SENIOR FIVE

ICT

NOTE

COPY ALL THE NOTES

ANSWER THE QUESTIONS

YOU MAY NOT DRAW.BUT STUDY THE DIAGRAMS

Green computing practices

- Buy/use “energy star” labeled devices. These save energy because they can be programmed to power down to a lower power state when they are not in use, which also allows enables them to have a longer life.
- Activate the power management features of the computer system e.g. allowing the device to go to sleep mode after a set time of idleness.
- Turn off devices when not in use.

- Switch off the mains connected to the device to prevent it from drawing idle current, which is the current drawn even after the equipment is shut off.
- E-cycle/recycle used computer devices. This can be done by refurbishing used parts and devices to extend their usefulness or processing the parts into other usable form instead of carelessly disposing them.

- Reduce paper waste by; printing as little as possible, using email instead of paper memos and fax, using double-sided printing, presentations can be made and given using computers.

Advantages of green computing

- Reduced energy usage from green computing techniques translates into lower carbon dioxide emissions, stemming from a reduction in the fossil fuel used in power plants and transportation.
- Conserves resources because less energy is required to produce.
- Saving energy and resources saves money.

Limitations to green computing

- Green computing is costly. E.g. high conversion costs and use of more expensive products.
- Some computers that are green may be considerably underpowered.
- Rapid technology change which increases the rate of e-waste.

The computer lab

- A computer laboratory is a room which contains more than one computer, usually networked, for public use.
- Computer labs can be found in libraries, schools, government buildings, science labs, community centres, companies with IT departments that require such a place for their employees to do their jobs, and research centres.

- They are distinct from Internet cafes in that the usage of the computer lab is free for those with access. Printers, scanners, and other peripherals may enhance the lab setup.

Measures taken in the computer lab to ensure safety and proper use of computers

- Regulating power supply
- Properly switching on and off of computers
- Avoid exposing computers to heat and direct sunshine
- Protecting computers from moisture and liquids
- Keeping computers in a dust free environment.

- physical security to control access to the computer lab e.g. Burglar proofing the building
- Regularly carrying out preventive maintenance
- Avoid careless connections in the computer lab

- Ensuring that computers are connected to the uninterruptible power supply (UPS).
- Physical security to control access to the computer lab.
- Electronic power security to avoid electrical shocks.
- Use of security cameras for surveillance

- Have a first aid box available in the computer lab
- install an air conditioning system in the computer lab.
- Put in place a set of lab rules and regulations
- Ensuring that the lab is properly locked after use

- Installing and updating the antivirus
- Regulating the power supply- use power stabilisers.

exercise

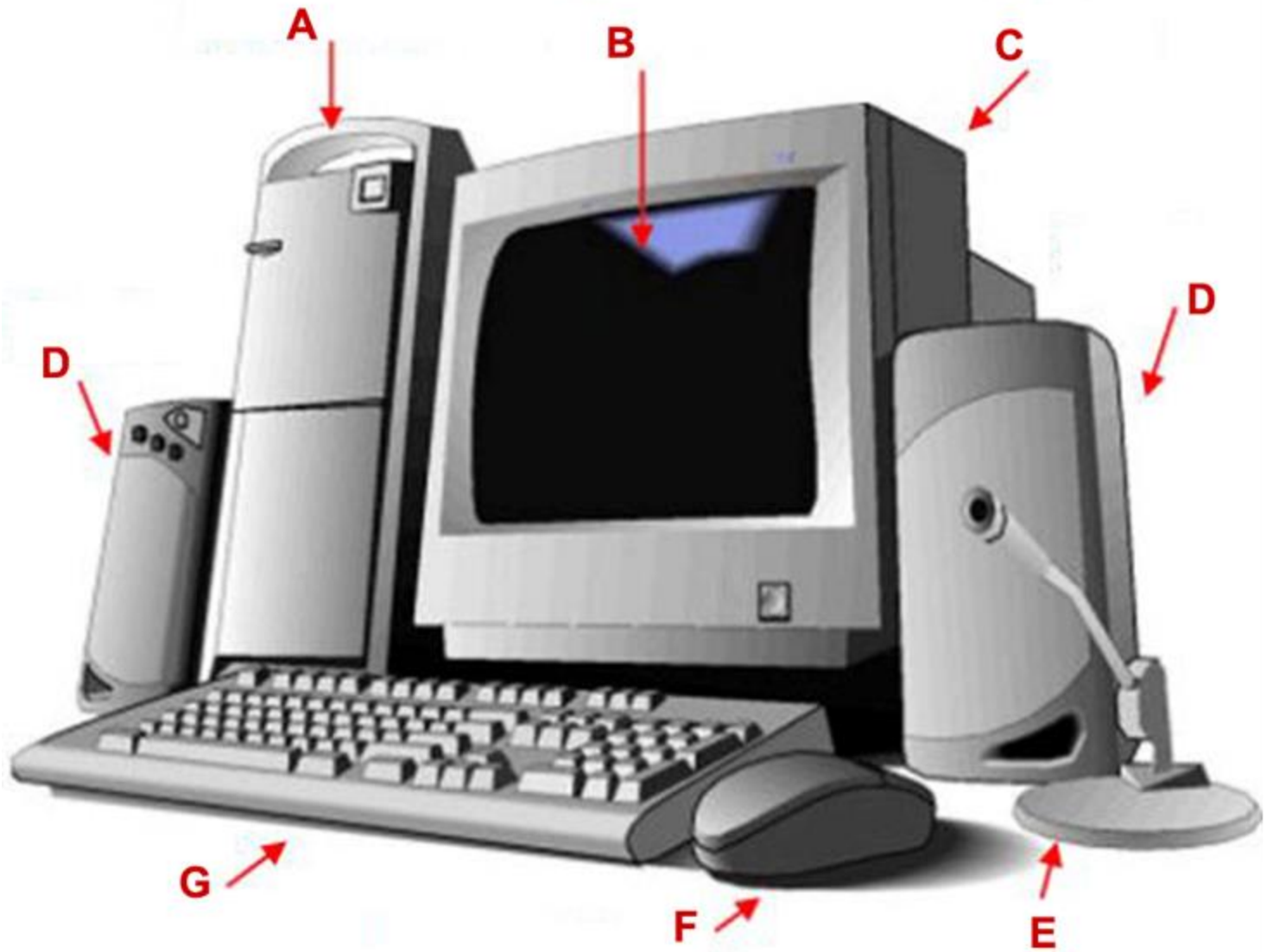
1.Identify measures to protect the following

a) Hardware
b) Software
c) users

Computer hardware

Computer hardware are the physical and tangible parts of a computer system; they are largely electronic and electromechanical in nature: they are broadly categorized into:

- Input devices
- Processing devices
- Output devices
- Storage devices
- Communication devices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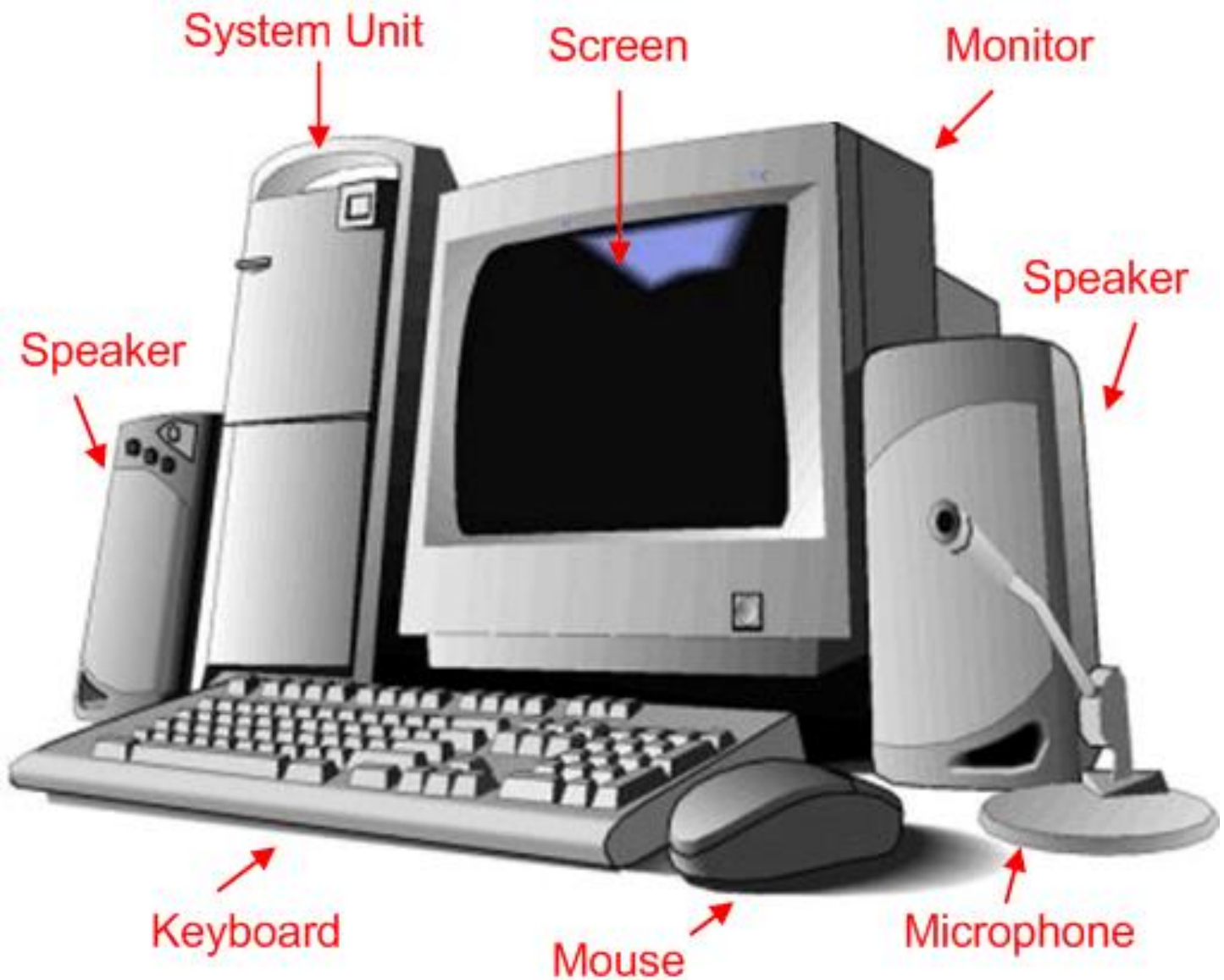

System Unit
Screen
Monitor
Speaker
Speaker
Keyboard
Mouse
Microphone


ZIP
DISK DRIVE

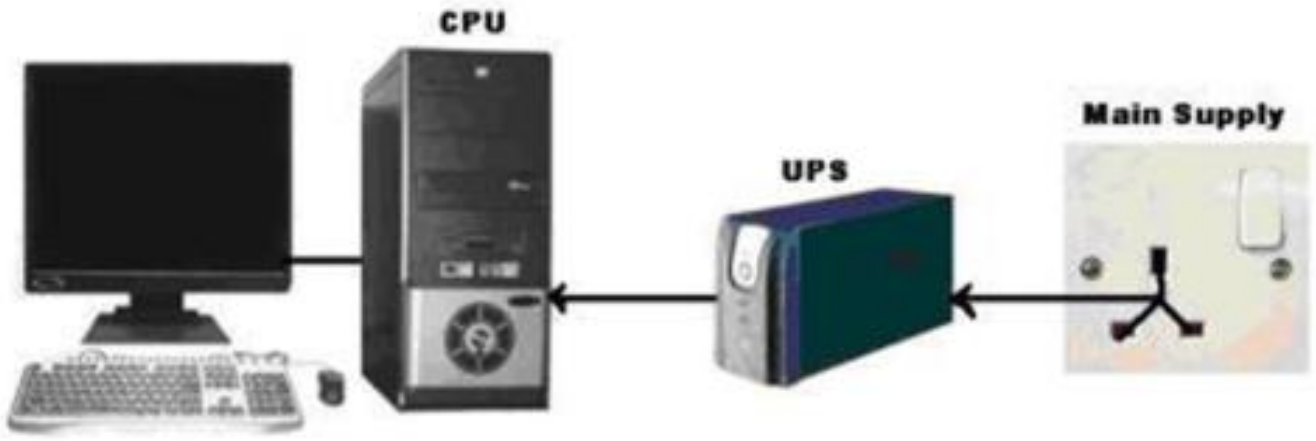
1 Monitor
2 Modem
3 System unit
4 Mouse
5 Speaker
6 Printer
7 Keyboard


The Monitor
The System Unit or CPU
Speakers
Mouse
Printer
Keyboard
Scanner


CD/RW DRIVE
DVD-ROM DRIVE
FLOPPY DRIVE
SYSTEM UNIT
KEYBOARD
SPEAKER
MONITOR
SPEAKER
MOUSE

SEQUENCE OF CONNECTING A COMPUTER

Check the sequence of connection



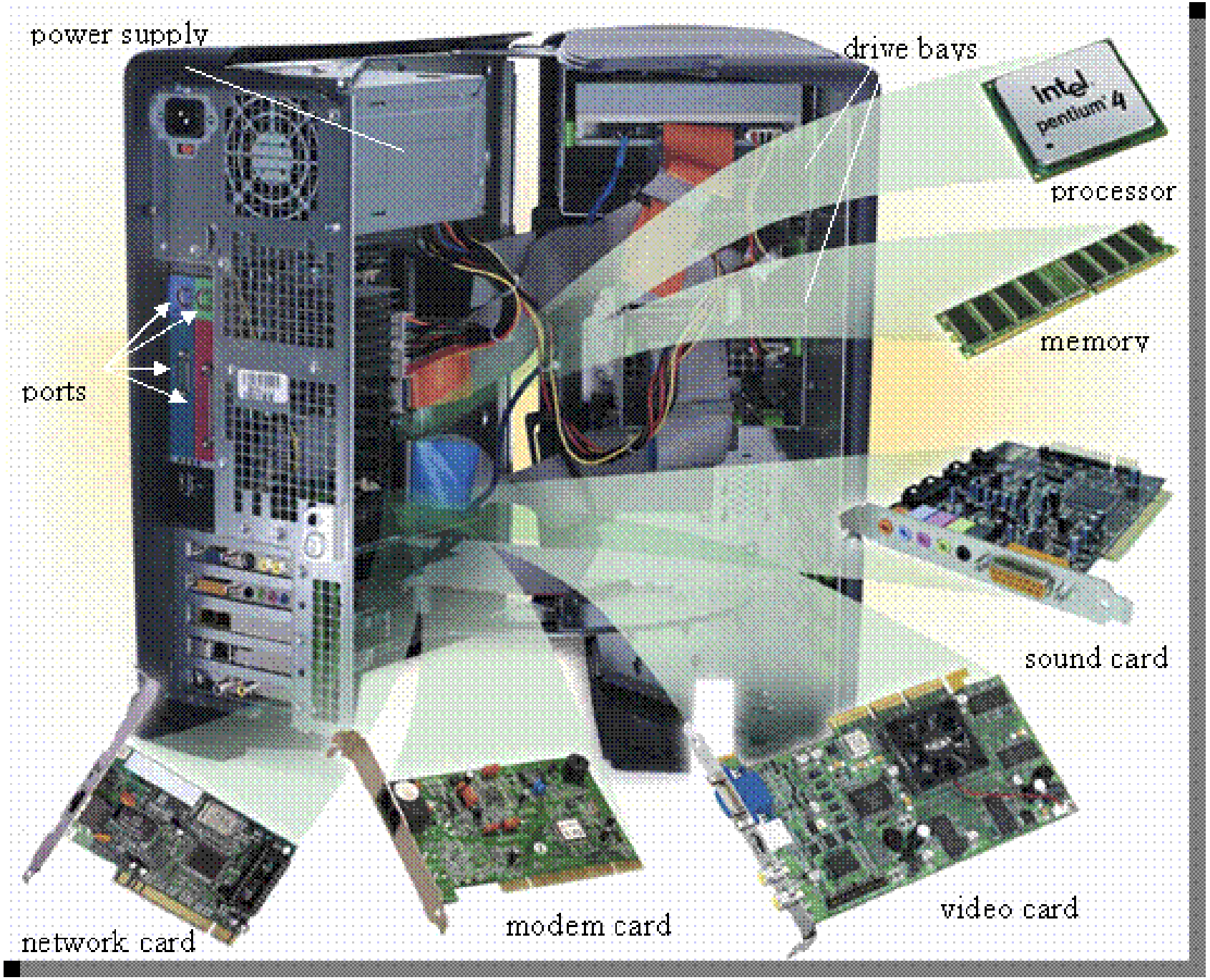
Uninterruptible power supply(UPS)

Uninterruptible power supply (UPS)

- The device connected between the power mains and the computer supply to ensure power supply in case there is a power cut from the mains

Functions of the UPS

- To regulate power entering the computers instead of connecting the computer directly to the power source.
- The UPS provides extended/temporary power in case the main power source goes off to give enough time for users to save their work and therefore avoid loss of any unsaved data.

