

# Information Technology Essentials

## COMP106



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### **Chapter 5**

## **Installing and Configuring System Components**

## Objectives

- ◆ In this session, you will learn to:
  - ◆ Select, install, and configure storage devices.
  - ◆ Install and configure power supplies.
  - ◆ Install and configure memory.
  - ◆ Install and configure CPUs.
  - ◆ Install and configure system boards.

## Install and Configure Storage Devices

- ◆ Before installing and configuring storage devices, you need to understand the following:
  - ◆ Drive types
    - ◆ HDD, FDD, Tape, Optical, Solid State
  - ◆ Power connectors
  - ◆ Hot swapping
  - ◆ Drive images and Disk partitions
  - ◆ Windows Disk Management
  - ◆ Internal device installation considerations
  - ◆ Configuration and optimization requirements

## Hard Disk Drive Types

- ◆ The various types of hard disk drives are:
  - ◆ Parallel ATA (also known as IDE, EIDE, and ATA)
  - ◆ SCSI
  - ◆ Serial ATA



Parallel ATA hard drive

## Floppy Disk Drives

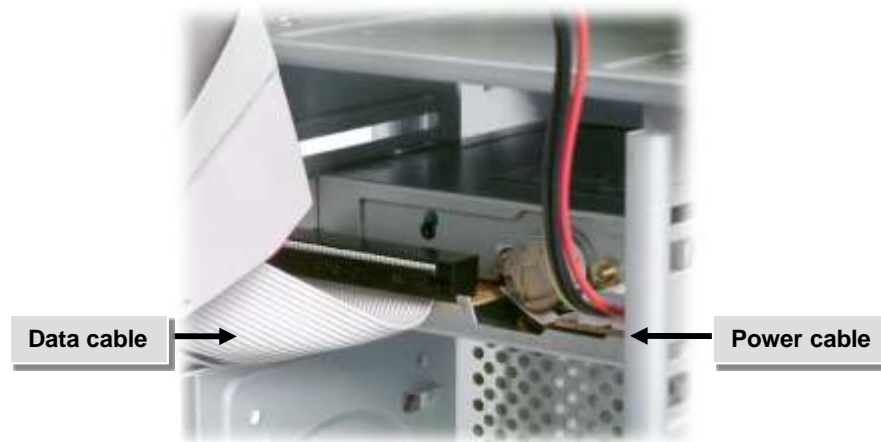
- ◆ A floppy disk drive is a read/write drive that uses removable disks:



Front view 3.5-inch floppy disk drive



3.5-inch floppy disk



Rear view of floppy disk drive

## Tape Drive Formats

- ◆ Tape drives come in several formats.
  - ◆ Quarter-inch cartridge (QIC)
  - ◆ 4 mm Digital Audio Tape
  - ◆ 8 mm tape (Exabyte)
  - ◆ Digital linear tape (DLT)
  - ◆ Linear Tape Open (LTO)



DAT tape

## Optical Drive Types

- ◆ Optical drives include CD and DVD drives.
  - ◆ CD
    - ◆ Hold 650 MB to 1 GB
    - ◆ Minimum 150 KB/sec data transfer rate, multipliers up to 64X
    - ◆ CDFS or UDF file system
  - ◆ DVD
    - ◆ Hold 4.7 GB on one side, up to 9.4 GB if both surfaces are used
    - ◆ 600 KB/sec to 1.3 MB/sec data transfer rate
    - ◆ UDF file system



COMPACT  
disc



DVD  
VIDEO

## Solid State Storage Types

- ◆ Solid state storage comes in several formats.
  - ◆ USB flash drives
  - ◆ Flash drives
  - ◆ CompactFlash cards
  - ◆ SmartMedia cards
  - ◆ xD-Picture Cards
  - ◆ Memory Sticks
  - ◆ Secure Digital (SD) cards
  - ◆ MultiMediaCards (MMC)

