboard.

In rackmount servers allows addition of expansion cards in horizontal position vs vertical position.

Example, PCI riser card,

Use: expand capability on small motherboards, servers; space on rackmount servers.
• Power off and unplug everything, open the system case, ground yourself
• Insert the expansion card into the appropriate slot with firm force until it is seated
• Connect any internal or external cables
• Secure the expansion card to the case with screws and replace the case
• Turn on the system and make BIOS or firmware settings if necessary
• Install/configure software/drivers (if needed)
• Verify the expansion card is functioning
• PnP – Plug and Play
  • Automatic OS configuration (+Windows 95)
• READ AND FOLLOW MANUFACTURER'S INSTRUCTIONS
• Manually install manufacturer software/driver
• Use Add Hardware wizard
  • Hardware scan
  • Choose from list of devices
Device Manager Configuration

- Computer
  - ACPI 64-based PC
  - Boot Manager
  - Display adapters
  - Red Hat QXL GPU
  - Floppy drive controllers
  - Standard floppy disk controller
  - IDE ATA/ATAPI controllers
  - ATA Channel 0
  - ATA Channel 1
  - Intel(R) 823715B PCI Bus Master IDE Controller
- Keyboards
  - Standard PS/2 Keyboard
- Mice and other pointing devices
  - PS/2 Compatible Mouse
- Network adapters
  - Realtek RTL8139C+ Fast Ethernet NIC
- Ports (COM & LPT)
  - Communications Port (COM1)
- Processors
  - Intel Core i7 9x (Nehalem Class Core i7)
  - Intel Core i7 9x (Nehalem Class Core i7)
  - Intel Core i7 9x (Nehalem Class Core i7)
  - Intel Core i7 9x (Nehalem Class Core i7)
- Sound, video, and game controllers
  - High Definition Audio Device
- Storage controllers
  - Red Hat QXL SCSI controller
- System devices
  - ACPI Fixed Feature Button
  - Composite Bus Enumerator
  - High Definition Audio Controller
  - High precision event timer
  - Intel 823715B PCI to ISA bridge
  - Intel 82441FX Pentium(R) Pro Processor to PCI bridge
  - Microsoft ACPI-Compliant System
  - Microsoft System Management BIOS Driver
  - Microsoft Virtual Device Enumerator Driver
  - PCI bus
  - Plug and Play Software Device Enumerator
  - Remote Desktop Device Redirector Bus
  - System CMOS/default time clock
  - UMBus Enumerator
  - UMBus Root Bus Enumerator
  - VIRTIO Balloon Driver
  - VIRTIO-Serial Driver
  - Universal Serial Bus controllers
  - Intel(R) 823715B PCI to USB Universal Host Controller
  - USB Root Hub
• Power off and unplug everything, open the system case, ground yourself
• Disconnect any internal or external cables/wire and make note of location/orientation
• Remove the screw holding in the expansion card
• Rock the card back and forth to loosen and remove it from the slot
• Place card into an anti-static bag
• Replace and screw down the slot cover
• Replace the case and power on the system
• Size
• Technical needs: software, application use, high resolution, multiple displays, etc
• Efficiency (order least to greatest): CRT → Plasma → LCD → LED → OLED
• Cost (order low to high cost): LCD → LED → OLED → Plasma
• Resolution
  • Windows 7: Screen Resolution Tool
    • Right click on desktop, select Screen Resolution
    • Select the desired resolution, Press OK
    • Select Keep Changes or Revert
  • Windows XP:
    • Right click on desktop, select Properties → Settings tab
    • Select the desired resolution, Press Apply
    • Select Keep Changes or wait to revert
    • Select Apply then OK in the Display Properties
Display Devices – Adjust Output

Windows 7
Display Devices – Installation

• Power off and unplug everything
• Find the connectors (VGA, DVI, HDMI, USB) and cables
• Align and insert connectors into proper port on both display graphics adapter port, computer system, and the display
• Secure the cables to ports using finger screws
• Plug in and power on everything
• Verify the display works
  • Power light steady on, color is correct, no lines, waves, or distortions
Windows XP
Windows 7

- Control Panel → Hardware and Sound
  - Adjust system volume settings link
  - Manage audio devices link
    - Playback tab – select and configure playback device
    - Recording tab – select and configure microphones and audio input devices
    - Sounds tab – assign sounds and schemes for operations and events
- Device manager for MIDI and other devices
Windows 7
Windows 7

Multimedia – Configuration

Windows can automatically adjust the volume of different sounds when you are using your PC to place or receive telephone calls.

When Windows detects communications activity:
- Mute all other sounds
- Reduce the volume of other sounds by 80%
- Reduce the volume of other sounds by 50%
- Do nothing
Windows 7

Multimedia – Configuration

Windows can automatically adjust the volume of different sounds when you are using your PC to place or receive telephone calls.

When Windows detects communications activity:

- Mute all other sounds
- Reduce the volume of other sounds by 80%
- Reduce the volume of other sounds by 50%
- Do nothing
Windows XP

• Control Panel → Sounds and Audio Devices
  • Volume tab
  • Sounds tab
  • Audio tab
  • Voice tab
  • Hardware tab
Windows XP

Multimedia – Configuration
Windows XP

[Screenshot of the Sounds and Audio Devices Properties window in Windows XP, showing device properties for QEMU QEMU DVD-ROM and other devices.]

Device Properties:
- Manufacturer: (Standard CD-ROM drives)
- Location: Location 0 (0)
- Device Status: This device is working properly.
Windows XP
Windows XP
• 2400 – 2483 Mhz ISM band
• PAN – personal area network and connection for faxes, mobile phones, telephones, laptops, personal computers, printers, Global Positioning System (GPS) receivers, digital cameras, and video game consoles
• V1.2 – 2005, 1 Mb/s
• V2+EDR - 2004, 3 Mb/s, easier pairing
• V3+HS – 2009, 24 Mb/s, enhanced power control
• V4 – 2010, BLE Bluetooth low energy
• Range - Class 1 ~100 m, Class 2 ~10 m, Class 3 ~ 1m
• IrDA – Infrared Data Association
• Used with mobile phones, laptops, cameras, printers, medical devices
• Line of sight
• Speed: 2.4Kb/s – 1 Gb/s
• Angle: +/− 15 degrees
• Range: 1 m
THANK YOU