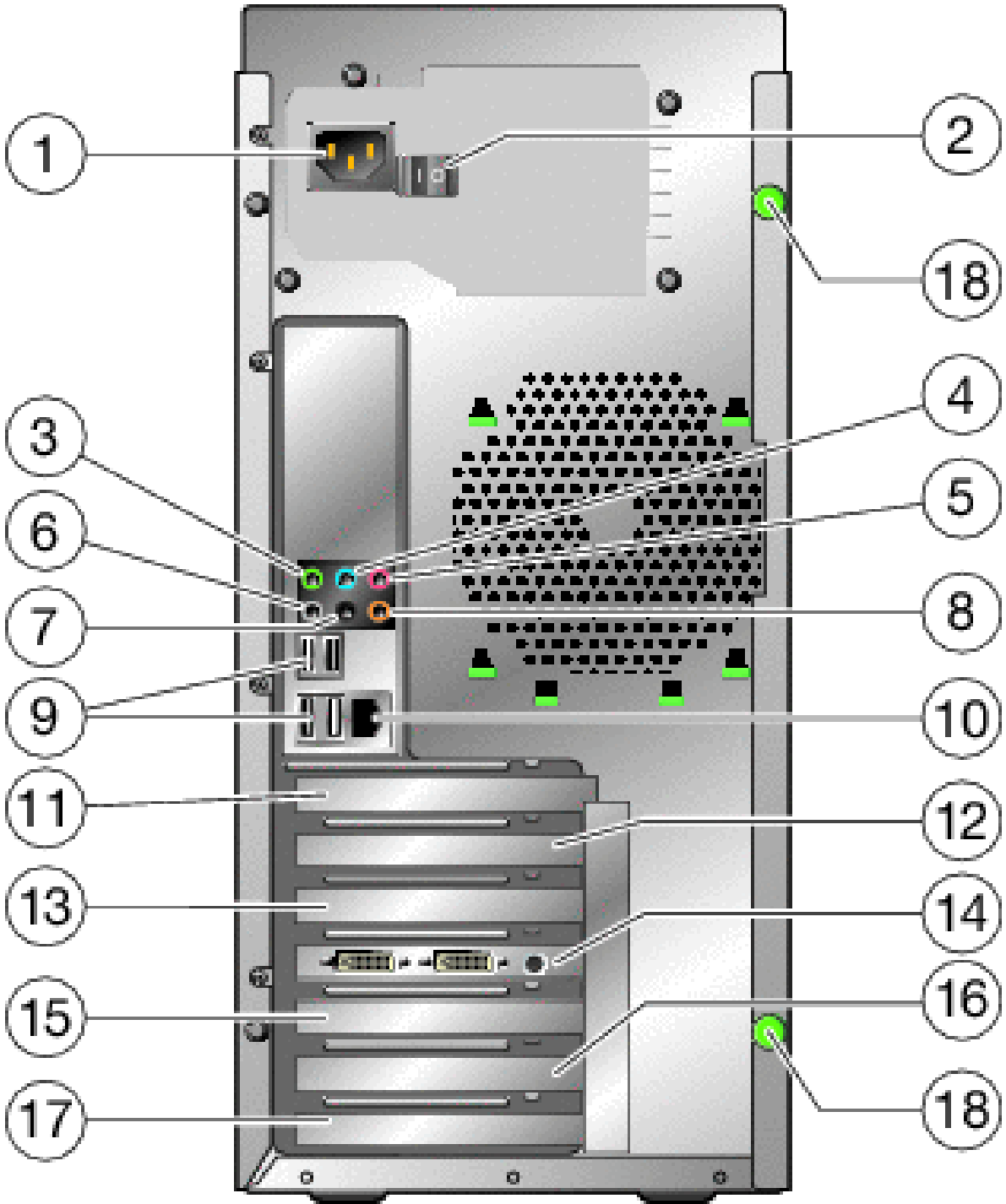

power supply
drive bays
processor
memory
ports
sound card
network card
modem card
video card

Computer Cables and Connectors

- A cable is one or more wires covered in a plastic covering that connects a computer to a power source or to another device.
- There are two main types of computer cables: a data cable and a power cable.

Data Cable

- A data cable is a wire that provides a connection and communication between devices.
- For example, the data cable (VGA cable) that connects a monitor to the computer allows the computer to display a on the an image on the monitor by transmitting the data from the system unit to the monitor.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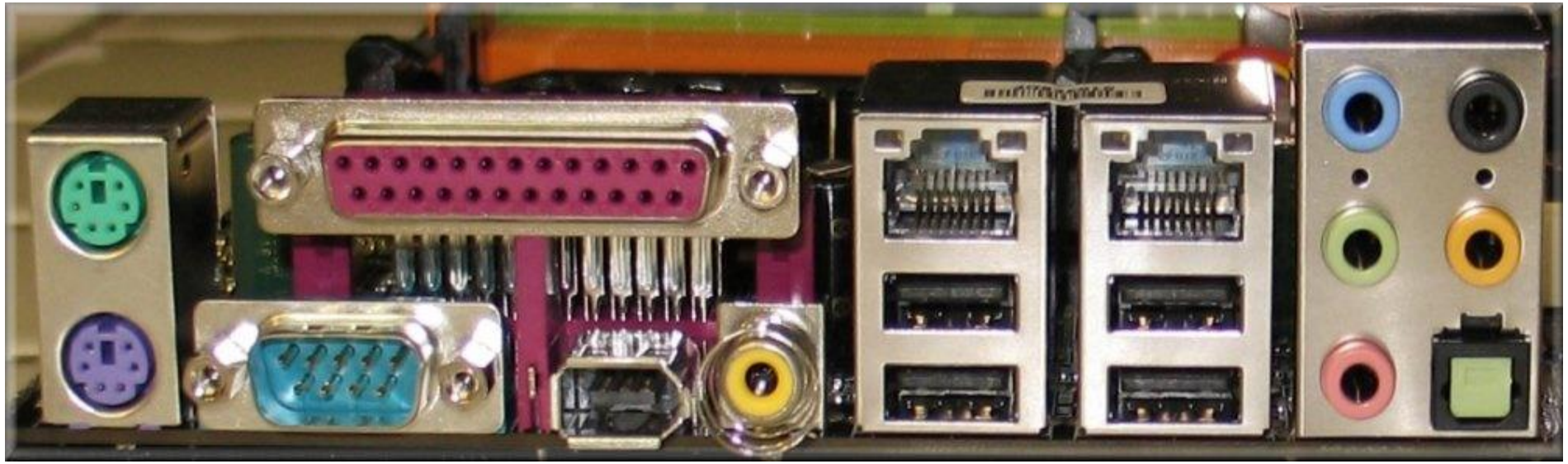
Computer ports



What are computer ports?

Computer Ports

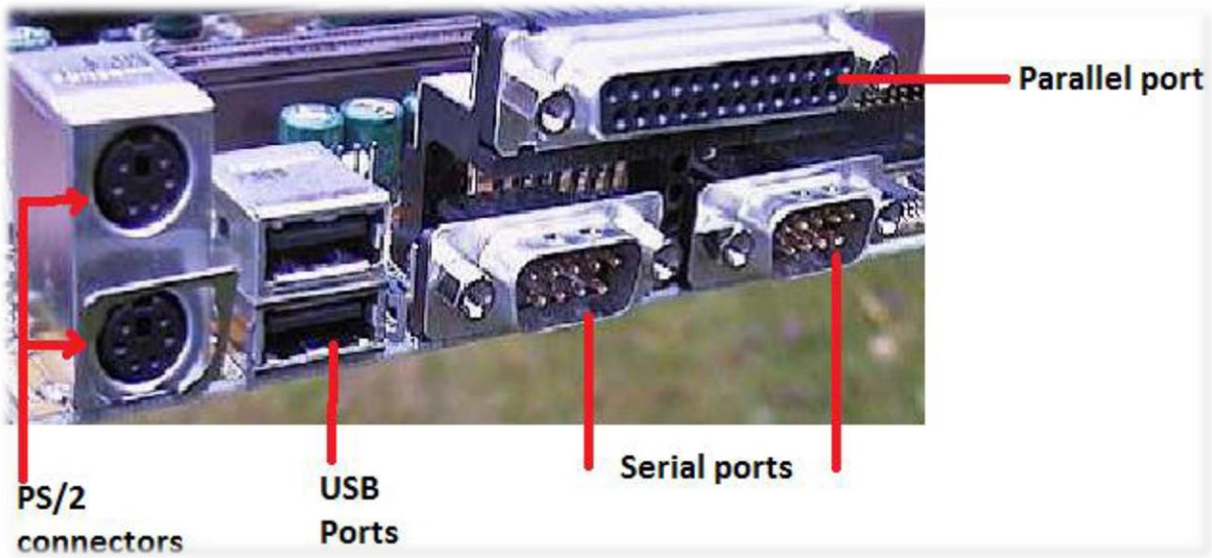
- Ports are sockets located on the motherboard, or on a separate adapter/circuit card into which a connector from a peripheral device such as monitor or keyboard is fixed. Ports are visible on the outside of the system chassis/back panel.

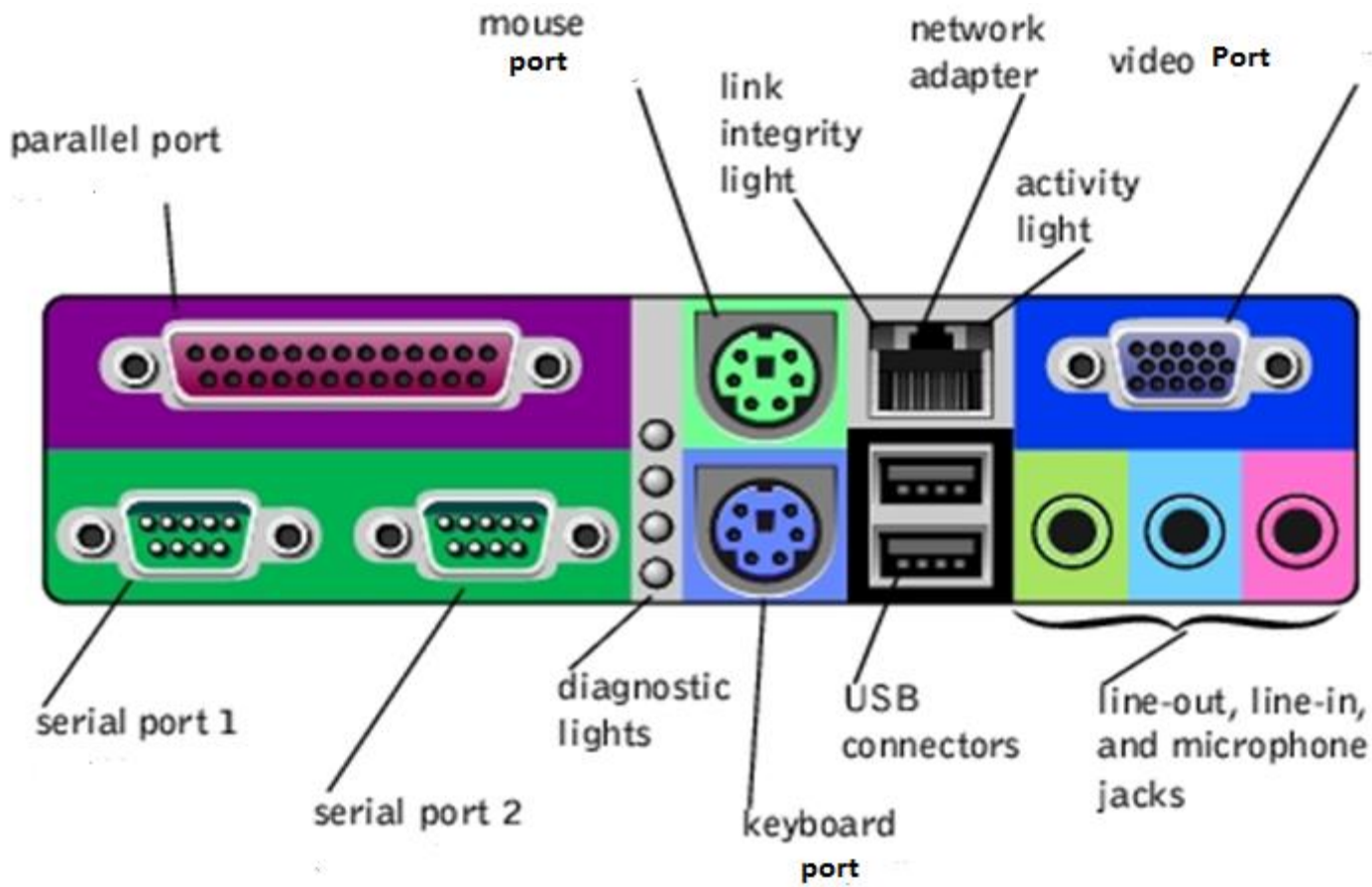
Peripheral devices

- A Peripheral device/peripheral is an external hardware that is not part of the system unit, but can be fixed to it using cables or wirelessly to increase the usability of the computer system.

- Peripheral devices are classified according to the purpose they serve:
- Input devices are used for data input
- Output devices are used for data output
- Storage devices are used to store data for long periods of time

Types of ports




mouse port
network adapter
video Port
link integrity light
activity light
parallel port
serial port 1
serial port 2
diagnostic lights
keyboard port
USB connectors
line-out, line-in, and microphone jacks

USB ports(Universal Serial Bus)

A special kind of port designed to establish short distance digital data communication between devices and personal computers.

USB ports can also supply electric power across the cable to devices without their own power source

USB PORTS

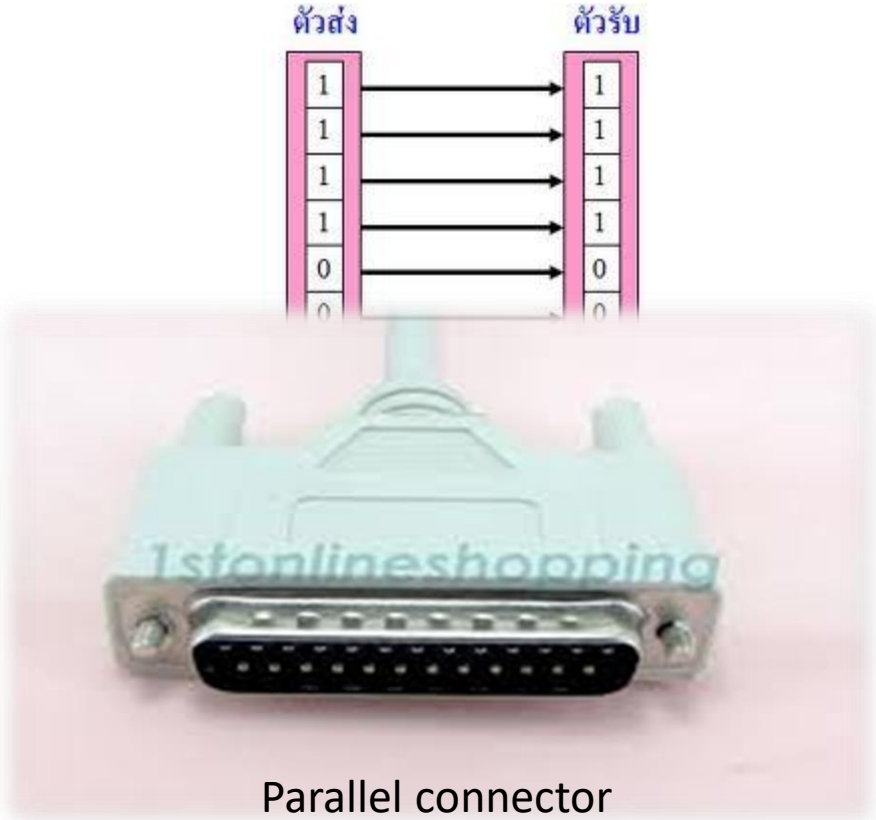
Serial cable and Serial Port

- Serial cables and ports are those that transmit one BIT of data at a time (in series).
- They are used to connect the mouse, keyboard, and communication devices such as the Modem to the system unit. A special type of serial port called a Musical Instrument Digital Interface (MIDI) port.

Parallel ports and Parallel Cables

- Parallel cables and ports transmits 8 BITs at a go that is in parallel.
- Parallel ports and cables are used to connect devices that send or receive large amounts of data such as printers, scanners, External hard disk drives, and external CD/DVD drives.

Parallel transmission



Parallel connector

FireWire port

A FireWire is a connection used to send data to and from high-bandwidth digital devices such as a digital camcorder.

FireWire connectors

FireWire Ports

Ethernet/network ports

An Ethernet port is a jack/opening on a computer or a network equipment that Ethernet cables are plugged into with RJ-45 connectors to connect the equipment/computer to a wired local area network.

Input devices

Input devices are physical computer components used to send data and instructions into the computer system for processing;

Task

- Name some commonly used input devices

Commonly used input devices include:

- Keyboard
- Mouse
- Trackball
- Light pen
- Touch screen
- Modem
- Scanner
- Microphone
- Bar code reader
- Digital camera
- Video digitiser
- Magnetic ink character recognition (MICR)
- Magnetic strips or stripes reader
- Touch pad

Categories of input devices

- Pointing input devices
- Keying input devices
- Scanning input devices
- Speech recognition input devices
- Audio input devices

Pointing devices

Devices that are used to input data and commands into the computer system using the Graphical user interface system by a pointing mechanism that controls the movement of the pointer to select items on a display screen.

It allows the user to control and provide data to the computer using physical movements like point, click, and drag.

- the movements of the pointing device are reflected/shown on the display screen by movements of the pointer (or cursor) and other visual changes.

Examples of pointing devices

- Mouse
- Joystick
- Trackball and Track pad
- Light pen

Pointing devices based on touch of a surface:

- Touch screen,
- Stylus,
- Trackball,
- Graphics tablet,
- Touch pad.

Joystick

Light Pen

Pointing Devices

Stylus used on a smartphone

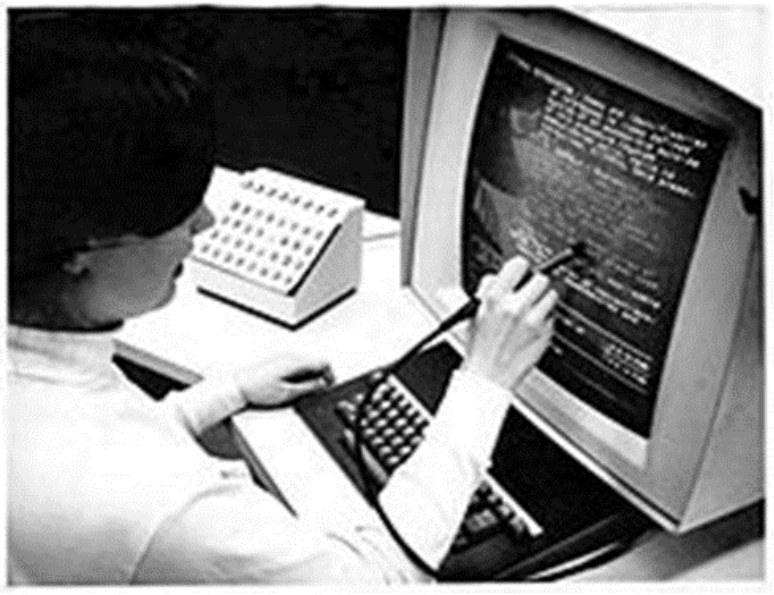
A virtual keyboard on an iPad

A graphics tablet with a pen

Track pad on an Apple MacBook Pro

Trackball

A gamepad with a trackball



Using a light pen

Using a touch screen

The computer Mouse

- A computer mouse is a small handheld device pushed over a horizontal surface to control the coordinates of the cursor on the computer screen as the user moves the mouse around on a surface and as he/she clicks on the mouse’s buttons.