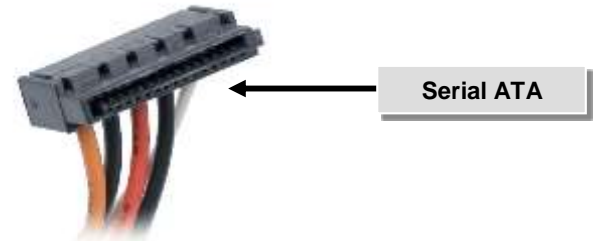
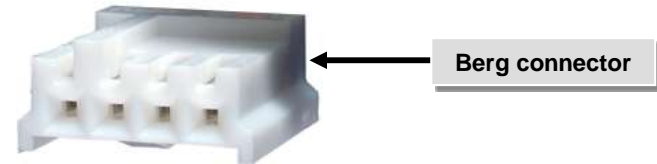




## Storage Device Power Connectors

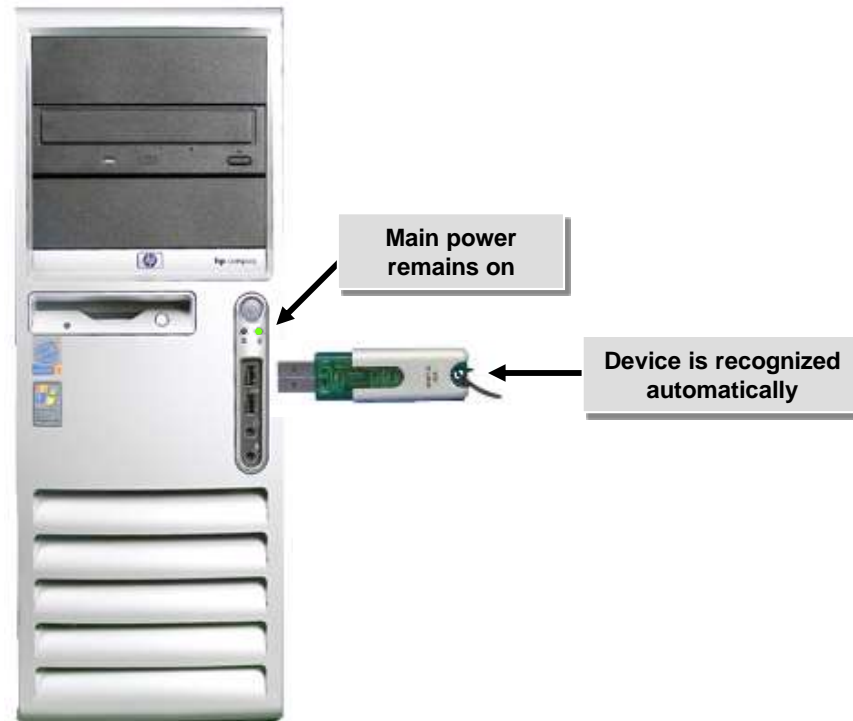
- ◆ Every internal storage devices uses one of several types of power connectors to get electrical power from the computer's power supply.

- ◆ Berg connector
- ◆ Molex connector
- ◆ SATA Power Connector



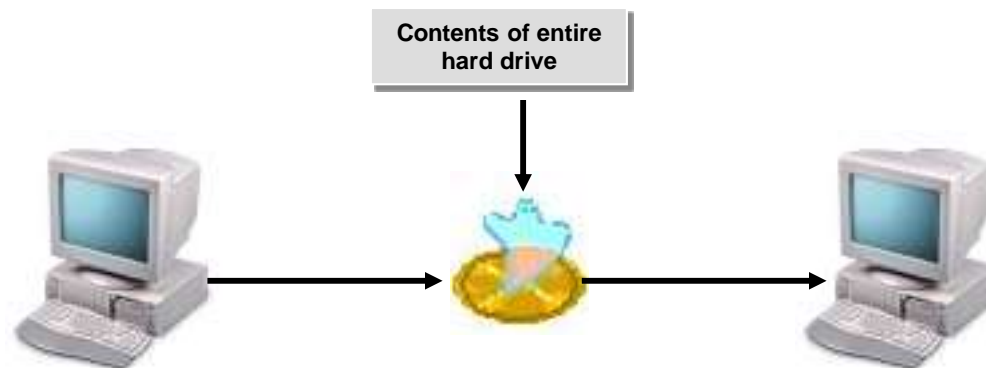
## Hot Swapping

- ◆ **Hot swapping** is a type of hardware replacement procedure where a component can be replaced while the main power is still on.



