Introducing Hardware - Chapter #1

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Key Terms

1. **Advanced Configuration and Power Interface (ACPI)** - a power management specification developed by Intel, Microsoft, and Toshiba. ACPI, which will be part of the next version of Windows, enables the operating system to control the amount of power given to each device attached to the computer. With ACPI, the operating system can turn off peripheral devices, such as a CD-ROM players, when they're not in use. As another example, ACPI will enable manufacturers to produce computers that automatically power up as soon as you touch the keyboard.

2. **Advanced Power Management (APM)** - an API developed by Intel and Microsoft that allows developers to include power management in BIOSes. APM defines a layer between the hardware and the operating system that effectively shields the programmer from hardware details.

3. **Basic input/output system (BIOS)** - the built-in software that determines what a computer can do without accessing programs from a disk. On PCs, the BIOS contains all the code required to control the keyboard, display screen, disk drives, serial communications, and a number of miscellaneous functions.

4. **Binary Number System** - Pertaining to a number system that has just two unique digits. For most purposes, we use the decimal number system, which has ten unique digits, 0 through 9. All other numbers are then formed by combining these ten digits. Computers are based on the binary numbering system, which consists of just two unique numbers, 0 and 1. All operations that are possible in the decimal system (addition, subtraction, multiplication, division) are equally possible in the binary system.

5. **Bit** – Short for binary digit, the smallest unit of information on a machine. The term was first used in 1946 by John Tukey, a leading statistician and adviser to five presidents. A single bit can hold only one of two values: 0 or 1. More meaningful information is obtained by combining consecutive bits into larger units. For example, a byte is composed of 8 consecutive bits.

6. **Bus** – A collection of wires through which data is transmitted from one part of a computer to another. You can think of a bus as a highway on which data travels within a computer. When used in reference to personal computers, the term bus usually refers to internal bus. This is a bus that connects all the internal computer components to the CPU and main memory. There's also an expansion bus that enables expansion boards to access the CPU and memory.

7. **Byte** – Abbreviation for binary term, a unit of storage capable of holding a single character. On almost all modern computers, a byte is equal to 8 bits. Large amounts of memory are indicated in terms of kilobytes (1,024 bytes), megabytes (1,048,576 bytes), and gigabytes (1,073,741,824 bytes).

8. **Cards** – Adapter boards or interface cards placed into expansion slots to expand the function of a computer, allowing it to communicate with external devices such as monitors or speakers.

9. **Central processing Unit (CPU)** - The CPU is the brains of the computer. Sometimes referred to simply as the processor or central processor, the CPU is where most calculations take place. In terms of computing power, the CPU is the most important element of a computer system.

10. **Chip Set** - A number of integrated circuits designed to perform one or more related functions. For example, one chipset may provide the basic functions of a modem while another provides the CPU functions for a computer. Newer chipsets generally include functions provided by two or more older chipsets. In some cases, older chipsets that required two or more physical chips can be replaced with a chipset on one chip.

11. **Circuit board** – A computer component, such as the main motherboard or an adapter board that has electronic circuits and chips.

12**. Clock Speed** – The speed or frequency expressed in MHz, that controls activity on the motherboard and is generated by a crystal or oscillator located somewhere on the motherboard.

13. **CMOS configuration chip** – A chip on the motherboard that contains a very small amount of memory, or RAM – enough to hold configuration, or setup, information about the computer.   The chip is powered by a battery when the PC is turned off. Also called CMOS setup chip or CMOS RAM chip.

14. **CMOS RAM chip** –   (Same as the CMOS configuration chip) A chip on the motherboard that contains a very small amount of memory, or RAM – enough to hold configuration, or setup, information about the computer.   The chip is powered by a battery when the PC is turned off.

15. **CMOS setup** – **(1)** the CMOS configuration chip. **(2)** The program in system BIOS that can change the values in the CMOS RAM.

16. **CMOS setup chip** – (Same as the CMOS configuration chip) A chip on the motherboard that contains a very small amount of memory, or RAM – enough to hold configuration, or setup, information about the computer.   The chip is powered by a battery when the PC is turned off.

17. **Complementary metal-oxide semiconductor (CMOS)** –   the technology used to manufacture microchips. CMOS chips require less electricity, hold data longer after the electricity is turned off, are slower, and produce less heat than earlier technologies. The configuration, or setup, chip is a CMOS chip.

18. **Data bus** –   The lines on the system bus that the CPU uses to send and receive data.

19. **Data path size** – The number of lines on a bus that can hold data, for example, 8, 16, 32, and 64 lines, which can accommodate 8, 16, 32, and 64bits at a time.

20. **Dual inline memory module (DIMM)** – a miniature circuit board used in newer computers to hold memory. DIMMs can hold up to 2 GB of RAM on a single module.

21. **Dual inline package (DIP) switch** – a switch on the circuit board or other device that can be set on or off to hold configuration or setup information.

22. **Expansion card** –   a circuit board inserted into a slot on the motherboard to enhance the capability of the computer.