Types of mouse

- The mechanical (ball) mouse has a ball beneath it and two freely rotating rollers.
- One roller detects the forward–backward motion of the mouse ball and the second roller detects the left–right motion of the ball.
- The movements of the rollers direct the movement of the pointer on the screen.

- An optical mouse: which uses a light-emitting diode and photodiodes to detect movement relative to the underlying surface, rather than moving some of its parts as in a mechanical mouse.


This device complies with
Part 15 of the FCC Rules
FC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Using a computer Mouse

- The user has to move the mouse to move the cursor in the same direction.
- If there is something on the screen that the user wants to choose, he or she can move the cursor over it and uses the left button to click” that option.
- By default, the right mouse button is used to open menus that are different depending on the position of the cursor on the screen.

- A mouse can have one to six buttons to click, but most mice have two or three.
- Most mice also have a scroll wheel – a small wheel found between the two main mouse buttons.
- The user can move the wheel up or down to scroll through things like a webpage or folder.
- The other mouse buttons can do different things, depending on the software.

The Keyboard

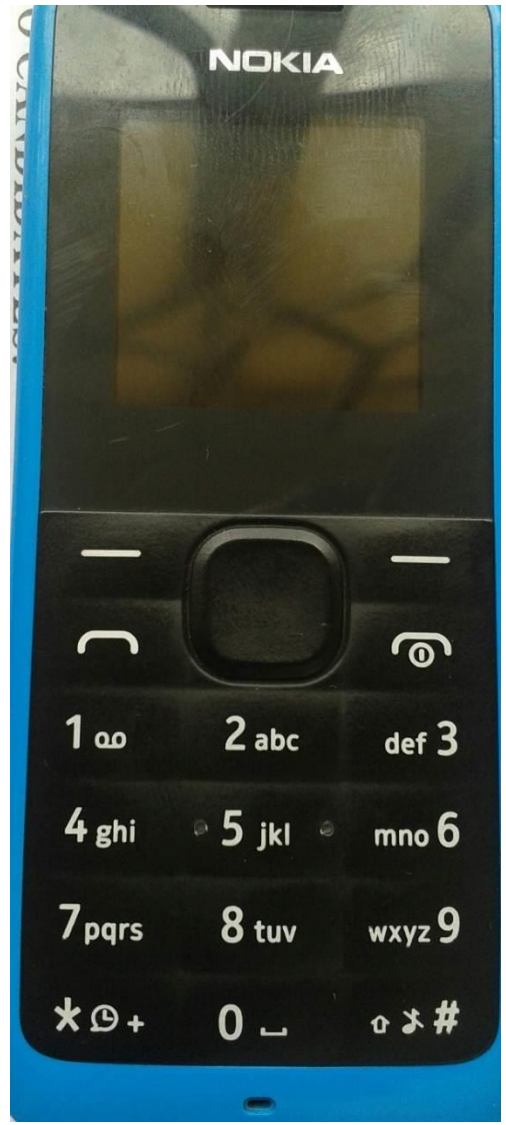
- The keyboard has a set of keys used to enter commands and characters into the computer system.
- A keyboard layout is any specific mechanical, visual, or functional arrangement of the keys, legends (labels, markings, and engravings on keys), or key–meaning associations of a computer, typewriter, or other typographic keyboard.


Ctrl
Alt
Alt
Ctrl

Types of keyboards

There are two types of keyboards: alphanumeric keyboards and special-function keyboards:

- The alphanumeric keyboard contains letters, numbers and symbols in particular layouts. This keyboard is modeled on the typewriter keyboard, also known as a QWERTY keyboard (based on the sequence of letters at the top left).


NOKIA
1 oo
2 abc
def 3
4 ghi
5 jkl
mno 6
7 pqrs
8 tuv
wxyz 9
0

Sections of alphanumeric keyboards

- Function keys- top row. Pressing these keys will instruct the operating system to perform a certain command.
- The main section of the keyboard is made up of five rows. The first row contains numbers and symbols, while the middle three rows are for the letters of the alphabet and punctuation marks and other symbols.

- The bottom row has the spacebar and special keys.
- The numeric pad on the right side of the keyboard, activated by pressing the Numlock.

Special keys

- Spacebar: Moves the insertion point one space to the right.
- Enter/return: Moves the start of the typing to the beginning of the next line/moves the insertion point to the next line.
- Backspace: Deletes the character immediately to the left of the insertion point/deletes one character at a time to the left.

- Shift: This is pressed down together with other keys to give the given key’s second-function command. Or entering a letter as upper case letters (when Caps Lock is off).
- Caps Lock: Changes between upper and lower case.

- The Delete key delete/erases one character at a time immediately to the right of the insertion point.
- The Insert key (INS) is used to change between two states of the text editor, insertion mode and overtype mode. The insertion mode is its default mode which allows the user to enter extra characters at the insertion point. In the overtype mode, new characters being typed erase the characters that were previously typed.

- The Direction/four arrow keys are used to move the insertion point in the document.
- The rightmost section of the keyboard contains a numeric keypad for quick and easy entry of numerical data. Pressing the Num Lock in this section turns the Num Lock light on to activate the numeric pad or turns it off

The Special-function keyboards are invented for a particular purpose. For example:

- The Braille keyboard has its keys marked with raised dots to aid the blind.
- The concept keyboard contains a flatbed of contact switches covered by a flexible membrane. Over each contact switch whole words, pictures or symbols are superimposed. The computer is then programmed to respond appropriately to these.

Digitizer

- The left-handed keyboard is designed for the left-handed individual.
- A virtual/projection keyboard is projected onto any surface and touched. The keyboard can register your finger movement and hence translate that movement into a keystroke. An example is the touch-screen keyboard of the automatic teller machines (ATM) found in front of banks, etc.

Keyboard shortcuts

Keyboard shortcuts are combinations of two or more keys that, when pressed concurrently perform a task that would require a mouse or other pointing device.

General keyboard shortcuts

F1: Help	ALT+TAB: Switch between open programs
CTRL+ESC: Open Start menu	Windows Logo + L: Lock the computer (without using CTRL+ALT+DELETE)
CTRL+C: Copy	CTRL+X: Cut
CTRL+V: Paste	CTRL+B: Bold
CTRL+U: Underline	CTRL+I: Italic
ALT+F4: Closes the current window	Alt + F: File menu options in current program.
Alt + E: Edit options in current program	Ctrl + A: Select all text.
Ctrl + V: Paste	Ctrl + Home: Goes to beginning of document.
Ctrl + Z: Undo an action	Ctrl + Y: Redo an action
Alt + Tab: Switch between open items	Ctrl + enter: page break at the cursor position

SHIFT+right click: Displays a shortcut menu containing alternative commands	ALT+double click: Displays properties
SHIFT+double click: Runs the alternate default command (the second item on the menu)	SHIFT+DELETE: Deletes an item immediately without placing it in the Recycle Bin
Ctrl+Alt+Tab: Use the arrow keys to switch between open items	CtrL + Return = Page Break

Scanning devices

A scanner is a device that optically scans images, printed text, handwriting, or an object (3D), and converts it to a digital image.

Types of scanning devices

- Flatbed scanner: it scans a document, image or object placed on a glass window for scanning.
- Drum scanner: scanner used to capture the highest resolution from an image. Photographs and transparencies are taped, fitted into a clear cylinder (drum) that is spun at very high speed during the scanning operation.

- Sheet-fed scanner: This allows only paper to be scanned rather than books or other thick objects.
- Magnetic Ink Character Recognition (MICR) is a character recognition input device that recognises special ink and characters. a document that contains magnetic ink to be read is passed through a machine (MICR), which magnetizes the ink and then translates the magnetic information into characters.

- MICR is mainly used in the banking industry to read cheques. Bank cheques have the following information encoded in them:
- The cheque number
- The bank branch number
- The customer’s account number
- Hand-held scanners, where the device is moved by hand.

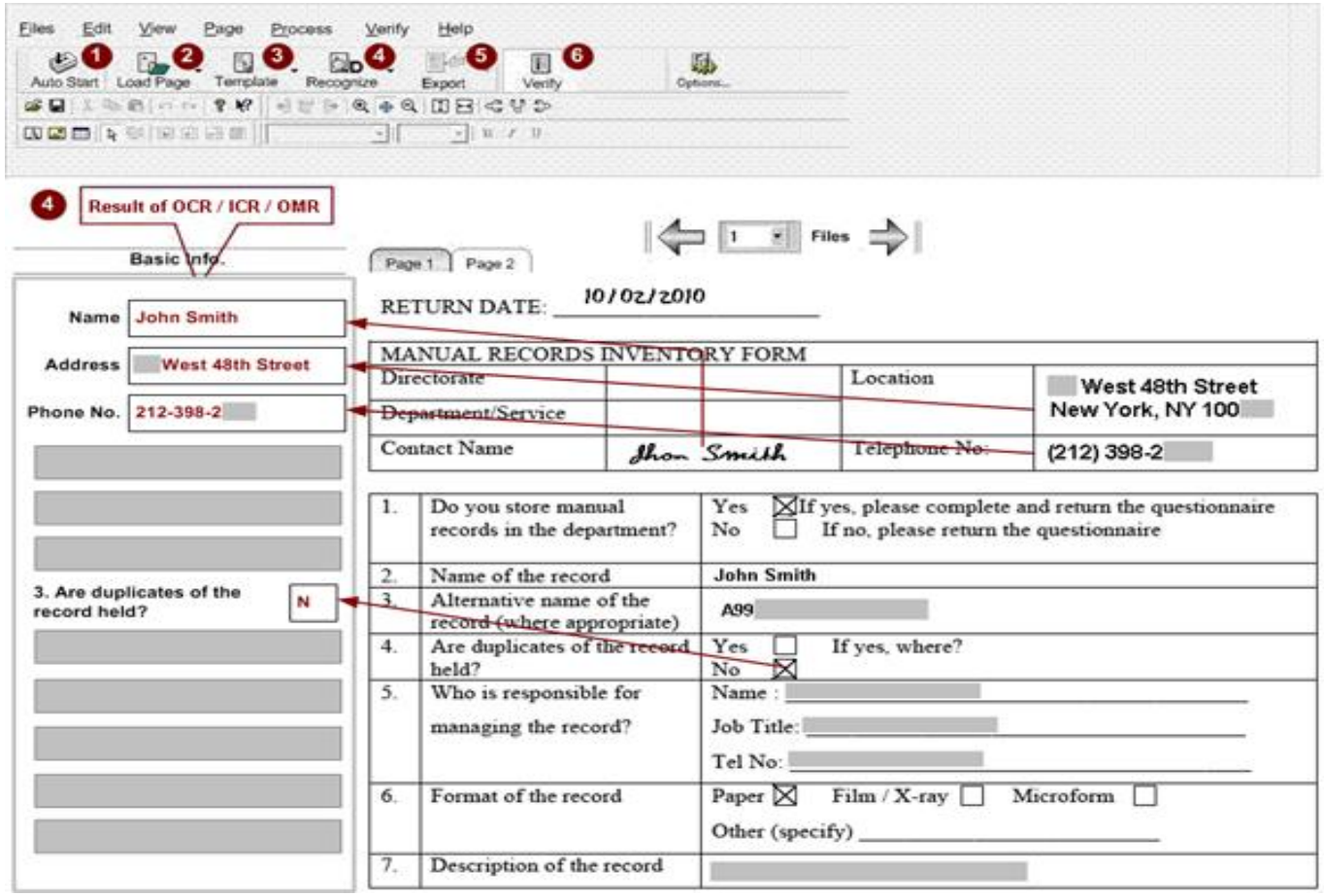
Flatbed scanner

Drum scanner

- Optical Mark Readers (OMR).

OMR is the technology of electronically extracting intended data from marked fields, such as checkboxes and fill-in fields, on printed forms. OMR technology scans a printed form and reads predefined positions and records where marks are made on the form.

Survey form where OCR is applied



Optical Character Recognition (OCR)

OCR (optical character recognition) is the recognition of printed or written text characters by a computer. This involves photo scanning of the text character-by-character, and translation into character codes, such as ASCII, commonly used in data processing.

Barcode readers

A barcode reader (or barcode scanner) is an electronic device for scanning and reading printed barcodes, using a laser beam. it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones.

The information received by the scanner is sent to a computer for processing.

Barcodes

- A barcodes are optical machine readable bars representing data relating to the object to which it is attached

Barcode types

QR codes (Quick Response Code)

UPC (Universal Product Code) codes

Barcode reader

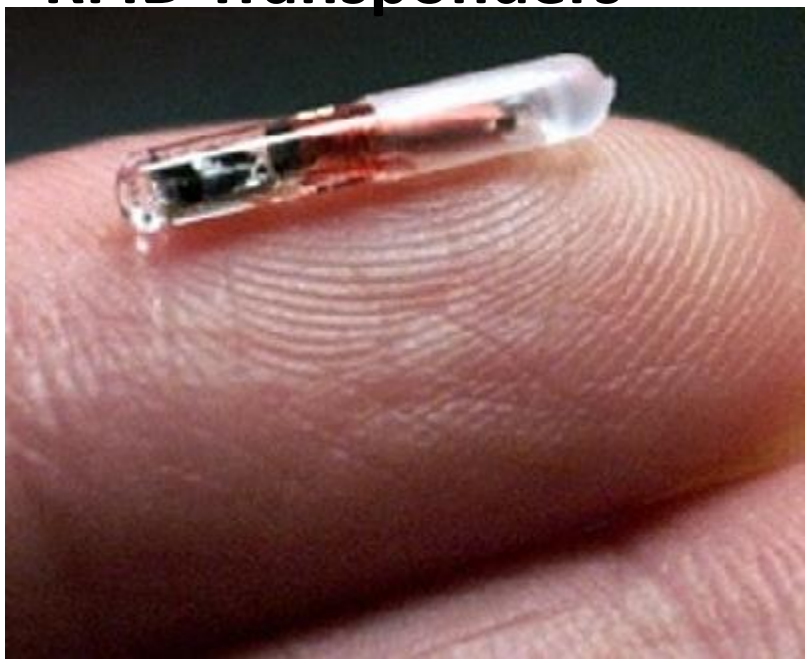
RFID (radio frequency identification)

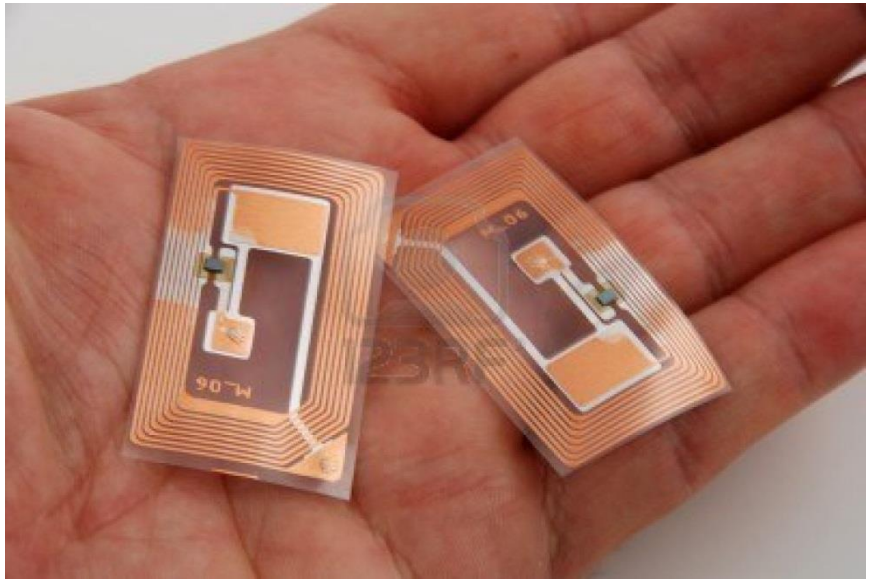
Radio frequency identification (RFID) is the wireless use of electromagnetic fields to transfer data for purposes of automatically identifying and tracking tags attached to objects such as animals.

The tag has a small antenna connected to it and has electronically stored information such as a serial number which is transmitted to an RFID receiver that converts the radio waves to digital information so that it can be processed by the computer.

RFID Transponders

Implanted Radio Frequency Chip/Tag





Magnetic Stripe Reader

Smart cards

Smart cards are storage media with very thin gold-coloured memory chips sealed into them that can store data. These chips can hold information for cell phone use, debit and credit cards, and any prepaid services.


CREDIT CARD
1234 5678 9876 5432
BioLink
RT CARD
RT CARD Applications

Iris scanner

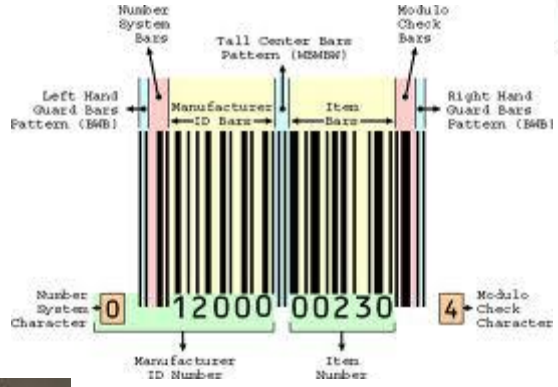
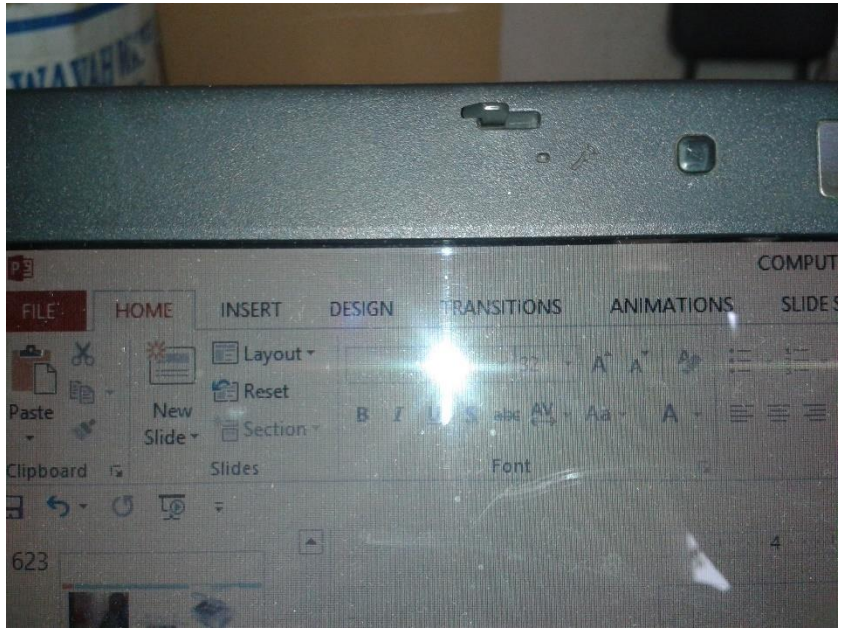


Image scanner

Finger scanning

The Audio and Video input devices

- Voice/speech recognition (automatic speech recognition, computer speech recognition, speech to text, or just STT) is the ability of a machine or program to identify words and phrases in spoken language and convert them to a machine-readable format.
- Voice recognition systems require the use of a microphone and voice recognition programs.