## Drive Images and Disk Partitions Types

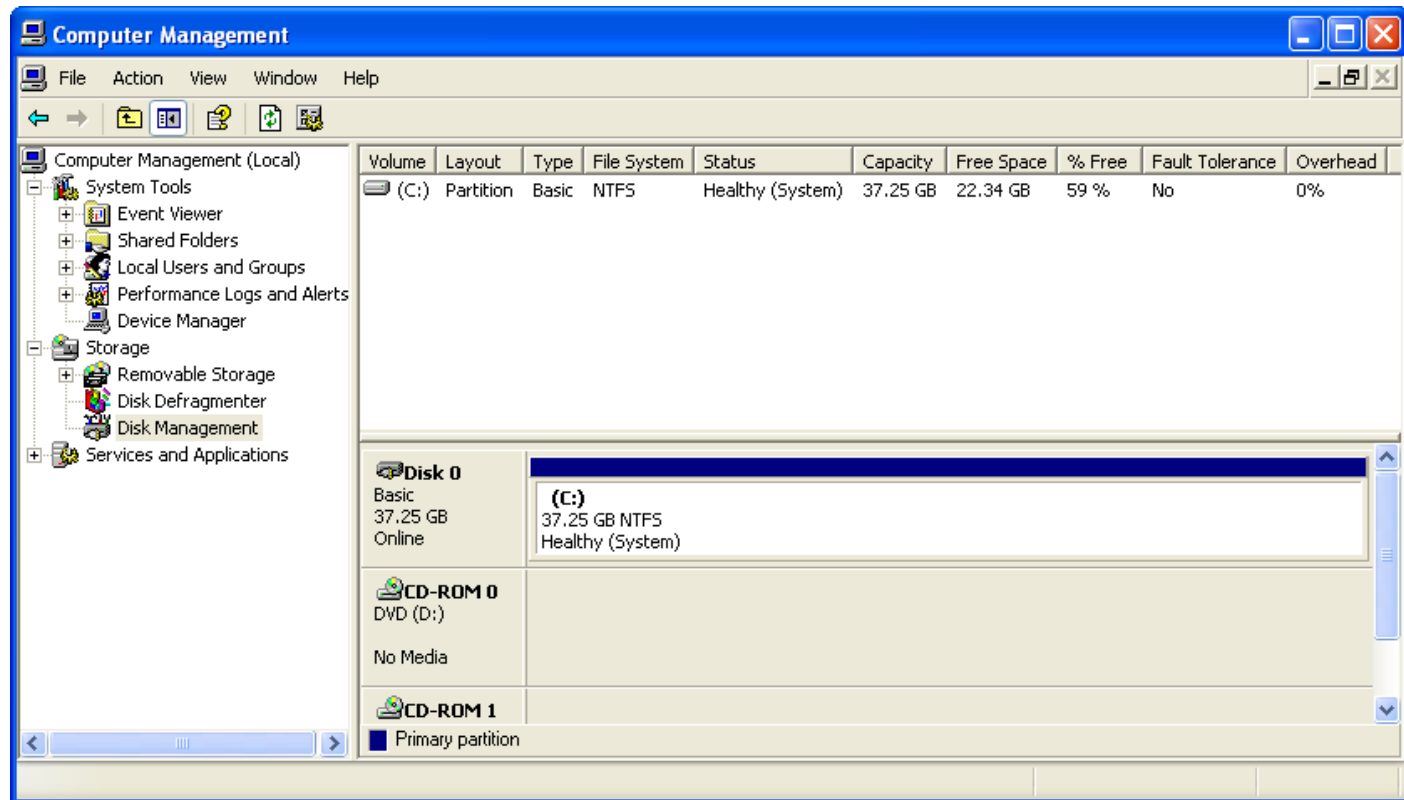
- ◆ A **drive image** is a computer file containing the complete contents and structure of a data storage medium or device.



- ◆ A **disk partition** is an isolated section of a disk that functions like a separate physical drive.
- ◆ There are several types of disk partitions.
  - ◆ Primary
  - ◆ Active
  - ◆ Extended
  - ◆ Logical

## The Windows Disk Management Utility

- ◆ The Windows Disk Management utility enables you to create, view, and manage disks.



