Motherboard, Power supply, BIOS and POST

Computer Maintenance and Protection

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Motherboards

- **A motherboard** is the circuit board which controls the entire functioning of the computer.
- All the components that form your computer are connected to the computer motherboard.
- The computer processor, which is the most important component of your computer, is mounted on the computer motherboard.
- All other components like the computer keyboard, computer monitor, computer mouse, hard drives, etc., are all connected to the computer motherboard through cables.

Motherboards…

- The motherboard is sometimes known as the **main board** or **system board.**
- Types of motherboards are based on dimensions.
- The physical dimensions of a motherboard is known as the *form factor*.
- **A motherboard form factor** is the description of the dimensions or size of the motherboard and what the layout of the motherboard components are.

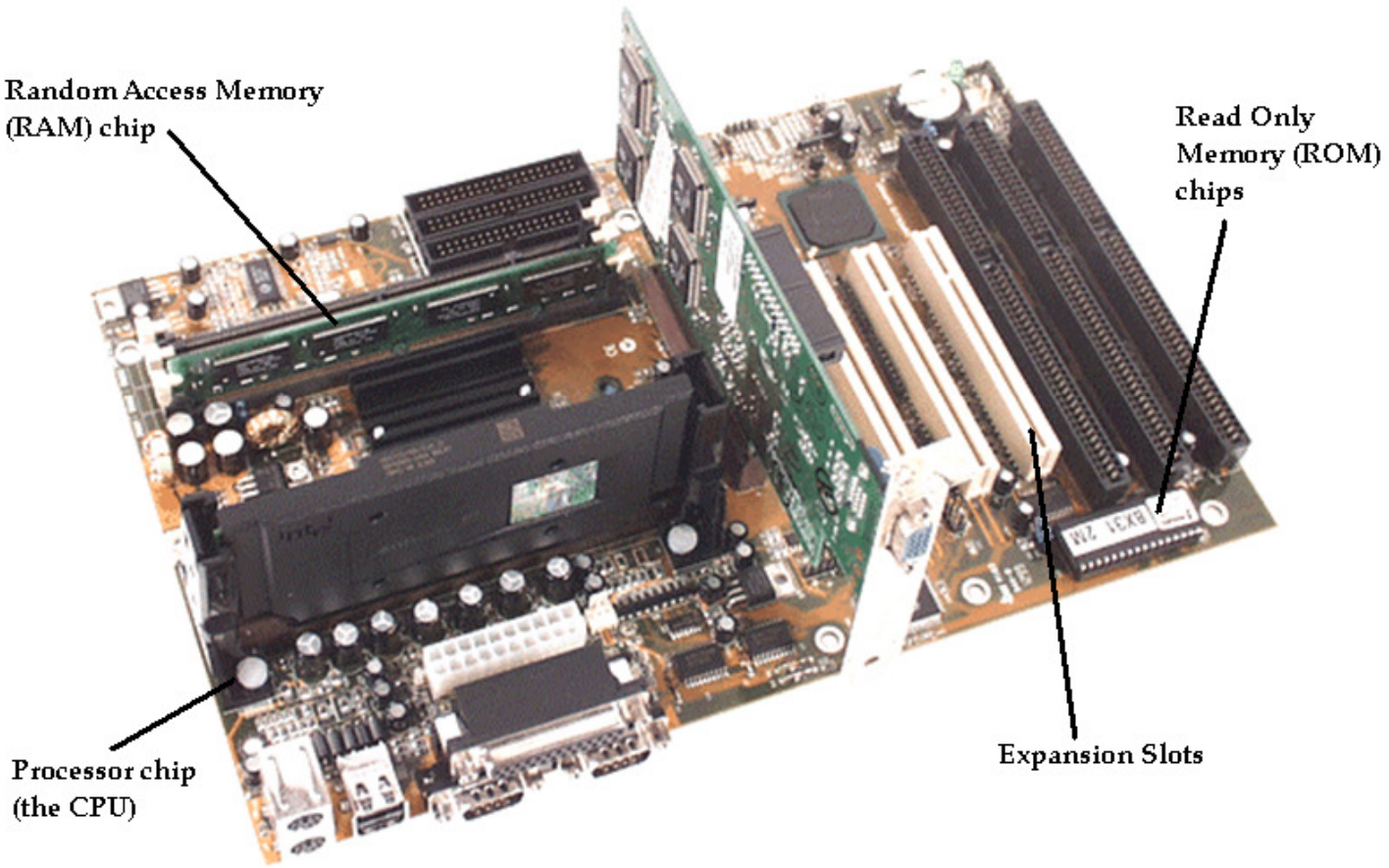
Motherboards…

- It is important to understand the different motherboard form factors, because you cannot take any motherboard and place it in to your computer case.
- Types of motherboards are Full AT, Baby AT and ATX