FILE
HOME
INSERT
DESIGN
TRANSITIONS
ANIMATIONS
Paste
New Slide
Layout
Reset
Section
Clipboard
Slides
Font

Sound capture

- All modern computers contain a built-in microphone for sound capture.
- A sound card on a computer is required for recording voice or music. The sound card digitises the information into a form that the computer can understand.

MIDI (Musical Instrument Digital Interface)instruments

- **Electronic musical instruments have a Musical Instrument Digital Interface (MIDI) port for music input into the computer. The sounds are digitised and stored as a file, can be displayed on screen, edited and played back, using applicable software.**

MIDI interface

USB MIDI Cable Interface Adapter for Music Electronic Keyboard Piano

A MIDI port on your Music keyboard, computer,

USB cable like MIDI interface

Graphics tablet/Digitiser

- A graphics tablet (digitizer) is a computer input device that enables a user to use a free hand to draw images, signatures and graphics on the surface of the digitiser and be translated into digital format into the computer system.


BAMBOO
wacom

Digital cameras

- Digital camera is a device that captures an image and stores it in memory within the camera.
- The processor in the camera converts this information into digital data and stores it on a small disk, or flash memory card.

- The digital images can then be uploaded to a computer where they can be displayed, manipulated/edited or printed.


Canon

Finger print reader

- Are devices that scan the pattern of ridges on the finger and compare it to a set of fingerprint patterns stored in computer memory.

Remote control

- A remote control emits a beam of infra-red light that carries data signals. Commonly used for input to televisions, radios and DVD players, they are now being used by computers as a wireless means of communication.

Sensors

A Sensor is a device that detects change in the environment such as Chemical or physical changes and converts them to electrical signals before passing it to a computer as input, where it is analysed, stored and manipulated by specialist software.

- A variety of sensors are used to detect changes in things like heat, light, sound, pressure, strain, acidity (pH), oxygen concentration, humidity, pulse, water level, water flow, speed, tilt or even something like a door or a valve opening or closing, touch, etc.

The Computer System Unit

The system unit is a collection of many electronic components that collectively process information. The system unit is normally housed in a rectangular box (chassis)

The chassis that houses the System unit components

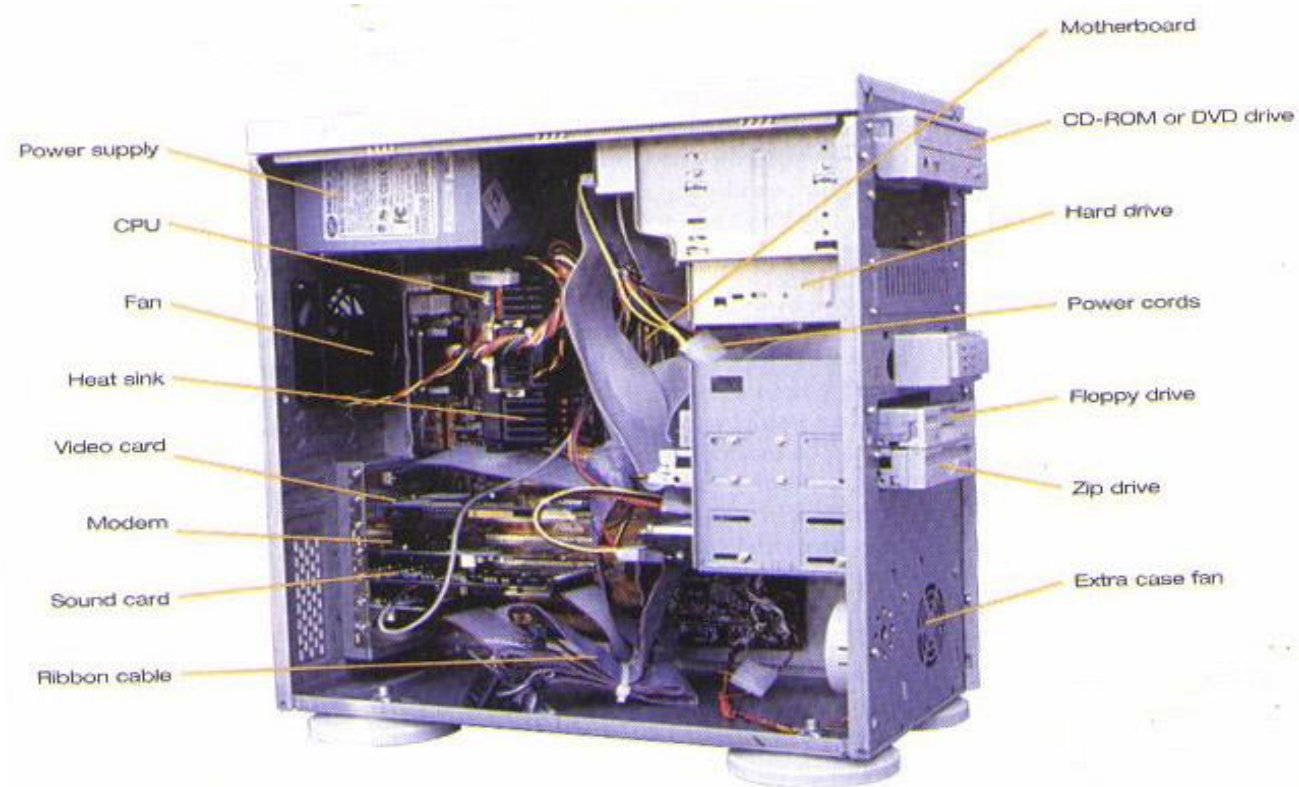
Uses of the Chassis (system casing)

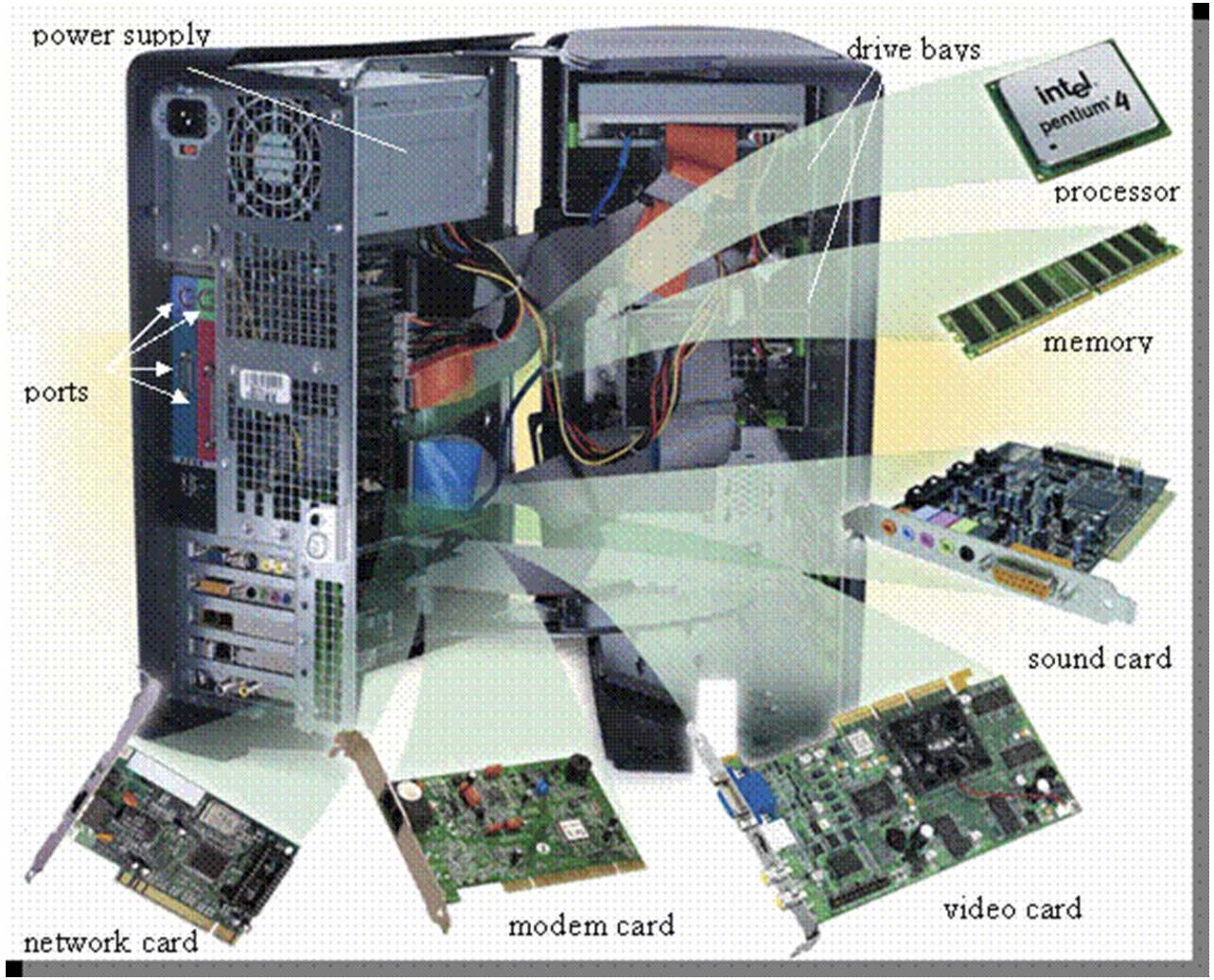
- It protects the internal parts against direct dust, water, and other falling objects.
- It provides attachments for holding different units together,
- It houses the different components as a single component.
- It facilitates easy movement of the system unit.
- It provides protection for the user against electrical signals.

Components of the system unit

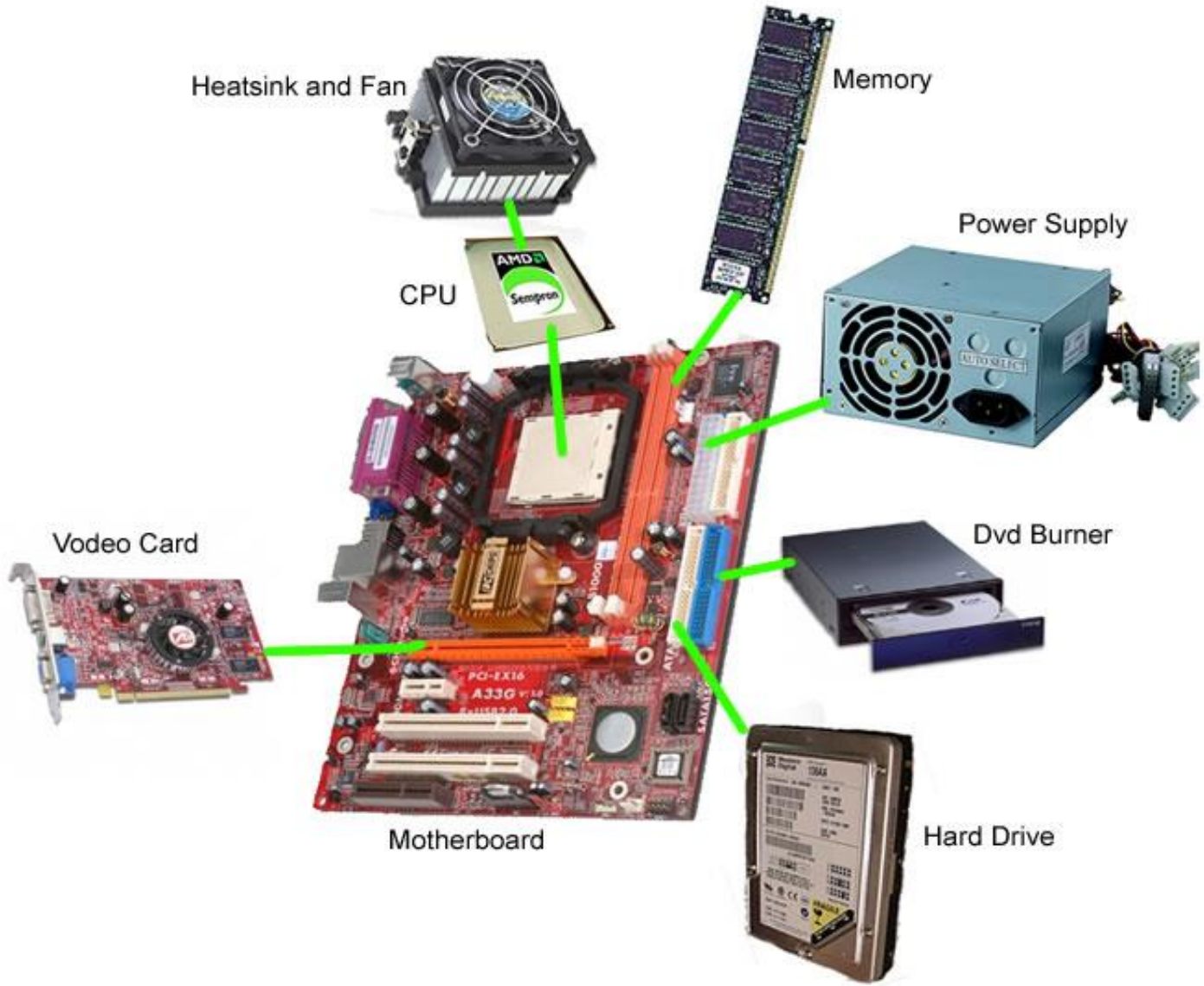
- The motherboard
- central processing unit (CPU), or microprocessor
- upgrade sockets, and expansion slots
- random access memory chips (RAM), connectors
- Drives, e.g. floppy, CD/DVD, and Harddisk/drives
- the power supply Unit
- sound adaptor

- ports through which peripheral devices are connected.


Motherboard
CD-ROM or DVD drive
Power supply
Hard drive
CPU
Power cords
Fan
Floppy drive
Heat sink
Zip drive
Video card
Modem
Extra case fan
Sound card
Ribbon cable


power supply
drive bays
intel
pentium 4
processor
memory
ports
sound card
network card
modem card
video card

Main parts of a system Unit



Computer Disk Drives

- A computer drive is a piece of hardware that is used to read and store information on a storage Disk. These include solid state drives (flash disks and cards) and rotating drives.
- Examples of disk Drives include:
- Optical disk drives including CD/DVD drives
- Hard disk drives
- Floppy disk drives
- Zip drives, Flash Disk Drives