## Internal Storage Device Installation Considerations

- ◆ There are a number of factors you should keep in mind when attempting to install an internal storage device.
  - ◆ Placement
  - ◆ Air flow
  - ◆ Power
  - ◆ Device Drivers



## Storage Device Configuration and Optimization Requirements

- ◆ There are several configuration and optimization requirements you must review before installing a storage device.
  - ◆ External USB devices
    - ◆ Use USB 2.0 if possible
  - ◆ Internal PATA hard disk drives
    - ◆ Verify jumpers properly configured
  - ◆ SCSI devices
    - ◆ IDs and termination
  - ◆ Any storage device
    - ◆ CMOS setup for recognition



## Activity 5-2

### Activity on Installing Internal Storage Devices

## Install and Configure Power Supplies

- ◆ Before installing and configuring power supplies, you need to understand the following:
  - ◆ Power supply form factors
  - ◆ Voltage requirements



## Power Supply Form Factors

- ◆ Like system boards and other components, there are several form factors available for power supplies, such as:

Power Supply Form Factor	Description
AT	Used in AT form factor cases and with AT or Baby AT system boards. Dimensions are 213 x 150 x 150 mm. Found in older desktops and towers.
ATX	Used in ATX and NLX cases and with ATX and NLX system boards. Dimensions are 150 x 140 x 86 mm. Found in desktops and towers.
Proprietary	Some computer manufacturers use system board form factors that do not conform to standards such as ATX, NLX, and BTX. It's likely that these proprietary system boards will require nonstandard power supply form factors as well, although it is possible that an ATX power supply might be able to be used.

## Power Requirements

- ◆ Each component in a personal computer has different power requirements.
  - ◆ ISA bus: 5 V, 12.1 W
  - ◆ PCI bus: 3.3 or 5 V, 56.1 W
  - ◆ AGP bus: 3.3 or 5 V, 25, 50, or 100 W
  - ◆ PCI card: 3.3 or 5 V, 5 W
  - ◆ AGP card: 3.3 or 5 V, 20 to 30 W
  - ◆ SCSI PCI card: 3.3 or 5 V, 20 to 25 W
  - ◆ Floppy drive: 5 V, 5 W
  - ◆ RAM: 10 W per 128 MB of RAM
    - ◆ SIMMs: 5 V
    - ◆ DIMMs: 3.3 V
  - ◆ 7200 RPM hard drive: 5 V for logic, 12 V for motor, 5 to 15 W

## Power Requirements (Contd.)

- ◆ CPU Voltage requirements:
  - ◆ 1 GHz Pentium III CPU: 3.3 V, 34 W
  - ◆ 1.7 GHz Pentium 4 CPU: 3.3 V, 65 W
  - ◆ 300 MHz Celeron CPU: 3.3 V, 18 W
  - ◆ 600 MHz AMD Athlon CPU: 3.3 V, 45 W
  - ◆ 1.4 GHz AMD Athlon CPU: 3.3 V, 70 W

## Power Supply Safety Recommendations and Selection Tips

- ◆ Consider the following before installing power supplies:
  - ◆ Check for UL certification.
  - ◆ Replace instead of repairing.
  - ◆ Keep the computer case closed during normal operation.
  - ◆ Protect the power supply.
- ◆ The following criteria you should consider when selecting a power supply for a computer:
  - ◆ Power supply rating
  - ◆ Form factor
  - ◆ Cooling