Motherboard layouts

- In both the AT and ATX designs, the computer components included in the motherboard are:
  - *Processor*
  - *Memory*
  - *Basic input/output system (**BIOS**)*
  - *Expansion **slot***
  - *Connectivity Directly or Indirectly to every part of the PC.*

Layout…


Random Access Memory
(RAM) chip
Read Only
Memory (ROM)
chips
Processor chip
(the CPU)
Expansion Slots

Advice on Buying Motherboards

- Deal with reputable manufacturer
- Ensure that it has same form factor as current case
- Check the power supply requirements and processors
- Verify the form factor of your computer case matches the form factor of any motherboard you plan to buy
- Avoid tweaking voltages and timings

Choosing the Motherboard Case

- Make sure you choose a motherboard and case that are compatible, especially in regards to the form factor.
- You must put an ATX board in an ATX case.
- The motherboard book or technical manual contains critical information about the motherboard.
- When choosing motherboard cases make sure you answer questions like:
  - ☞ What CPU will work?
  - ☞ How much RAM is supported?
  - ☞ Will I have room to upgrade RAM in the future?

Power Supply

- The electricity available from a standard wall outlet is alternating current (AC), but a microcomputer runs on a direct current (DC).
- The *power supply* is a device that converts AC to DC to run the computer.
- The on/off switch in your computer's system unit turns on or shuts off the electricity to the power supply.

Power supply…

Power supply…

- Electrical power drawn from a standard AC outlet can be quite uneven. For example sudden extremely high voltage can burn out the low voltage circuitry in your computer.
- Instead of plugging your computer directly into the wall electrical outlet, it's a good idea to plug it into the power protection device.
- The two principal types are *voltage regulators* and *UPS units*.

Voltage Regulator

- A voltage regulator is a device that protects a computer from being damaged by insufficient power. It helps to regulate (stabilizes) the voltage if power is too low or too high, it's as though the computer were turned off.

UPS

- A *UPS* (*Uninterruptible Power Supply)*, is a battery-operated device that acts as a surge protector and provides a computer with electricity if there is a power failure.
- The UPS will keep a computer going 5 – 30 minutes or more. It goes into operation as soon as the power to your computer fails.

BIOS

- The external data bus connects devices on the motherboard together.
- Everything is also connected to the address bus.
- These busses are the “physical” connections between the devices.
- But with what software does the CPU use to communicate with these devices?
- By the use of **BIOS**!

BIOS…

- **BIOS** is software that contains hundreds of programs that allow for communication between the CPU and devices.
- BIOS is stored on **ROM**, which is a permanent chip on the motherboard
- BIOS is software, ROM is hardware
- Permanent BIOS is called **firmware**, since it is software that does not change

POST- Power On Self Test

- Stored on the ROM chip.
- Runs every time computer is turned on.
- Instructs all devices to run a self check to determine if everything is working.
- First the basic devices checked and beeps are sounded to indicate problems.
- Second the rest of the devices are run and error codes are displayed to indicate problems.

The booting process

- The process of starting or restarting a computer is called **booting.**
- When turning on a computer that have been powered off completely you are performing a **cold boot**.
- A **warm boot** is a process of restarting a computer that is already powered on.

Steps in the booting process

- **Step 1:**

  The power supply sends an electrical signal to the components in the system unit.
- **Step 2:**

  The charge of electricity causes the processor chip to reset itself and find the ROM chip that contains BIOS.
- **Step 3:**

  The BIOS performs POST, which checks components such as mouse, keyboard, etc. are connected properly and operating correctly.

Steps…

- **Step 4:**

  The results of the POST are compared with data in a CMOS (Complementary Metal Oxide Semiconductor)
- **Step 5:**

  The BIOS looks for the system files in drive A (floppy disk drive), sometimes a CD or DVD drive, and then drive C (hard disk).
- **Step 6:**

  System files and the kernel of the operating system loads into RAM from hard disk.

Steps…

- **Step 7:**

  the operating system loads configuration information, may request user information, and display the desktop on the screen.

Thank You!