23. **Expansion slot** – a narrow slot on the motherboard where an expansion card can be inserted. Expansion slots connect to a bus on the motherboard.

24. **Firmware** – Software that is permanently stored in a chip. The BIOS on a motherboard is an example of firmware.

25. **Flash ROM** – ROM that can be reprogrammed or changed without replacing chips.

26. **Front side bus (FSB)** – (Same as system bus.) The bus between the CPU and memory on the motherboard. The bus frequency in documentation is called the system speed, such as 400MHz. Also called the memory bus, front-side bus, local bus, or host bus.

27. **Gigahertz (GHz)** – One thousand MHz or one billion cycles per second.

28. **Hard copy** – Output from a printer to paper.

29. **Hard drive** – The main secondary storage device of a PC, a small case that contains magnetic coated platters that rotate at high speed.

30. **Hardware** – the physical components that constitute the computer system, such as the monitor, the keyboard, the motherboard, and the printer.

31. **Hertz (Hz)** – Unit of measurement for frequency, calculated in terms of vibrations, or cycles per second. For example, for 16-bit stereo sound, a frequency of 44,000 Hz is used.

32. **Host bus** – (Same as memory bus, system bus, or FSB) The bus between the CPU and memory on the motherboard. The bus frequency in documentation is called the system speed, such as 400MHz. Also called the memory bus, front-side bus, local bus, or host bus.

33. **Jumper** – Two wires that stick up side by side on the motherboard and are used to hold configuration information. The jumper is considered closed if a cover is over the wires, and open if the cover is missing.

34. **Keyboard** – a common input device through which data and instructions may be typed into computer memory.

35. **Main board** – (Same as the motherboard.) the main board in the computer, also called the system board. The CPU, ROM chips, SIMMs, DIMMs, RIMMs, and interface cards are plugged into the motherboard.

36. **Megahertz (MHz)** – One million Hz, or one million cycles per second.

37. **Memory** – Physical microchips that can hold data and programming, located on the motherboard or expansion cards.

38. **Microprocessor** – (Same as the CPU.) The CPU is the brains of the computer. Sometimes referred to simply as the processor or central processor, the CPU is where most calculations take place. In terms of computing power, the CPU is the most important element of a computer system.

39. **Monitor** – the most commonly used output device for displaying text and graphics on a computer.

40. **Motherboard** – the main board in the computer also called the system board. The CPU, ROM chips, SIMMs, DIMMs, RIMMs, and interface cards are plugged into the motherboard.

41. **Mouse** – A pointing and input device that allows the user to move a cursor around a screen and select programs with the click of a button.

42. **Nonvolatile** – Refers to a kind of RAM that is stable and can hold data as long as electricity is powering the memory.

43. **Parallel port** – a female 25-pin port on a computer that can transmit data in parallel, 8 bits at a time, and is usually used with a printer. The names for parallel ports are LPT1 and LPT2.

44. **Peripheral device** – Devices that communicate with the CPU but are not located directly on the motherboard, such as the monitor, floppy drive, printer, and mouse.

45. **Plug and Play (PnP)** – A standard designed to make the installation of new hardware devices easier by automatically configuring devices to eliminate system resource conflicts (such as IRQ or I/O address conflicts). PnP is supported by Windows 9x/Me, Windows 2000, and Windows XP.

46. **Port** – **(1)** as applied to services running on a computer, a number assigned to a process on a computer so that the process can be found by TCP/IP. Also called a port address or port number. **(2)** Another name for an I/O address. **(3)** a physical connector, usually at the back of a computer, that allows a cable from a peripheral device, such as a printer, mouse , or modem, to be attached.

47. **Processor** – (Same as the CPU) The CPU is the brains of the computer. Sometimes referred to simply as the processor or central processor, the CPU is where most calculations take place. In terms of computing power, the CPU is the most important element of a computer system.

48. **Power supply** – a box inside the computer case that supplies power to the motherboard and other installed devices. Power supplies provide 3.3, 5, and 12 volts DC.

49. **Primary storage** – Temporary storage on the motherboard used by the CPU to process data and instructions. Memory is considered primary storage.

50. **Printer** – a peripheral output device that produces printed output to paper. Different types include dot matrix, ink-jet, and laser printers.

51. **Program** – a set of step-by-step instructions to a computer. Some are burned directly into chips, while others are stored as program files. Programs are written in languages such as BASIC and C++.

52. **Protocol** – a set of rules and standards that two entities use for communication.

53. **Random access memory (RAM)** – Memory modules on the motherboard containing microchips used to temporarily hold data and programs while the CPU processes both. Information in RAM is lost when the PC is turned off.

54. **Read-only memory (ROM)** – Chips that contain programming code and cannot be erased.

55. **RIMM** – a type of memory module developed by Rambus, Inc.

56. **Secondary storage** – Storage that is remote to the CPU and permanently holds data, even when the PC is turned off, such as a hard drive.

57. **Serial port** – A male 9-pin or 25-pin port on a computer system used by slower I/O devices such as a mouse or modem. Data travels serially, on bit at a time, through the port. Serial ports are sometimes configured as COM1, COM2, COM3, or COM4.