ASUS


zip

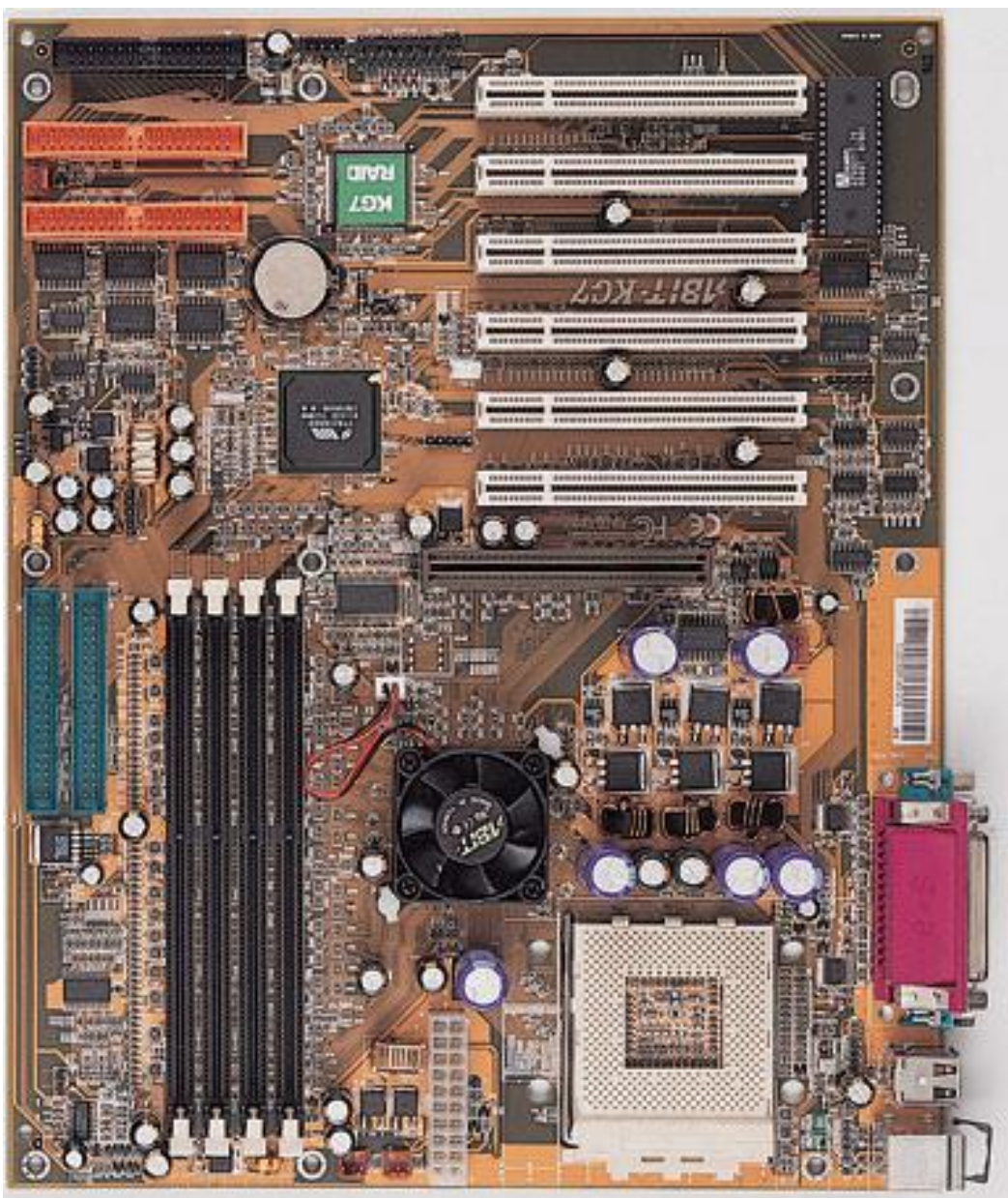
Disk drive access time

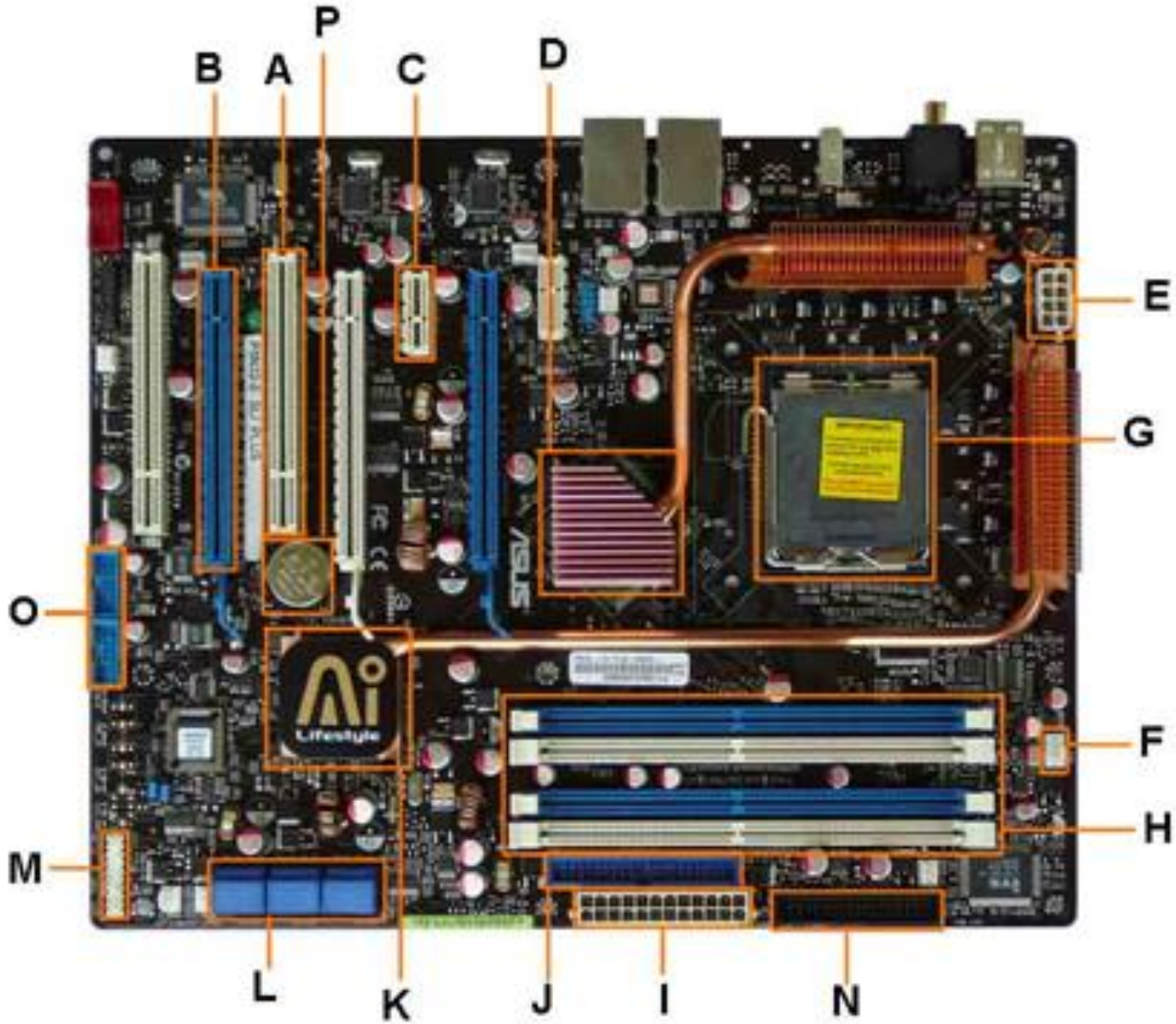
- The time the device takes to locate a single piece of information on a disk and makes it available to the CPU for processing.
- (ie. The access time or response time of a rotating drive is a measure of the time it takes before the drive can actually transfer data
- Access time = seek time + latent time

- Seek time is the time it takes the drive to access the information on a disk
- Latency is the delay waiting for the rotation of the disk to bring the required disk sector under the read-write head. It depends on the rotational speed of a disk (or spindle motor), measured in revolutions per minute (RPM

The Motherboard (main board or system board)

- The motherboard is the circuit board of a computer on which metallic circuits are printed, with sockets, slots and ports that hold all other system unit components together for the computer to work as a single unit to process data.


KG7
RAID
8IT-KG7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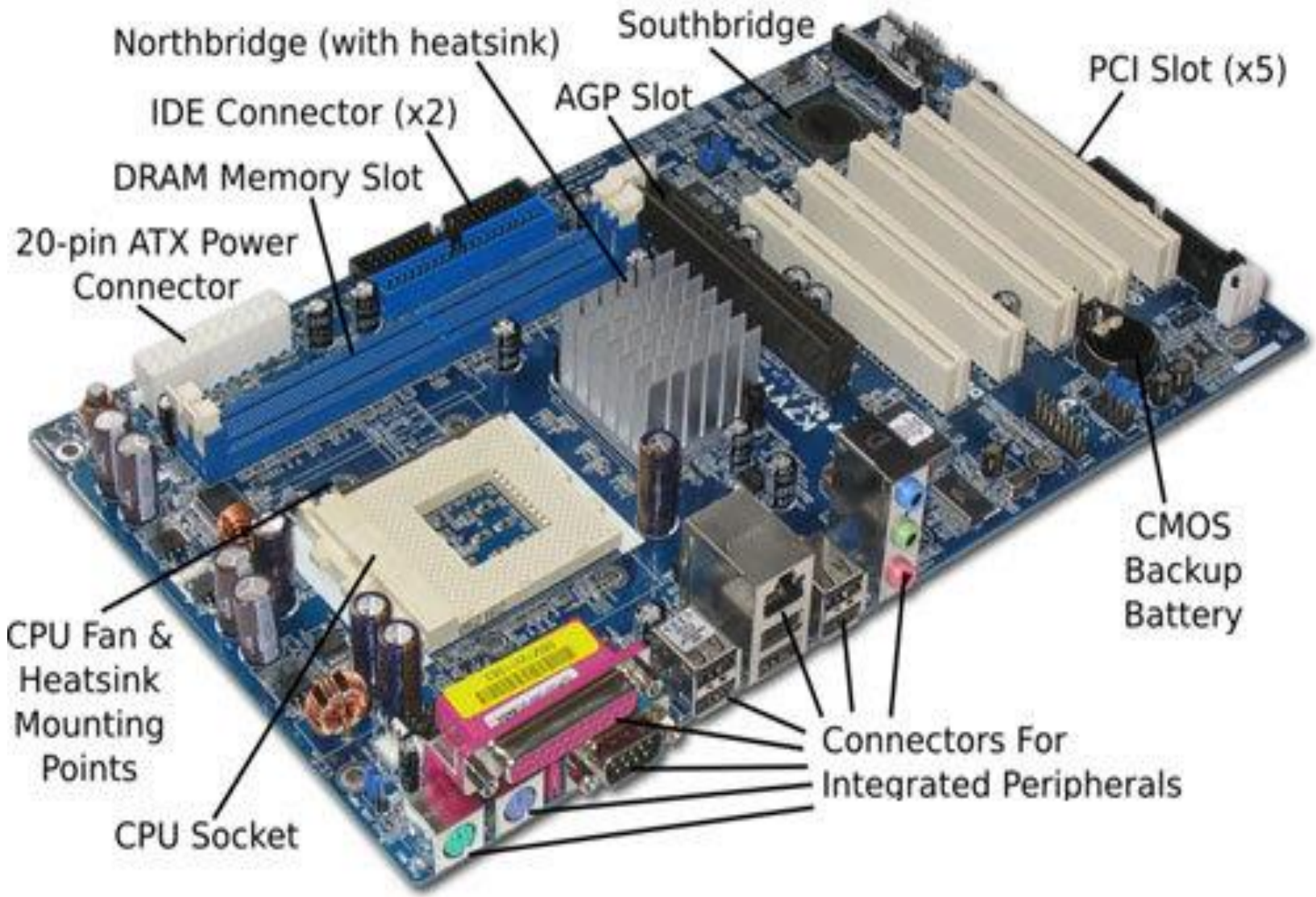
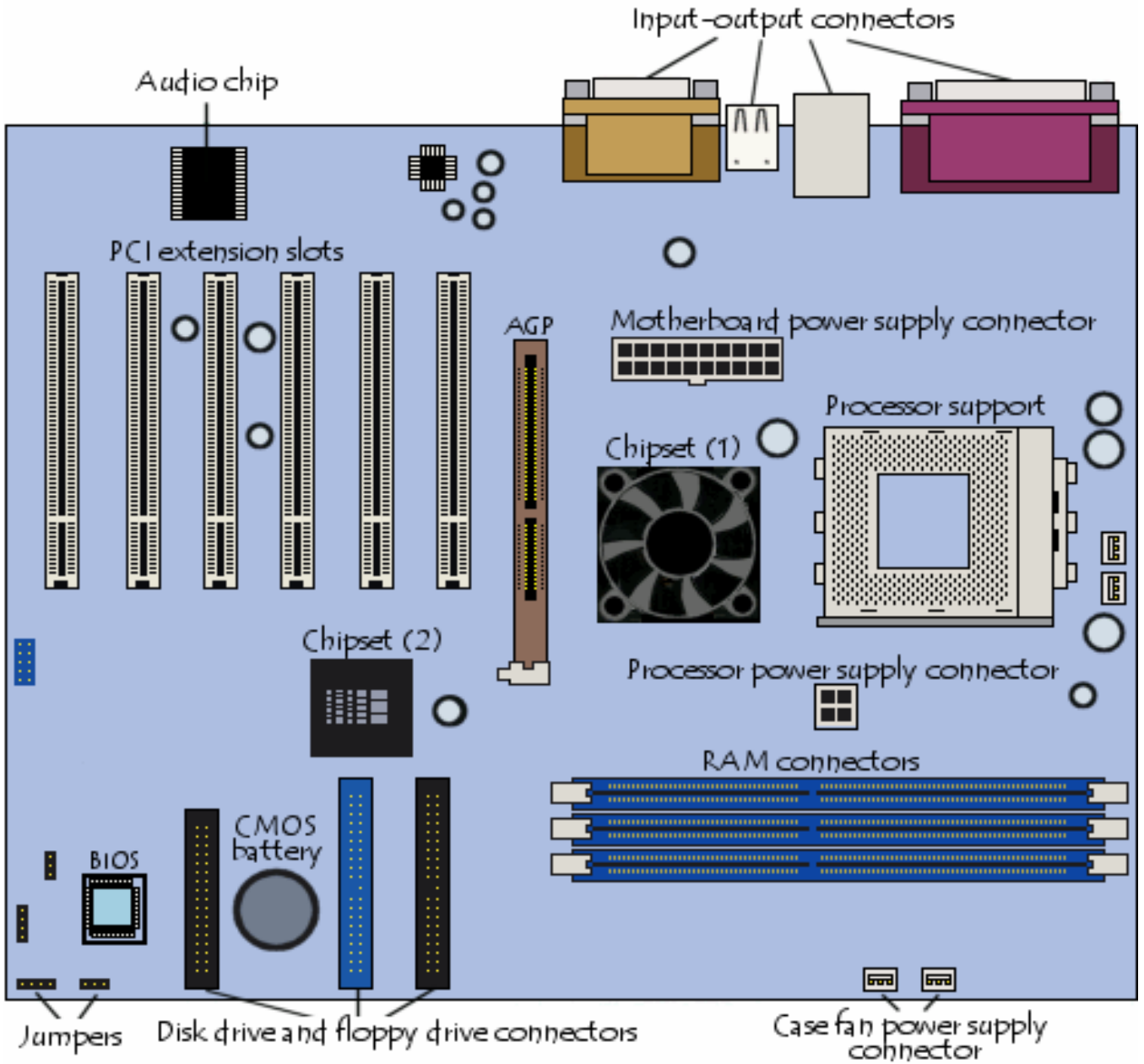

Northbridge (with heatsink)
Southbridge
IDE Connector (x2)
AGP Slot
PCI Slot (x5)
DRAM Memory Slot
20-pin ATX Power Connector
CMOS Backup Battery
CPU Fan & Heatsink Mounting Points
Connectors For Integrated Peripherals
CPU Socket

Connectors and slots on Motherboard



Classification of Motherboards

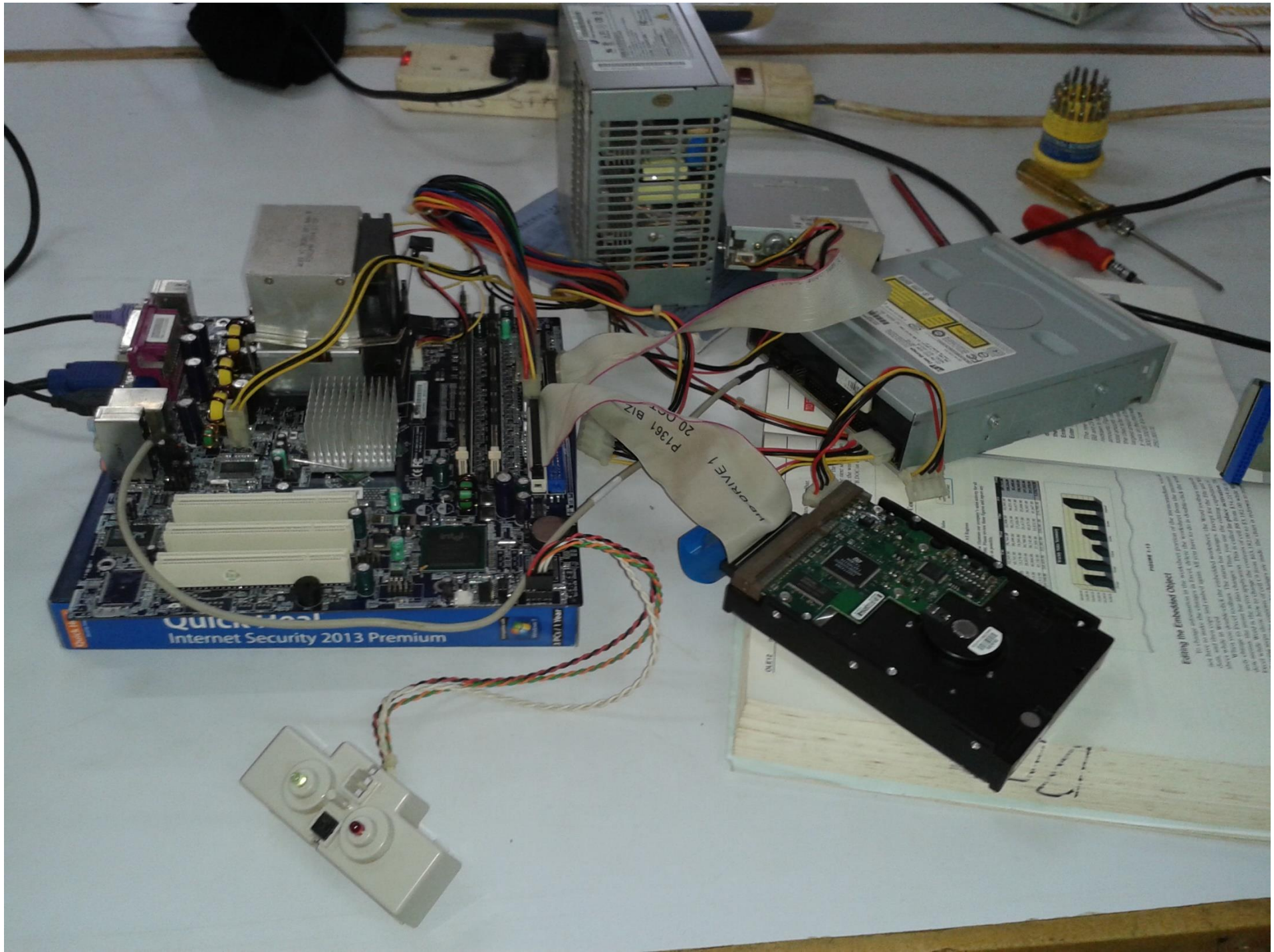
- Motherboards are divided into the following two main categories:
- Integrated motherboards and Non-integrated motherboards

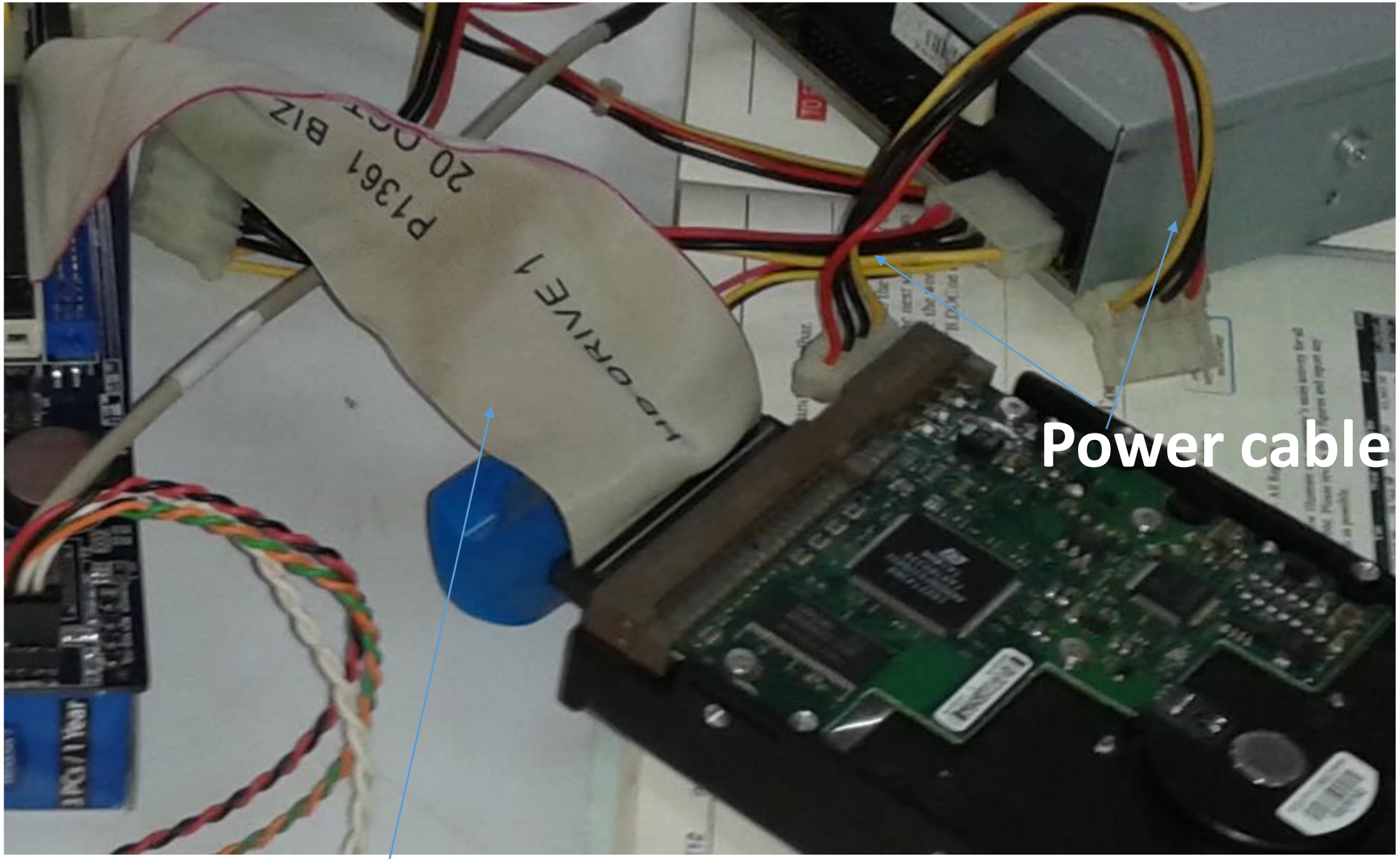
- Integrated motherboards come with all the essential components built into them

- Non-integrated motherboards don't have most of the main components built into them, but they normally have more expansion slots to allow the user to add them.