## Activity 5-3

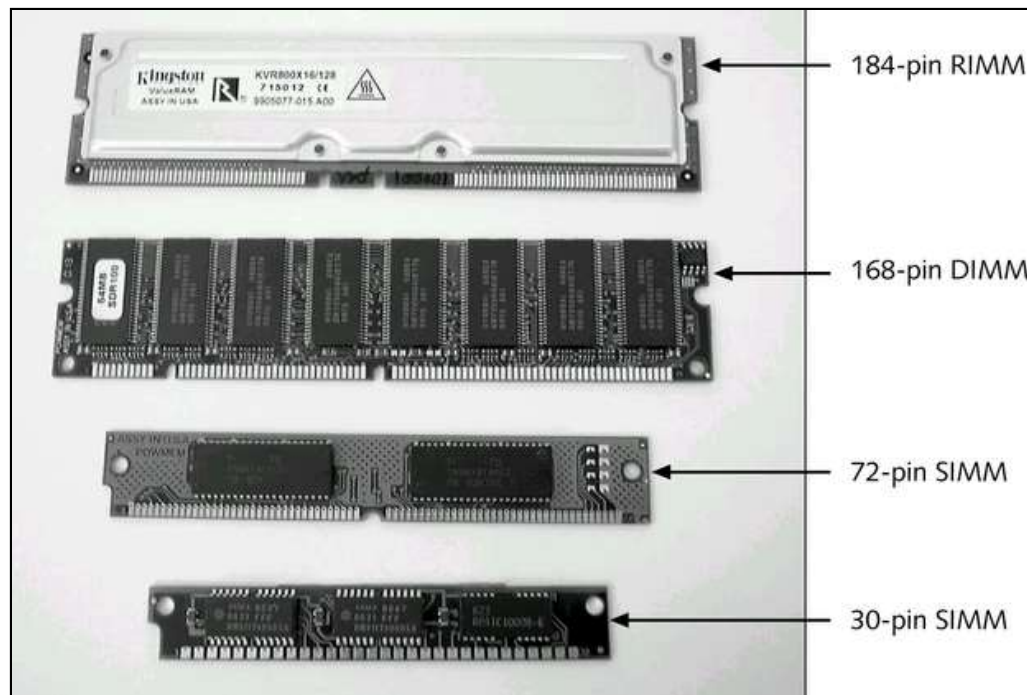
### Activity on Replacing a Power Supply

## Install and Configure Memory

- ◆ Before installing and configuring memory modules, you need to understand the following:
  - ◆ Memory Form Factors and Slot Types
  - ◆ Types of Memory

## Memory Form Factors and Slot Types

- ◆ Memory modules come in several form factors, such as:
  - ◆ SIMM (30 Pin, 72 Pin)
  - ◆ DIMM (64 bit, 168 pin SDRAM, 184 Pin DDR, 240 pin DDR2)
  - ◆ RIMM (16-32 bit 184 Pin)



## Memory Types

- ◆ There are several types of RAM, such as:
  - ◆ SRAM (Static Random Access Memory for Cache)
  - ◆ DRAM (Dynamic Random Access Memory)
  - ◆ RDRAM (Rambus Direct RAM)
  - ◆ SDRAM (Synchronous Dynamic RAM)
  - ◆ DDR SDRAM (Double Data Rate)
  - ◆ DDR2 SDRAM
  - ◆ SoDIMM (Small outline DIMM 32 bit, 72 Pin, 64 bit, 144 Pin, 200 Pin DDR/DDR2)
  - ◆ MicroDimm (64 bit, 144 Pin, 172Pin DDR/DDR2)



## Memory Selection Tips

- ◆ Consider the following before purchasing RAM for a computer:
  - ◆ Size
  - ◆ Speed
  - ◆ System board configuration

## Activity 5-5

### Activity on Adding RAM to a Computer

## Install and Configure CPUs

- ◆ Before installing and configuring CPUs, you need to understand the following:
  - ◆ CPU Chip Types
  - ◆ Instruction Sets
  - ◆ Cache memory
  - ◆ CPU Operational Characteristics
  - ◆ Processor Connections

## CPU Chip Types

- ◆ CPU chips are developed by several different manufacturers, such as:
  - ◆ Intel
  - ◆ AMD
  - ◆ Cyrix