58. **Single inline memory module (SIMM)** – A miniature circuit board used in older computers to hold RAM. SIMMs hold 8, 16, 32, or 64 MB on a single module.

59. **Software** – Computer programs, or instructions to perform a specific task. Software may be BIOS, Oss, or application software such as a word-processing or spreadsheet program.

60. **Startup BIOS** – Part of the system BIOS that is responsible for controlling the PC when it is first turned on. Startup BIOS gives control over to the OS once it is loaded.

61. **System BIOS** – BIOS located on the motherboard.

62. **System board** – (Same as the motherboard). the main board in the computer, also called the system board. The CPU, ROM chips, SIMMs, DIMMs, RIMMs, and interface cards are plugged into the motherboard.

63. **System bus** – the bus between the CPU and memory on the motherboard. The bus frequency in documentation is called the system speed, such as 400 MHz. Also called the memory bus, front-side bus, local bus, or host bus.

64. **System clock** – a line on a bus that is dedicated to timing the activities of components connected to it. The system clock provides a continuous pulse that other devices use to time themselves.

65. **Trace** – a wire on a circuit board that connects two components or devices.

66. **Universal serial bus (USB)** – a type of port designed to make installation and configuration of I/O devices easy, providing room for as many as 127 devices daisy-chained together.

67. **Video card** – an interface card installed in the computer to control visual output on a monitor. Also called display adapter.

68. **Volatile** – Refers to a kind of RAM that is temporary, cannot hold data very long, and must be frequently refreshed.

REVIEWING THE BASICS

1. Why is all data stored in a computer in binary form?
For the computer, the binary system is more natural because of its electrical nature (charged versus uncharged). In the binary system, each digit position represents a value of 2. Because computers use the binary number system, powers of 2 play an important role. This is why everything in computers seems to come in 8s (2 to the 3rd power), 64s (2 to the 6th power), 128s (2 to the 7th power), and 256s (2 to the 8th power).

2. What are the four primary functions of hardware?
Input, processing, storage, and output.

3. What three things do electronic hardware devices need in order to function?
A method for the CPU to communicate with the device, software to instruct and control the device, and electricity to power the device.

4. How many bits are in a byte?
8

5. What is the purpose of an expansion slot on a motherboard?
They enable the installation of expansion cards which enhance the capability of the computer.

6. Which component on the motherboard is used primarily for processing?
The CPU.

7. Name three CPU manufacturers.
AMD (Advanced Micro Devices), Intel Corp, and SiS.

8. What technology is most often used today to manufacture microchips?
CMOS

9. What are two other names for the system bus?
Front-side bus, memory bus, host bus, and local bus.

10. What are two other names for the motherboard?
Main board and System board.

11. List three types of ports that are often found coming directly off the motherboard to be used by external devices.
Serial port, USB port, and Parallel port.

12. List three kinds of memory modules.
SIMMs, DIMMs, and RIMMs.

13. What is the difference between volatile and nonvolatile memory?
Volatile refers to a kind of RAM that is temporary, cannot hold data very long, and must be frequently refreshed, while nonvolatile refers to a kind of RAM that is stable and can hold data as long as electricity is powering the memory.

14. What technology provides for up to four devices on a system, including the hard drive as one of those devices?
EIDE (Enhanced Integrated Drive Electronics)

15. What is the size of the data path on most system buses today?
64 bits wide with or without additional lines for error checking.

16. What is the measurement of frequency of a system bus and CPU? Which is faster, the system bus or the CPU? The speed and the CPU is faster.

17. Name four types of buses that are likely to be on a motherboard?
System bus, PCI bus, AGP bus and ISA bus.

18. A power supply receives 120 volts of AC power from a wall outlet and converts it to 3.3, 5, and 12 volts of DC power.

19. ROM BIOS chips that can be upgraded without replacing the chips are called Flash ROM.

20. List three ways that configuration information can be stored on a motherboard.
CMOS setup chip, CMOS RAM chip, and CMOS configuration chip

THINKING CRITICALLY

1. When selecting secondary storage devices for a new desktop PC, which is more important, a CD-ROM drive or a floppy drive? Why? A CD-ROM drive because bland cds hold up to 700 MBs of data while a blank floppy disk only holds only 1.44 MB of data.

2. Based on what you have learned in this chapter, when working on a Word document, why is it important to save your work often? Explain your answer in terms of primary storage and secondary storage. Primary storage is only temporary. If you save your work often it is stored in secondary storage which is permanent.   If something happens to the computer where it shuts down on you because of and electrical surge, etc, your work is lost if you haven't saved it to secondary storage.

3. Most buses are 16, 32, 64, or 128 bits wide. Why do you think these bus widths are multiples of eight? They are based on the binary number system.

4. Why do you think the trend is to store configuration information on a motherboard in CMOS setup rather than by using jumpers or switches? Jumpers and switches have to be mechanically set.

5. Why would it be difficult to install four hard drives, one CD-ROM drive, and one DVD drive in a single system? Because most computers use EIDE technology which can only accommodate four of these devices on one system.