Computer Cables and Connectors

- A cable is one or more wires covered in a plastic covering that connects a computer to a power source or to another device.
- There are two main types of computer cables: a data cable and a power cable.


Internet Security 2013 Premium

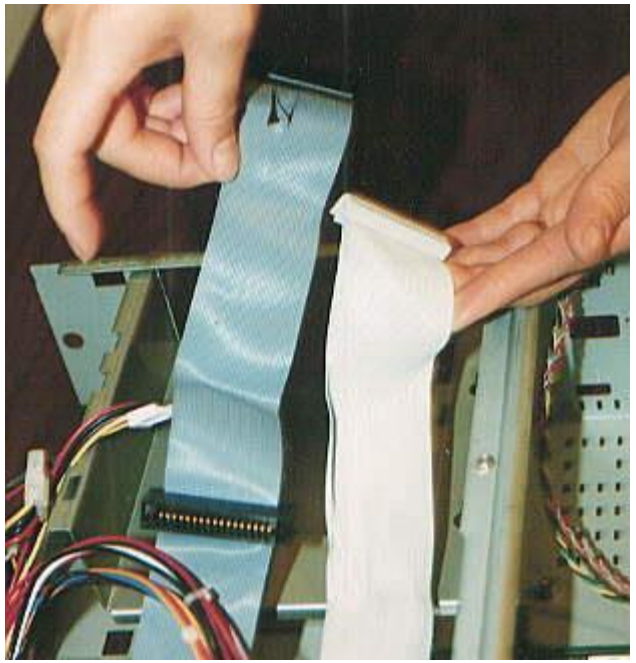

Power cable
Data Cable

Data Cable

- A data cable is a wire that provides a connection and communication between devices.
- For example, the data cable (VGA cable) that connects a monitor to the computer allows the computer to display a on the an image on the monitor by transmitting the data from the system unit to the monitor.

- Other examples of data cables include the CAT5*, IDE/EIDE, SATA, and USB cables.
- A power cable is any wire that transmits power from a power source to an electronic device. For example, the power cord that connects to the computer.

Ribbon cables



- Ribbon cables connect internal peripherals in computers, such as hard drives, CD drives and floppy drives.
- They are bulky making them awkward to handle and they obstruct air flow within the computer.

Round Data cables and SATA Data cables

- Round cables and Sata cables are used for internal connections in place of ribbon cables because they are less bulky and easier to handle.

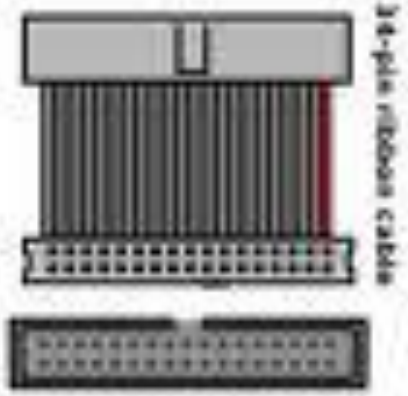
Round cables

SATA cables

Internal Data Cables and Ports

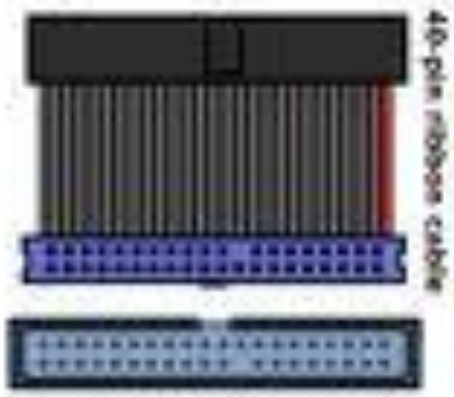
FDD

Connects Floppy Drives



IDE

Connects Hard Drives
Zip and Optical Drives



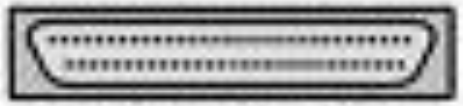
SATA

Connects Fast Hard Drives

SCSI

Connects Hard Drives

50-pin Ribbon Cable



68-pin High Density Cable

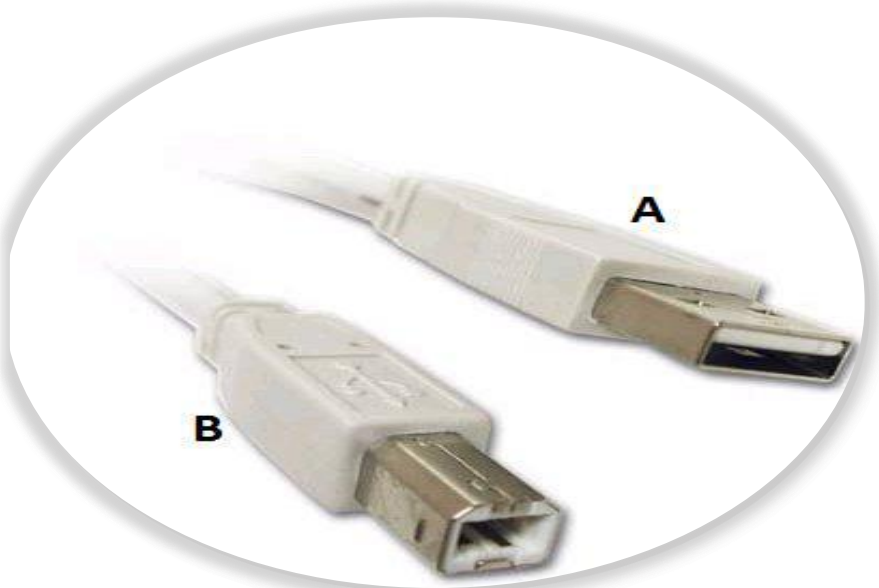
Cable Connectors

- A connector is a part that terminates the cable is plugged into a port or other interface to connect one device to another.
- a connector is either male (containing one or more exposed pins) or female (containing holes in which the male connector can be inserted).

- USB can connect computer peripherals such as mice, keyboards, digital cameras, printers, personal media players, flash drives, and external hard drives onto the computer system unit.
- USB standard

  uses "A" and "B“

  connectors.



VGA cables and connectors

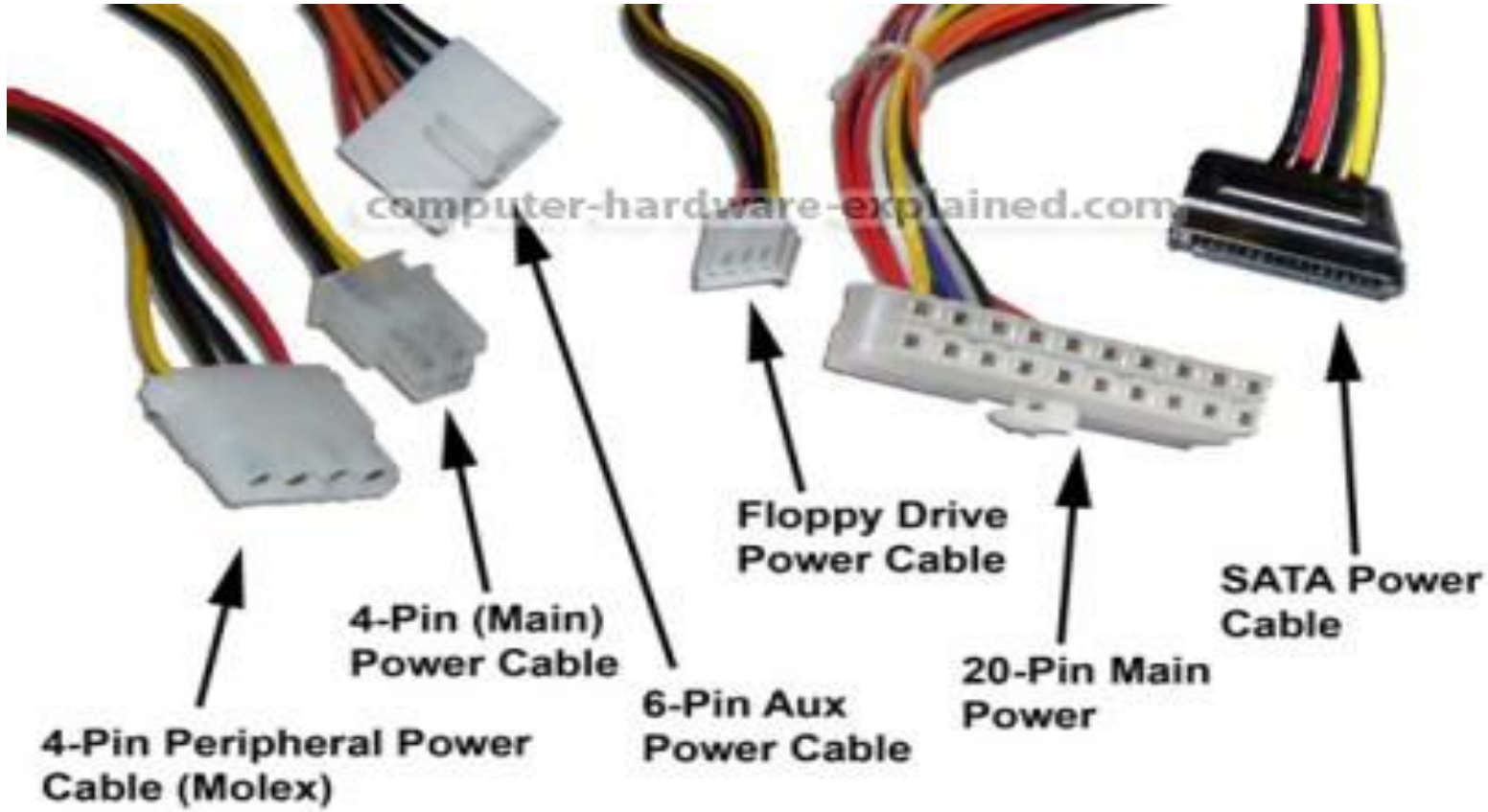
Audio connector

Ethernet cables

S-video connectors

USB connectors

RCA Connector Cables


computer-hardware-explained.com
4-Pin Peripheral Power Cable (Molex)
4-Pin (Main) Power Cable
6-Pin Aux Power Cable
Floppy Drive Power Cable
20-Pin Main Power
SATA Power Cable

Bus

A bus is a set of signal pathways that allow information to travel between components inside or outside of a computer.

Types of Bus

- system bus, which is an internal path between the computer’s Central Processing Unit (CPU) and its memory,
- The peripheral bus, which connects the computer to a peripheral device.
- External bus or Expansion bus allows the CPU to talk to the other devices in the computer and vice versa. It is called that because it's external to the CPU.

- Address bus. Address bus is one that allows the CPU to communicate with a device. It will select the particular memory address that the device is using and use the address bus to write to that particular address.
- Data bus. Data bus is one that allows the device to send information back to the CPU.

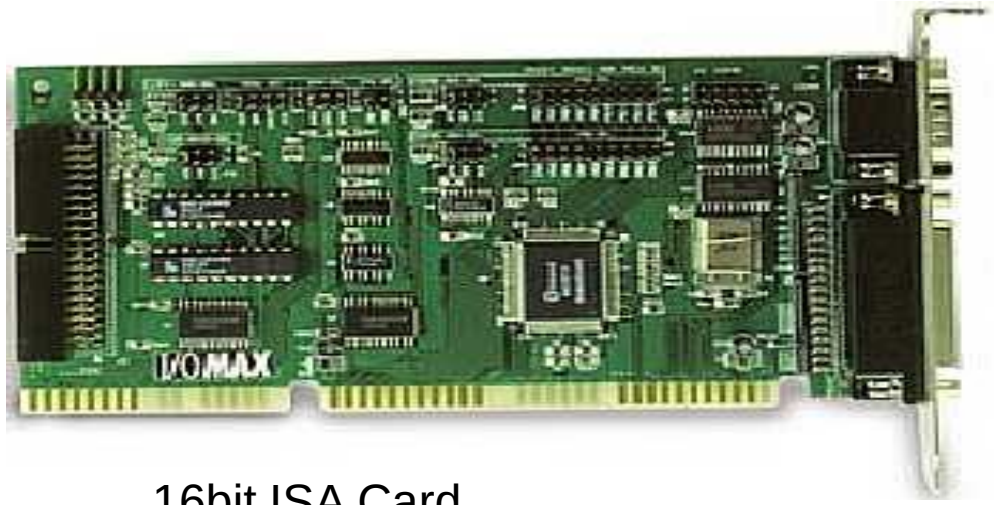
Types of Expansion Buses

Expansion bus are categorised by make, connector size and word size (data width), bus speed.

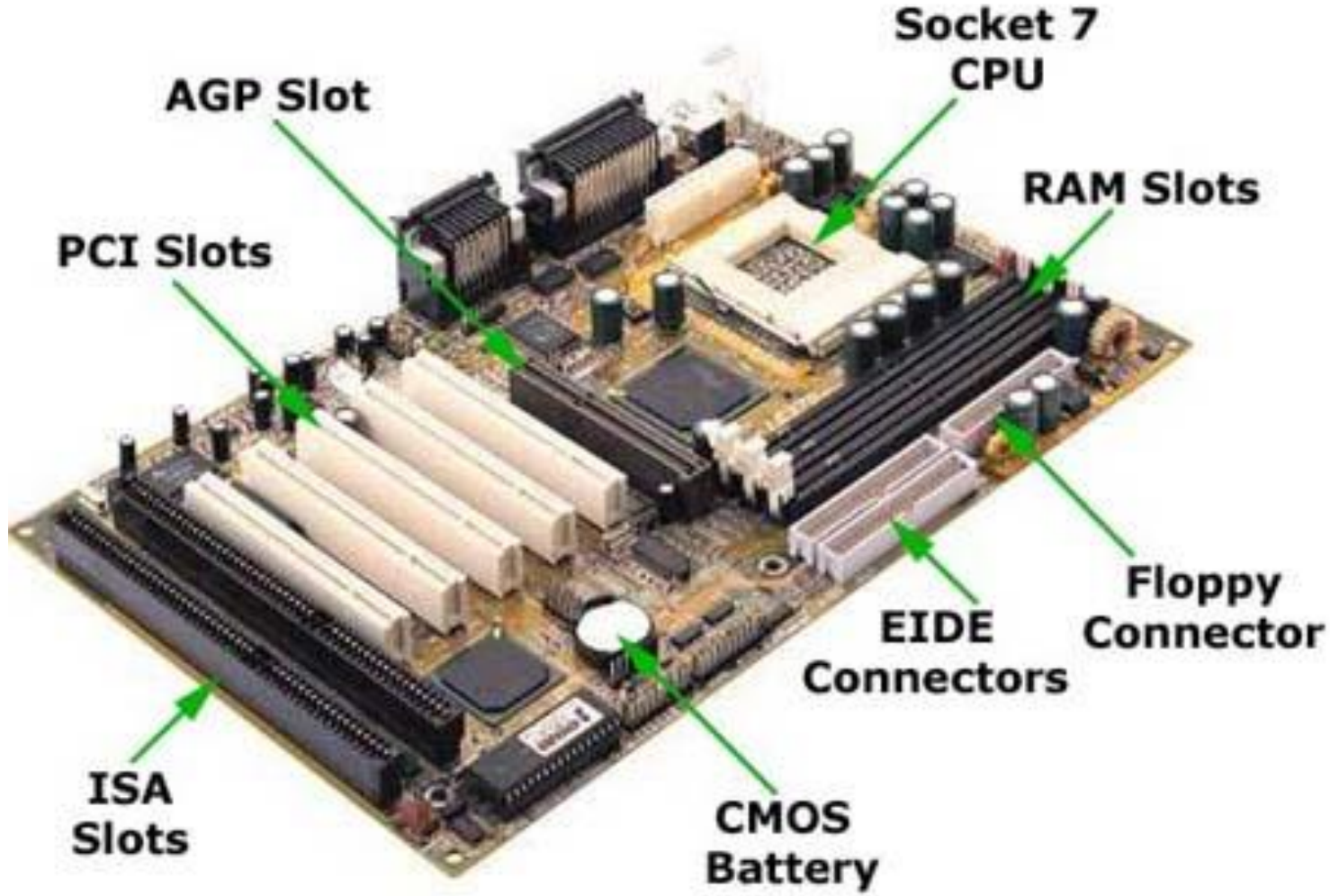
- ISA

Introduced by IBM, ISA (Industry Standard Architecture) was originally an 8-bit bus and later expanded to a 16-bit bus in 1984.