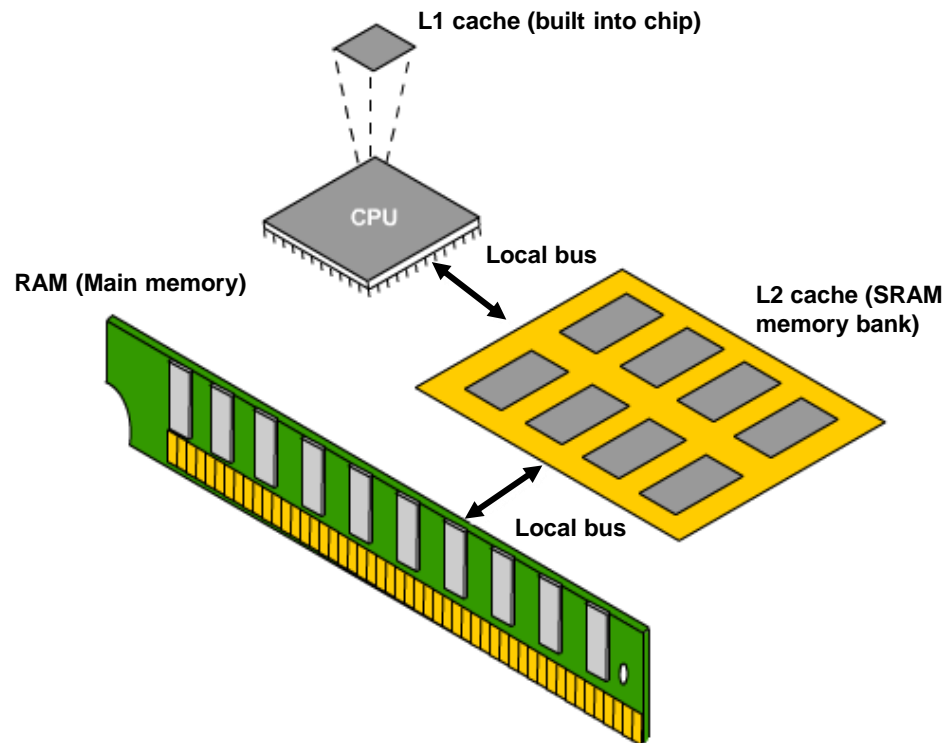
## Instruction Sets

- ◆ An **instruction set** is the collection of commands that is used by a CPU to perform calculations and other computing operations.
- ◆ The following are the two categories of instruction sets used by manufacturers:
  - ◆ CISC (Complex Instruction Set Computer Architectures use a broad set of instructions, resulting in fewer steps per operation)
  - ◆ RISC (Reduced Instruction Set Computer Architectures use a relatively small set of instructions, and RISC chips are designed to execute these instructions very rapidly)



## Cache Memory

- ◆ Cache memory, or CPU cache, is a type of memory that services the CPU.



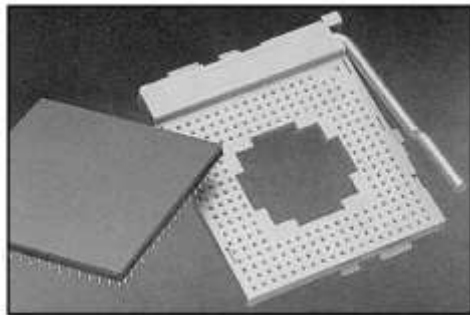
## CPU Operational Characteristics

- ◆ The following characteristics and technologies can affect a CPU's performance:
  - ◆ Bus width
  - ◆ Clock speed
  - ◆ Overclocking
  - ◆ CPU speed
  - ◆ Throttling
  - ◆ Hyperthreading
  - ◆ Dual core
  - ◆ Cache
  - ◆ Voltage Regulator Mode (VRM)
  - ◆ Multimedia Extensions (MMX)



## Processor Connections

- ◆ Different CPUs use different connection methods to connect to the system board, including various sockets, slots, and connection methods.
- ◆ Slot-based processors plug into a system board in much the same way as an expansion board.
- ◆ Socketed processors plug into a system board using a grid array of pins.





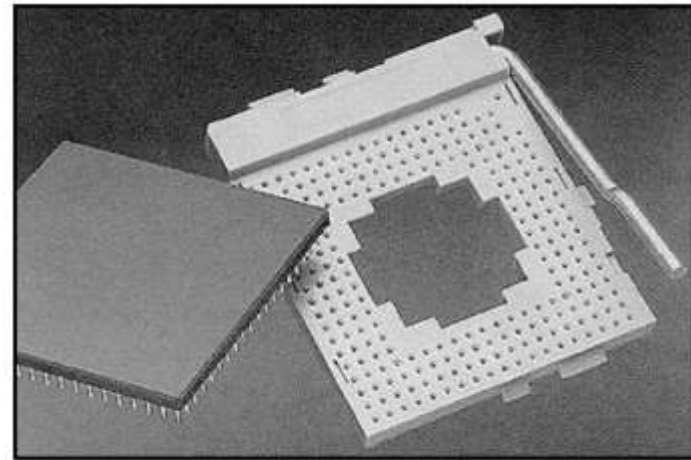
## CPU Selection Tips

- ◆ Consider the following before purchasing a CPU for a computer:
  - ◆ System board type
  - ◆ Budgetary constraints



## CPU Installation Considerations

- ◆ Consider the following when installing a CPU in a computer:
  - ◆ Power requirements
  - ◆ Proper removal and installation
  - ◆ Heat sink and fan



