



10/19/2019

## COMPUTER HARDWARE FUNDAMENTAL

### MODULE 02: The Motherboard

#### The Motherboard

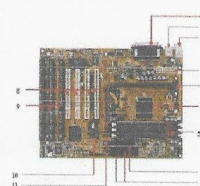
- Motherboard
- Form Factors
- Chipsets
- Connectors
- Buses
- BIOS

#### The Motherboard

- The main printed circuit board that resides inside the pc.
- Equipped with sockets where the processor, memory, plug-in cards, daughterboard, and peripheral devices are connected.

#### The Motherboard Connectivity

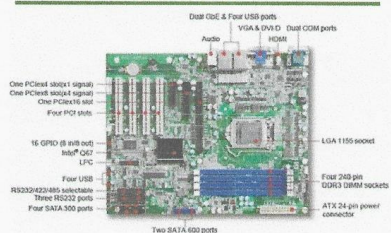
1. Mouse and keyboard connector
2. USB ports
3. Parallel port
4. CPU chip
5. RAM slots
6. Floppy controller
7. IDE controller
8. PCI slot
9. ISA slot
10. CMOS battery
11. AGP slot
12. CPU slot
13. Power Supply plugin



#### The Motherboard

- Obsolete motherboards:
  - PC/XT
  - Full-size AT
  - Baby-AT
  - LPX

#### The ATX Motherboard





10/19/2019

#### The ATX Motherboard

- Standard tower and desktop systems; most common type from 1996 through the present; supports high-end systems.
- Maximum Slots: 7

#### The Mini-ATX Motherboard

- A slightly smaller version of the ATX motherboard that fits the ATX chassis; many ATX motherboards are sold as Mini-ATX motherboards.
- Maximum Slots: 6

#### The Micro-ATX Motherboard

- Smaller version of the ATX.
- Used in mid-range systems.
- Fits the microATX or ATX chassis.
- Maximum Slots: 4

#### The ATX Motherboards

- Widely used in low-cost home PC and small form-factor corporate PC.
- An open, non-proprietary industry specification originally developed by Intel in 1995.
- Built in I/O external connector panel that eliminated the need for cables that runs from the motherboards to the rear of the case.

#### The ATX Motherboards

- Single main internal power supply connector that is very easy to plug and cannot be installed incorrectly.
- CPU and memory is relocated next to the power supply, so that they cannot interfere with any bus extension cards.
- Internal I/O connectors for the floppy and hard drive are relocated near the drive bay so cables can be shorter.

#### The ATX Motherboards

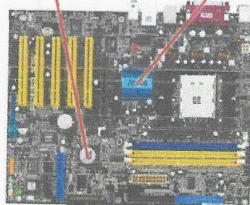
- CPU and main memory are designed to improve overall system cooling.
- Due to elimination of cables to external port connectors, it is considered cheaper to manufacture.



10/19/2019

### The Chipsets

South Bridge North Bridge



### The Chipsets

- Group of microchip on the motherboard that controls the flow of data and instructions to and from the CPU.
- Controls the memory cache, power management, external buses and some peripherals.

### The Buses

- An electrical channel that transfer bits internally within the circuitry of a computer allowing all of the devices to communicate with each other.
- Common pathway across which data can travel within a computer.

### The Buses

- The Bus carries the following:
  - Electrical power
  - Control signals
  - Memory addresses
  - Data

### The Buses

- System Bus
  - A local bus that works synchronously with the CPU and the system clock.
  - Connected directly to the CPU and is synchronized with the CPU.

### The Buses

- Types of system bus:
  - Data bus
    - Group of lines on the system bus that allow data to flow back-and-forth between devices.



10/19/2019

### The Buses

- Address bus
  - Communicates memory addresses and I/O devices to tell devices where data flowing on the data bus should travel.

### The Buses

- Control bus
  - Coordinates activity between various devices to prevent data collision.

### The BIOS

- A low-level software that controls the system hardware.
- Link between the hardware and the operating system.
- Devices drivers or drivers.

### The BIOS

- Three possible sources of BIOS in a PC:
  - Motherboard ROM
    - Contains the initial software drivers to run the system.

### The BIOS

- Adapter card ROM
  - Commonly used for devices that should be active during boot time.
  - Commonly found on video cards since it should be active during boot time.

### The BIOS

- Loaded into RAM from disk.
  - Commonly used for devices that do not need to be active during boot time.



10/19/2019

### The BIOS

- Real-time clock/Non-volatile memory (RTC/NVRAM)
- CMOS RAM
- Two separate chips that can be found on the motherboard.
- A portion of its memory was dedicated to the clock function while the rest was used to store BIOS setup information.

### The BIOS

- Four main functions of BIOS:
  - POST
    - Tests the PC components such as processor, memory, keyboard, etc.

### The BIOS

- Setup
  - Can be accessed by pressing a special key during POST.
  - Enables configuration of PC settings such as date and time, passwords, power management, boot-drive sequence, etc.

### The BIOS

- Bootstrap loader
  - Reads the disk drives and looks for a master boot record.
- BIOS
  - Actual collection of drivers that serves as an interface between the hardware and operating system after boot-up.

### The BIOS

- Four main types of ROM chips:
  - Read-only memory (ROM)
  - Programmable ROM (PROM)
  - Erasable PROM (EPROM)
  - Electrically EPROM (EEPROM)

### The BIOS

- Popular ROM BIOS manufacturers:
  - American Megatrends, Inc. (AMI)
  - Phoenix Technologies
  - Award Software



10/19/2019

### The BIOS

- BIOS setup keystrokes:
  - AMI BIOS - <delete>
  - Phoenix BIOS (FirstBIOS Pro) - <F2>
  - Award BIOS (FirstBIOS) - <delete> or <Ctrl+Alt+Esc>
  - Microaid Research (MR) BIOS - <Esv>

### The BIOS Setup Menu Screen

- Maintenance
  - Specifies the processor speed and clears the setup passwords. This menu is available only in CONFIGURE MODE, set by a jumper on the board.

### The BIOS Setup Menu Screen

- Main
  - Allocates resources for hardware components.
- Advanced
  - Specifies advanced features available through the chipset.

### The BIOS Setup Menu Screen

- Security
  - Specifies passwords and security features.
- Power
  - Specifies power management features.

### The BIOS Setup Menu Screen

- Boot
  - Specifies boot options and power supply controls.
- Exit
  - Saves and discards changes to the setup program options.