16bit ISA Slot



16bit ISA Card


Socket 7
CPU
AGP Slot
RAM Slots
PCI Slots
Floppy
Connector
EIDE
Connectors
ISA
Slots
CMOS
Battery

PCI (Peripheral Component Interconnect)

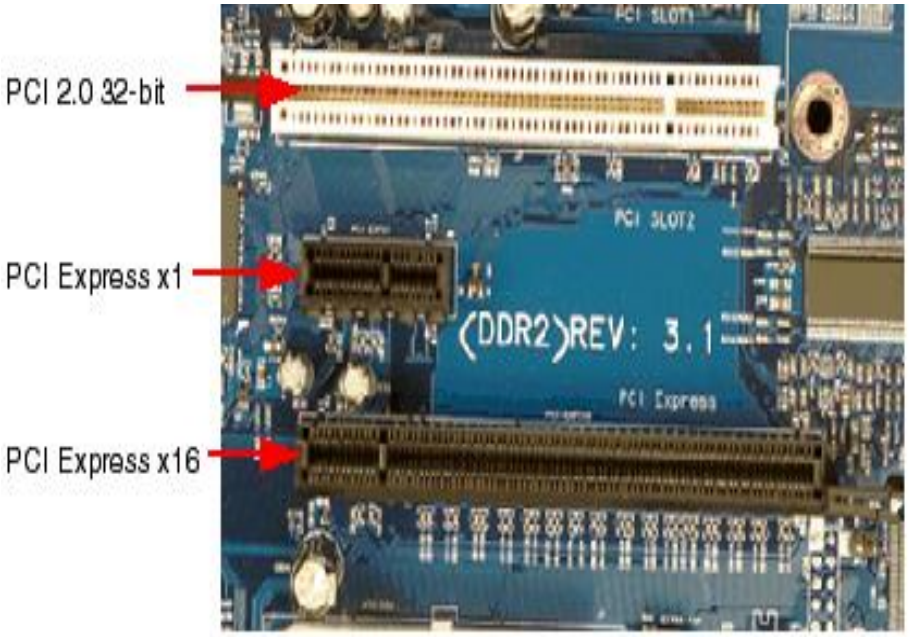
- Introduced by Intel in 1992, it is a 32-bit or 64-bit expansion bus.
- The PCI bus is the most popular expansion bus use in today's computers

PCI slot

PCI card

PCI Express. A high speed serial I/O interconnect standard being used for high speed connection it will eventually replace the PCI standards

PCI-e Card



AGP (Advanced Graphic Port)

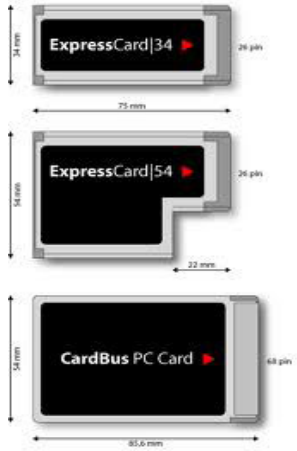
AGP is a 32-bit bus or 64-bit bus AGP is fast expansion bus used only for video or graphics environment with a direct line to the computers memory which allows 3-D elements to be stored in the system memory instead of the video memory.

AGP slot

AGP CARD

PCMCIA or PC Card

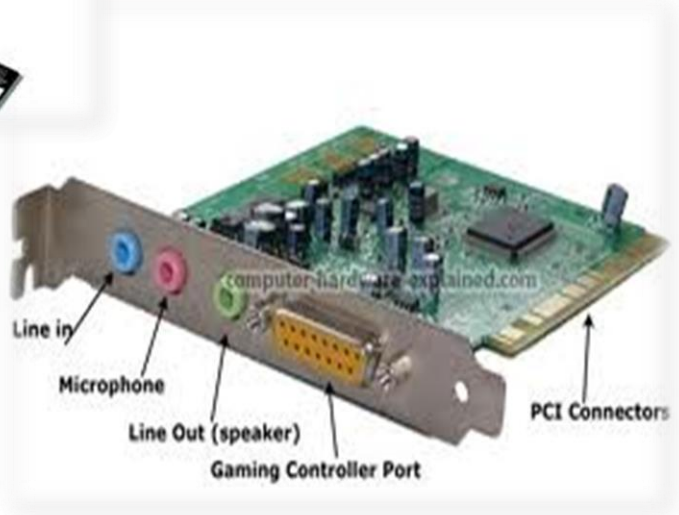
- Personal Computer memory card international association is a type of bus use for laptops. There are different types of cards and you primarily slide in the card in a PC card slot of a laptop.



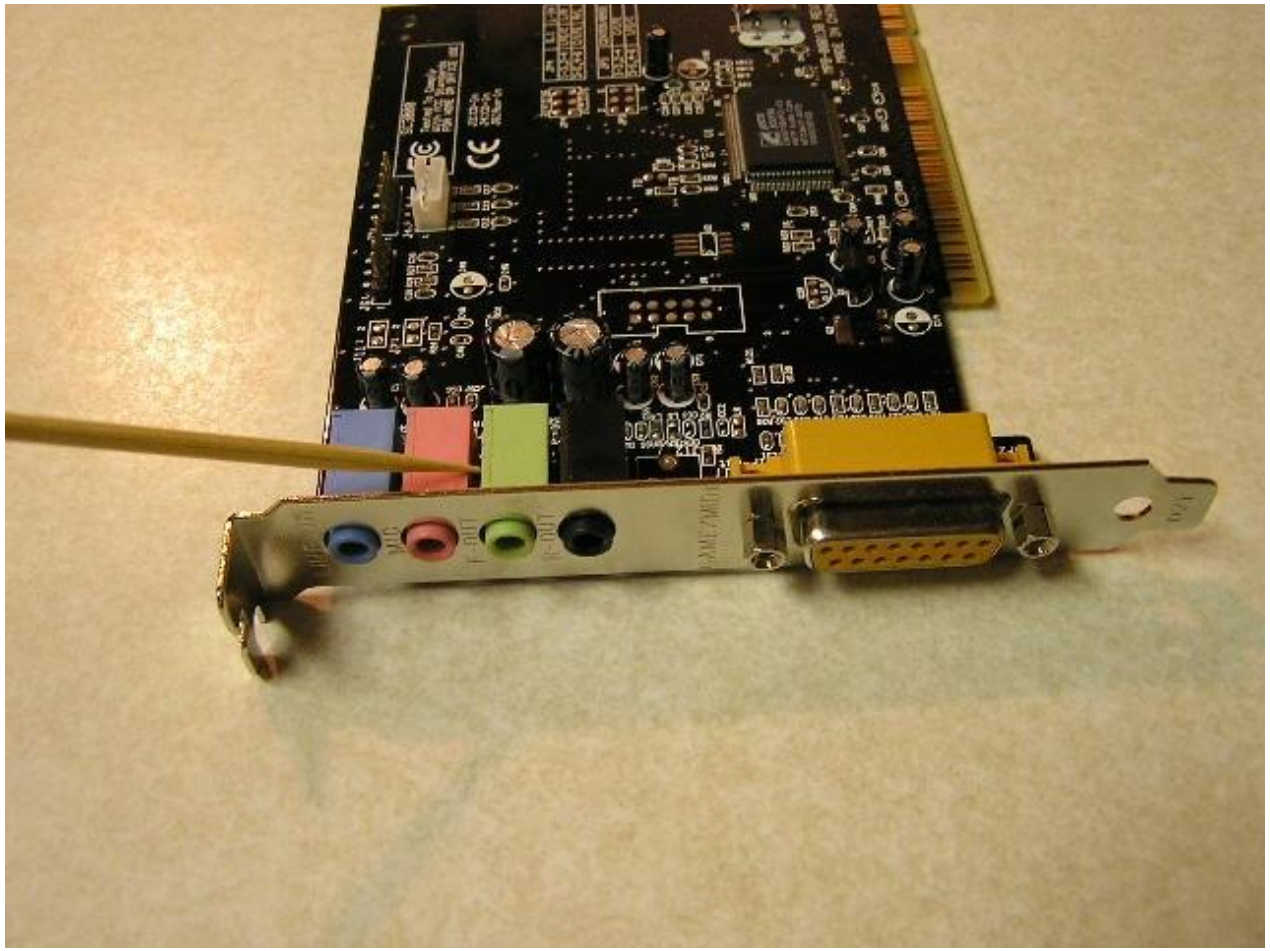
Expansion cards(adapter card)

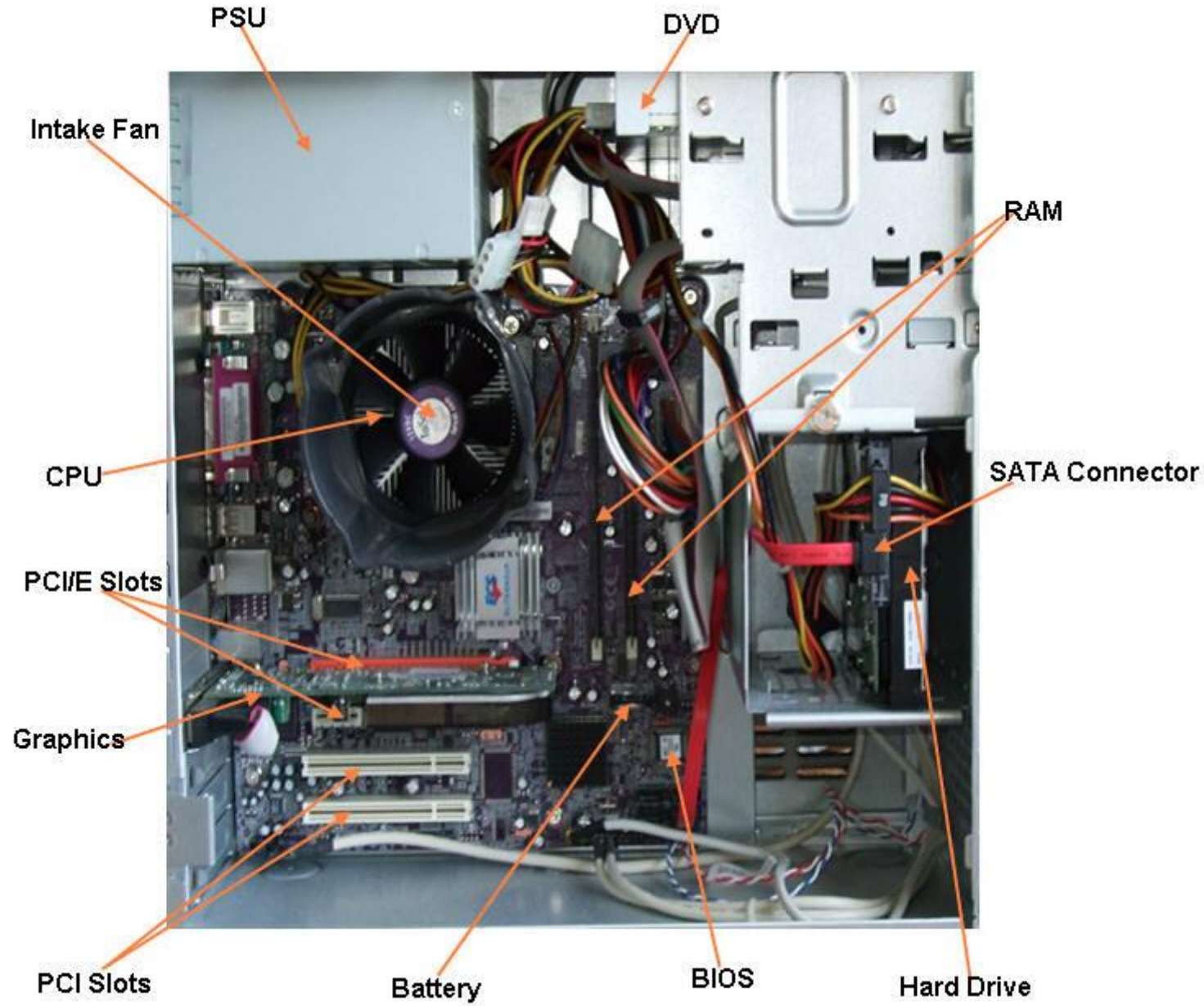
- This is a printed circuit board that can be inserted into an expansion slot of a computer motherboard to add functionality to the computer system via the expansion bus.
- Examples of cards:
- Network
- Video
- TV
- Sound

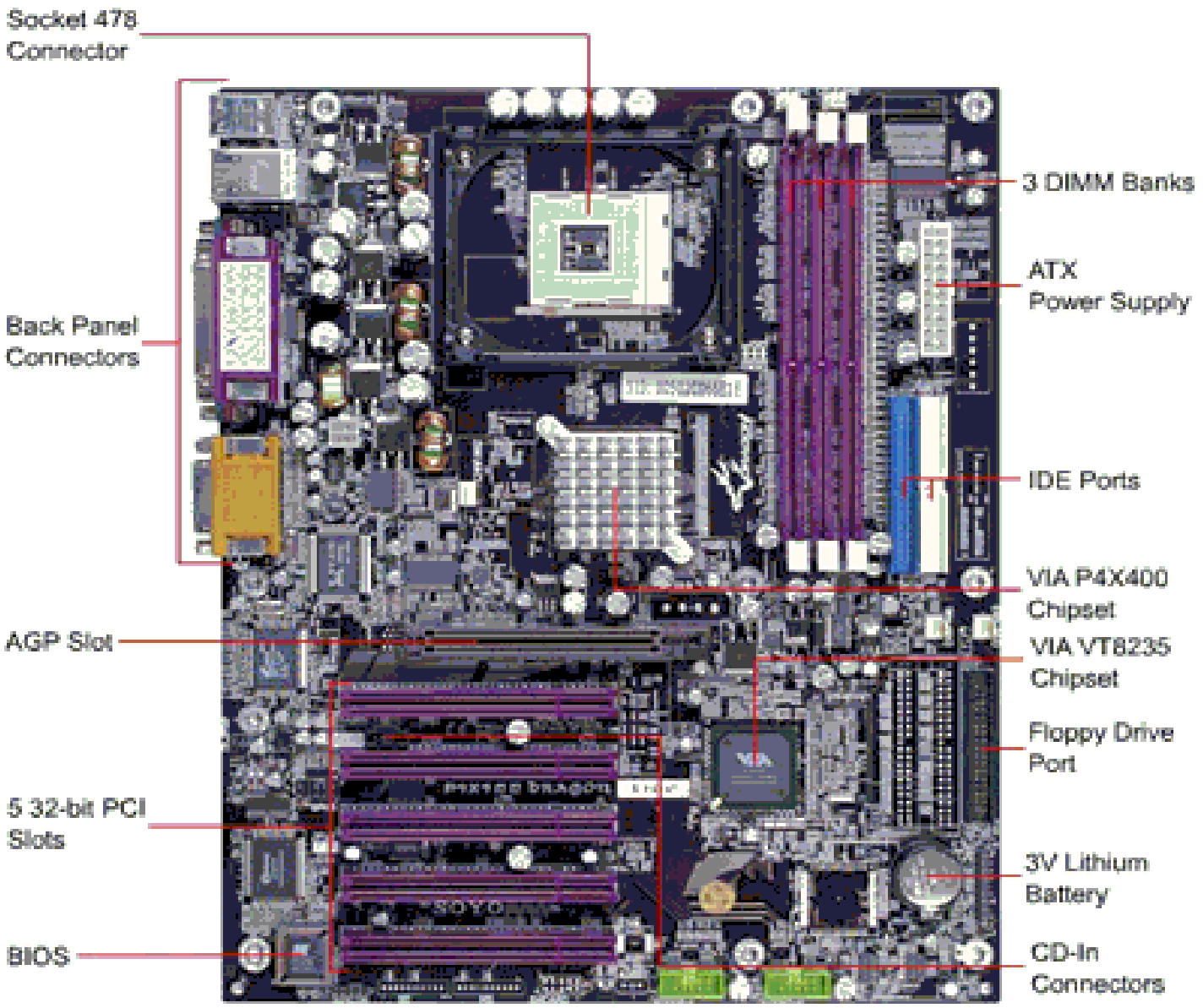
Cards(adaptors)



Sound Card






Socket 478
Connector
Back Panel
Connectors
AGP Slot
5 32-bit PCI
Slots
BIOS
3 DIMM Banks
ATX
Power Supply
IDE Ports
VIA P4X400
Chipset
VIA VT8235
Chipset
Floppy Drive
Port
3V Lithium
Battery
CD-In
Connectors

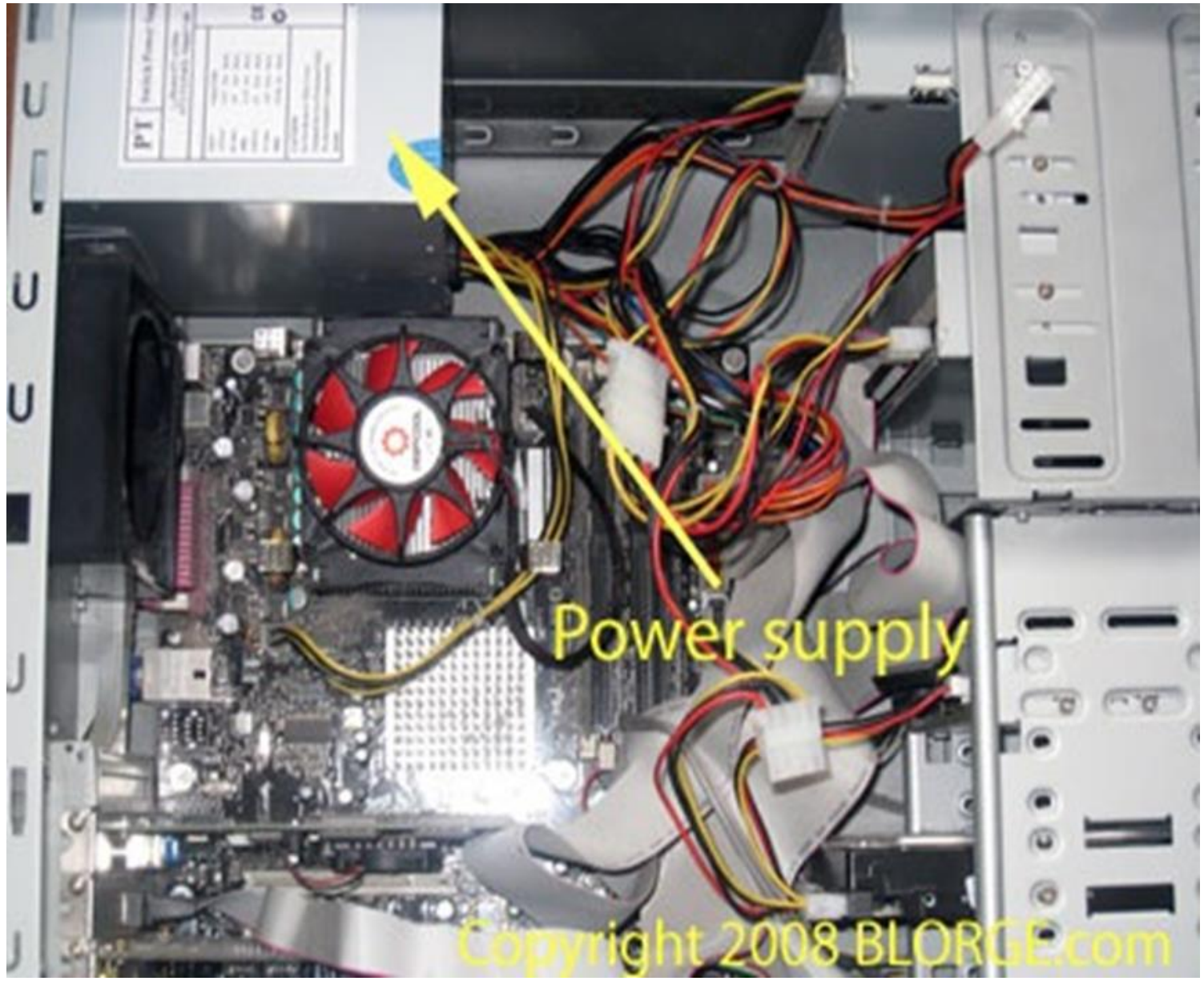
Power supply unit (PSU)

The power supply unit is the shielded metal box fixed within the computer chassis to feed power from the mains/wall socket into the components of the system unit.