## CPU Configuration and Optimization Requirements

- ◆ Consider the following when configuring and optimizing a CPU after installation on a computer:
  - ◆ Voltage settings on older systems
  - ◆ Jumpers
  - ◆ CMOS Setup

## Activity 5-6

### Activity on Upgrading the CPU

## Install and Configure System Boards

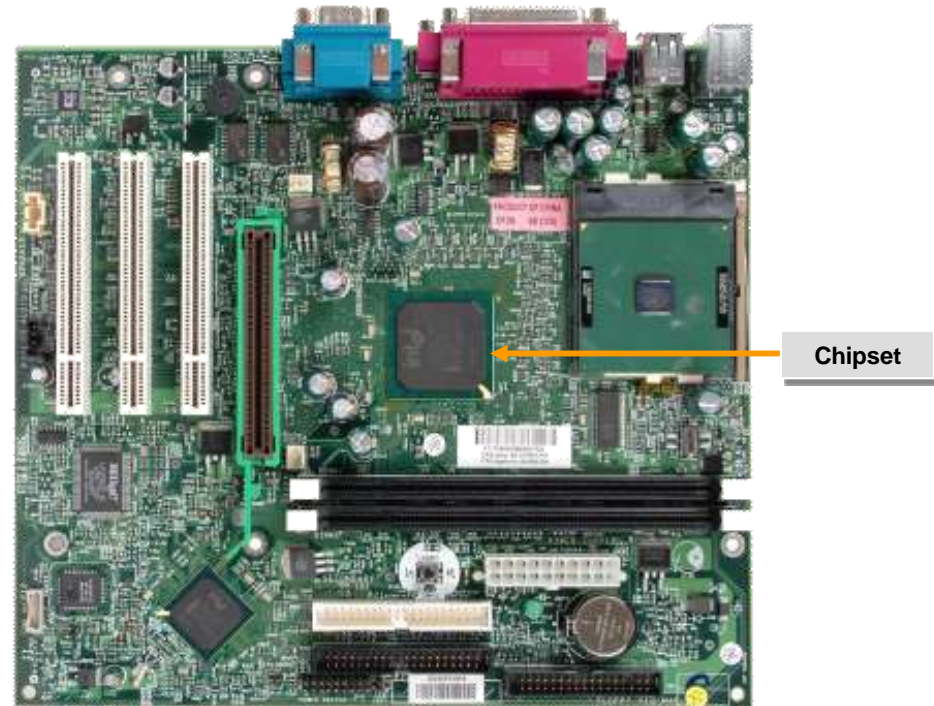
- ◆ Before installing and configuring system boards, you need to understand the following:
  - ◆ Integrated I/O Port Types
  - ◆ Chipsets
  - ◆ BIOS types
  - ◆ CMOS settings

## Integrated I/O Port Types

- ◆ System boards can include any or all of a number of integrated controllers or ports:
  - ◆ Sound
  - ◆ Video
  - ◆ Network
  - ◆ Modem
  - ◆ USB
  - ◆ Serial
  - ◆ FireWire
  - ◆ Parallel

## Chipsets

- ◆ A **chipset** is a system board component that includes the CPU and other chips that support basic functions of the computer.
- ◆ The two main chips in the chipset are:
  - ◆ Northbridge
  - ◆ Southbridge



## BIOS Types

- ◆ System BIOS types include:
  - ◆ American Megatrends
  - ◆ Award BIOS
  - ◆ Phoenix BIOS
  - ◆ IBM SurePath BIOS
  - ◆ Microid Research
  - ◆ BootControl Pro
  - ◆ MicroFirmware
  - ◆ SystemSoft
  - ◆ Unicore





## Complementary Metal Oxide Semiconductor (CMOS) Memory Settings

- ◆ You can configure the following settings from the keyboard by using the CMOS Setup program:
  - ◆ System date and time
  - ◆ Password
  - ◆ Boot sequence
  - ◆ Memory
  - ◆ Floppy drive
  - ◆ Display
  - ◆ Parallel ports
  - ◆ Serial/COM ports
  - ◆ Power management

## System Board Selection Tips

- ◆ Consider the following before you choose a motherboard for a computer:
  - ◆ RAM
  - ◆ CPU
  - ◆ Ports
  - ◆ Expansion slots
  - ◆ Drive interfaces
  - ◆ Form factor
  - ◆ Clock speed

## System Board Installation Considerations

- ◆ Consider the following before you install or replace a motherboard for a computer:
  - ◆ Computer case
  - ◆ Connectors to fasten system board to computer case
  - ◆ Close cover properly



Full-size  
tower



Mid-size  
tower



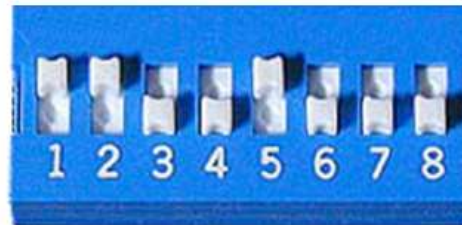
Micro-size  
tower



Desktop

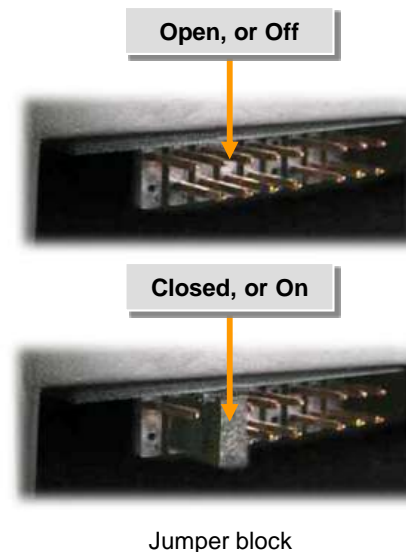
## System Board Configuration and Optimization Requirements

- ◆ Consider the following after you install the motherboard on a computer:
  - ◆ Match CPU frequency
  - ◆ DIP switches and jumpers
  - ◆ CMOS Setup



Switch or switch block

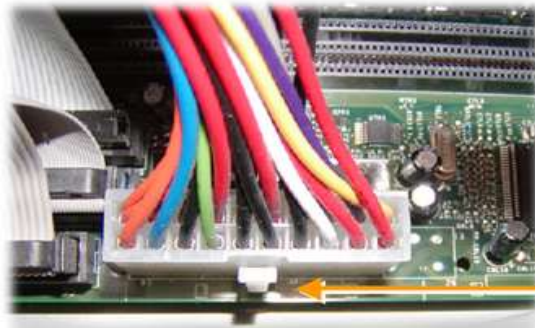
Closed=on  
Open=off



Jumper block

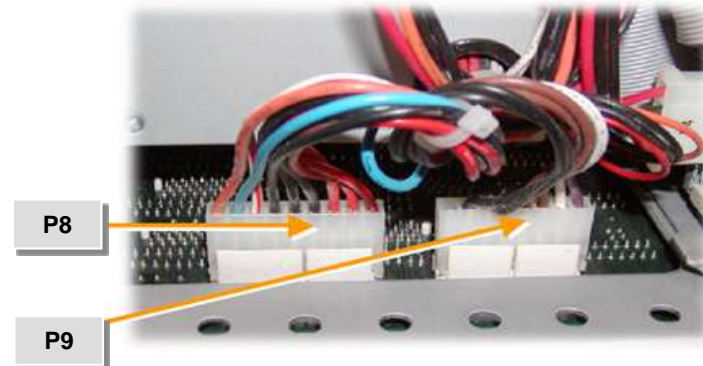
## System Board Power Supply Connectors

- ◆ The power supply connection to the system board is a keyed or unkeyed connection.



Notch for keyed connector

A single keyed connector



A pair of connectors

## Activity 5-7

### Activity on Upgrading the System Board

## Summary

- ◆ In this session, you learned that:
  - ◆ You need to consider various factors while installing and configuring the different types of storage devices so that you can provide the users with the optimized data storage capabilities.
  - ◆ You need to provide adequate power supply to the system so as to prevent system power problems and keep the number of support calls down.
  - ◆ You can also enhance the computer performance by upgrading the memory of your system and this is the most frequent task that can be performed.
  - ◆ You can also enhance the performance of the computer by installing a second processor or by upgrading an existing processor.

## Summary (Contd.)

- ◆ You must know the factors that should be considered for either installing or configuring a new system board or for repairing an existing system board as this is the most important system component in a computer.