It has a transformer that converts the current that comes from standard electricity outlets e.g. wall sockets or UPS to low-voltage regulated DC power of different voltages and current flows needed by the different system unit parts of the computer.

Power port for the cable that connects to the wall socket

Powe supply power connectors that plug into other supply unit devices like the Harddrive


Power supply
Copyright 2008 BLORGE.com

The Uses of the power supply

- It coverts AC from the mains to DC used by the system.
- It receives and distributes power to the different system parts in the required voltage.
- It can be used to alternate electricity according to the regional voltage settings i.e. between 110 and 240 volts.
- Some have a fuse for protecting the system.

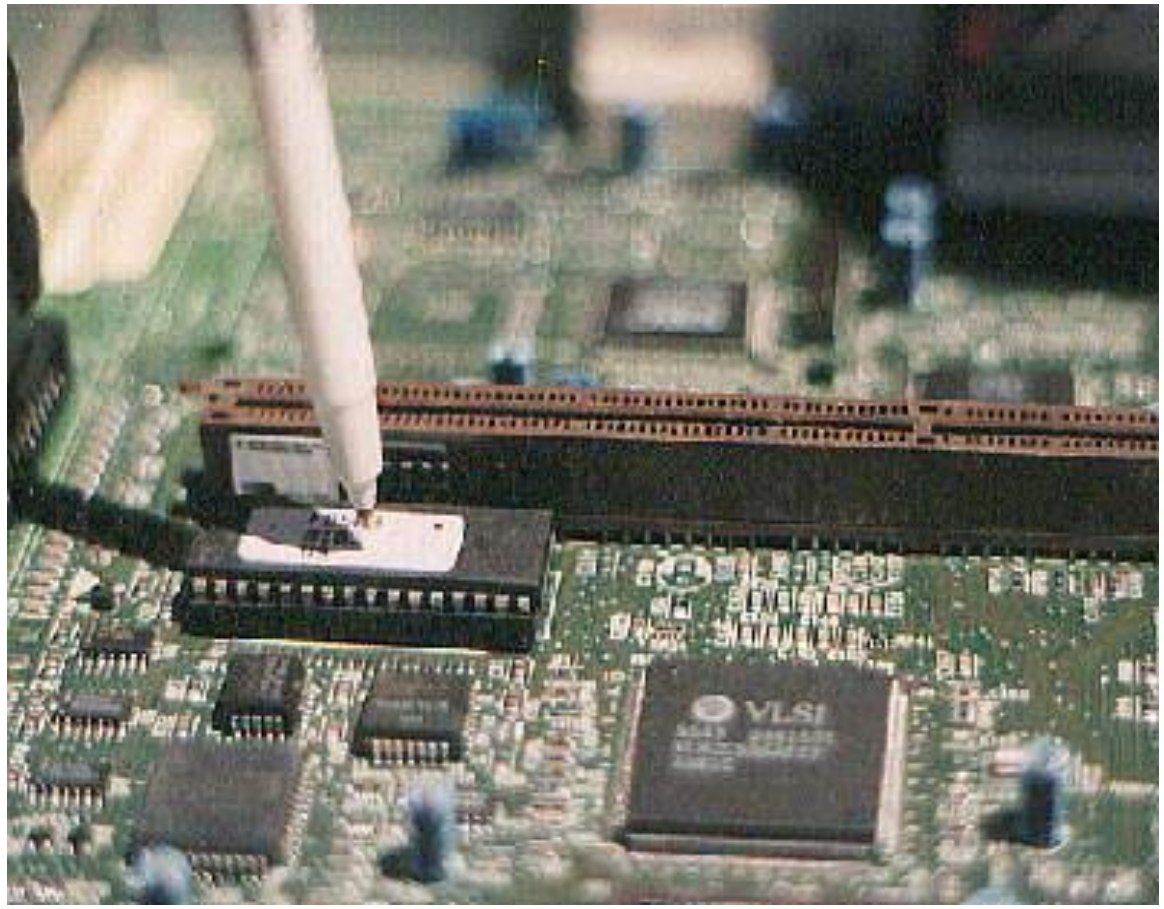
Memory chips

A memory chip holds programs and data either temporarily or permanently.

BIOS chip (ROM BIOS)

- BIOS stands for Basic Input/output System.
- The BIOS chip houses the BIOS software which is a built-in non-volatile software. This ensures that the BIOS will always be available and will not be damaged by disk failures

ROMBIOS chip



- The BIOS is a ROM chip that stores BIOS software that has the computer start-up information which is the first code run by a PC when powered on (boot firmware).
- When the PC starts up, BIOS does the power-on self-test.

Flash BIOS chips

- BIOS that have been recorded on a flash memory chip, which can be updated enabling BIOS upgrade if necessary.

- BIOS has a user interface (UI), typically a menu system accessed by pressing a certain key on the keyboard when the PC starts. In the BIOS UI, a user can:

  (i) configure hardware

  (ii)set the system clock

  (iii)enable or disable system components

  (iv)select which devices are eligible to be a potential boot device

(v)set various password prompts, such as a password for securing access to the BIOS UI functions itself and preventing malicious users from booting the system from unauthorized peripheral devices.

CMOS memory chip

- CMOS stands for Complementary Metal Oxide Semiconductor.
- CMOS is a small amount of memory on a CMOS chip on the computer motherboard that stores the computer configuration settings of a computer.
- All PCs have a CMOS chip, which is used to save your hardware settings while your computer is powered down.

- Computer Configuration are the settings of functional units installed on a computer according to their nature, number, and chief characteristics.
- Several configuration options are controlled by the CMOS chip. These settings include the correct date and time, details of the hard drive(s) connected, and language settings.

CMOS battery

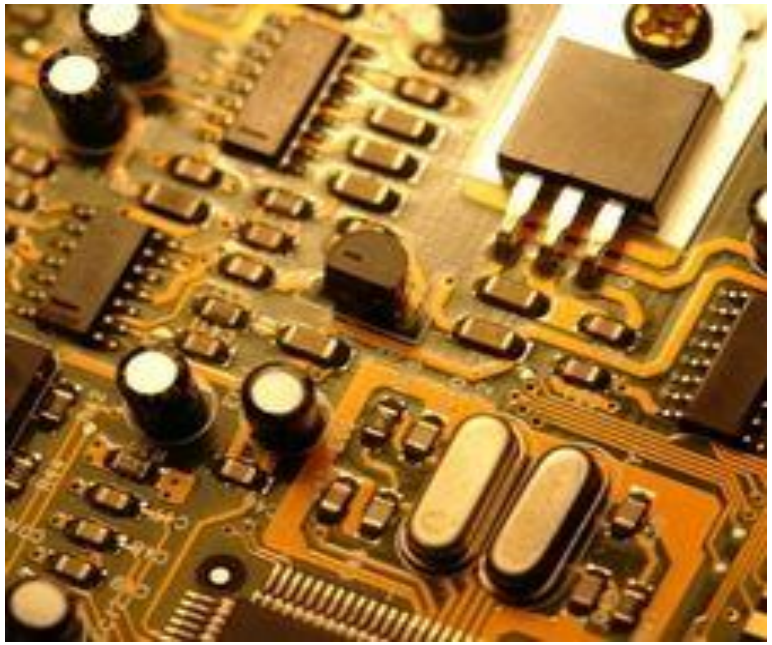
- The CMOS chip is supported by a CMOS battery, allowing it to store these settings without main power.
- The CMOS battery powers up the CMOS chips which stores configuration information about the computer, such as the type of hardware installed on the computer, date/time, and BIOS settings.

CMOS Configuration

- CMOS settings are configured through the computer's hardware set-up utility known as CMOS set-up that resides in the ROMBIOS chip. This utility is generally accessed by holding down a function key, such as F1, while your computer boots up.

❑ Although the set-up utility itself is stored on the BIOS chip, the system settings are held within the CMOS.

CMOS CHIP




release

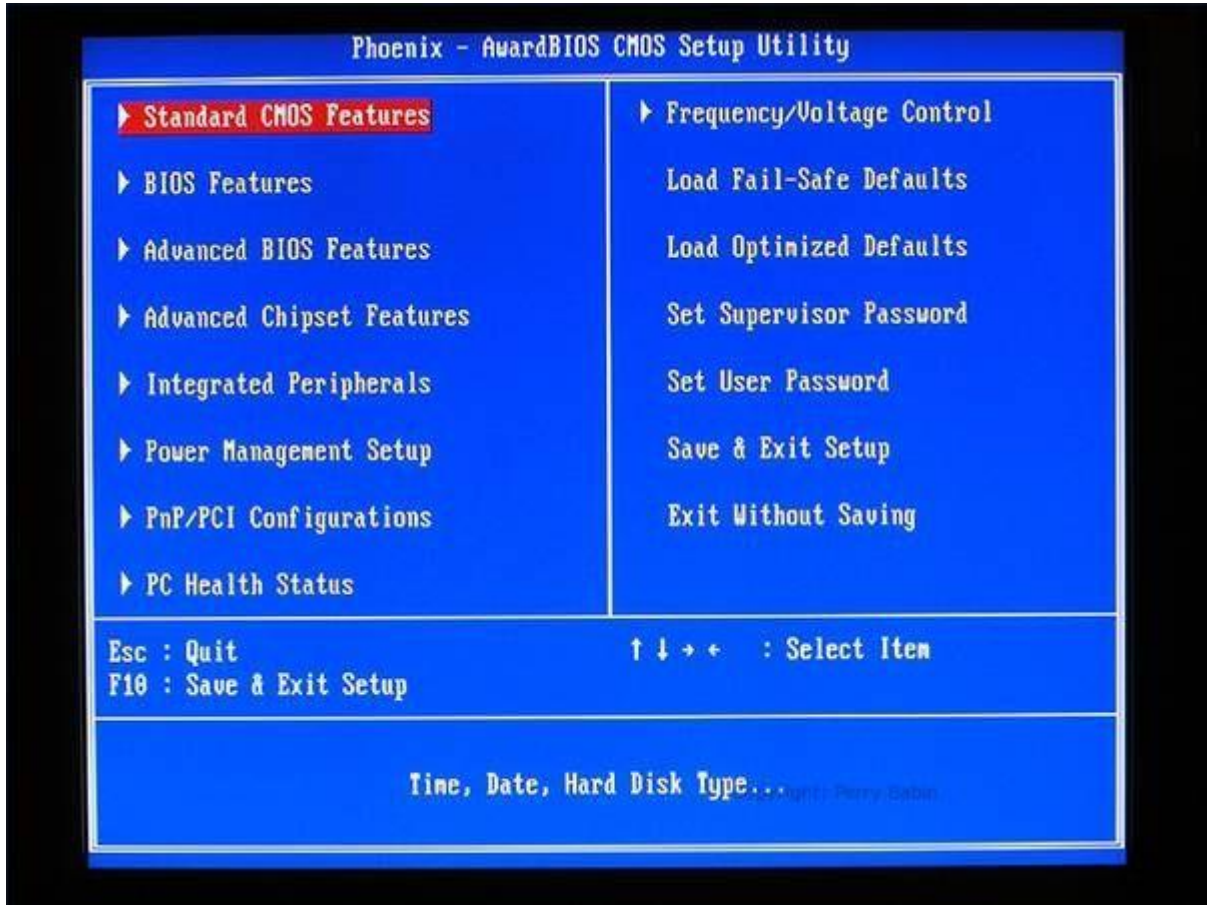

BAT
CLRTC

- The CMOS setup utility is composed of five major sections that are accessed using menus. These screens vary depending on PC manufacturer, PC age, and the BIOS manufacturer. However, they are often organized as follows:
- Standard CMOS Setup: In this menu, you can set system time, date, hard disk drive type, video settings (such as EGA, VGA, and so on).

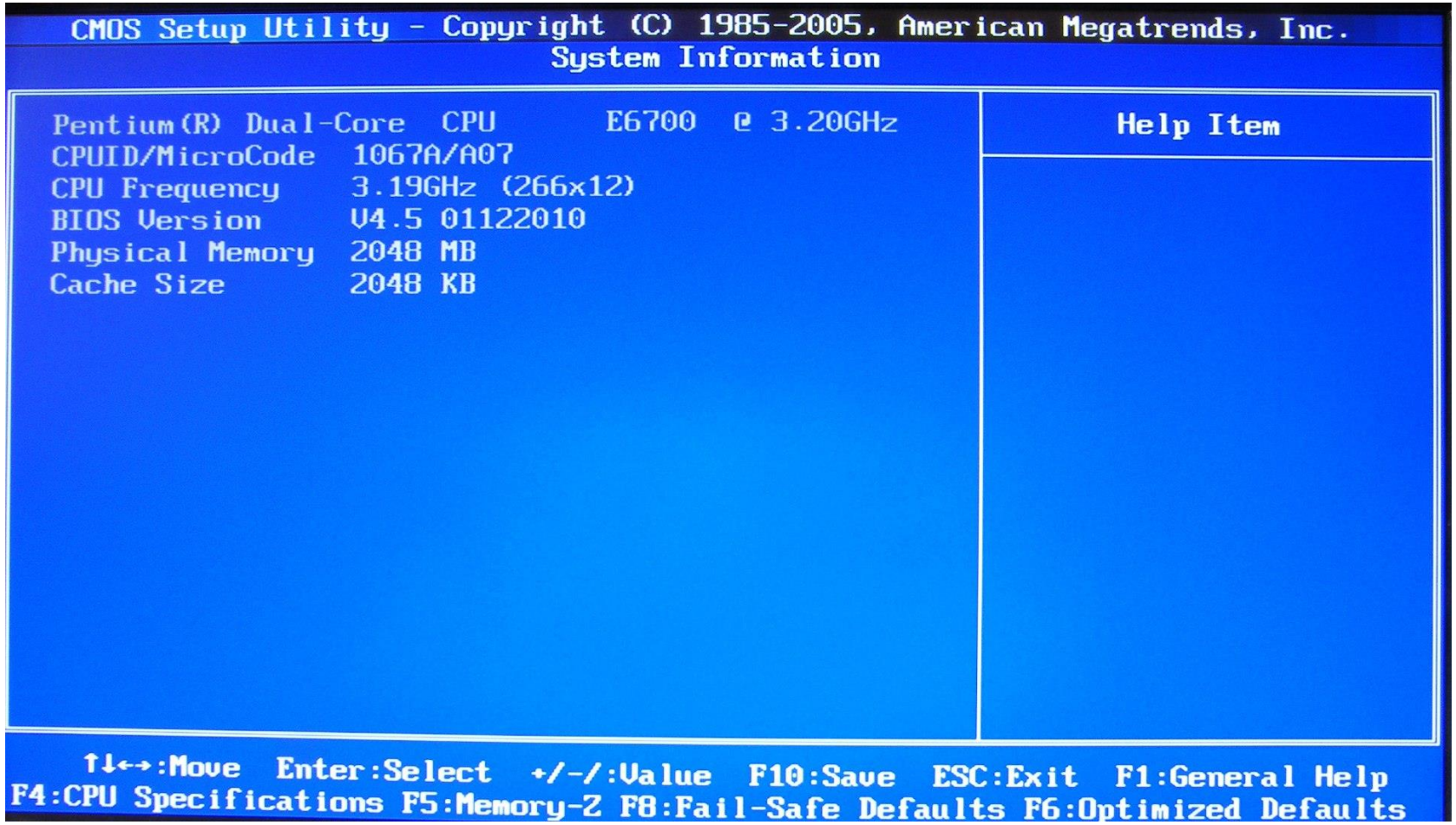
- Power Management: You change power saver settings in this menu. These settings may be particularly important if the PC is a laptop and battery consumption is an issue.
- Boot Options: On some CMOS editors this is a separate item from the BIOS features setup.

DON’T COPY THE NEXT FIVE SLIDES

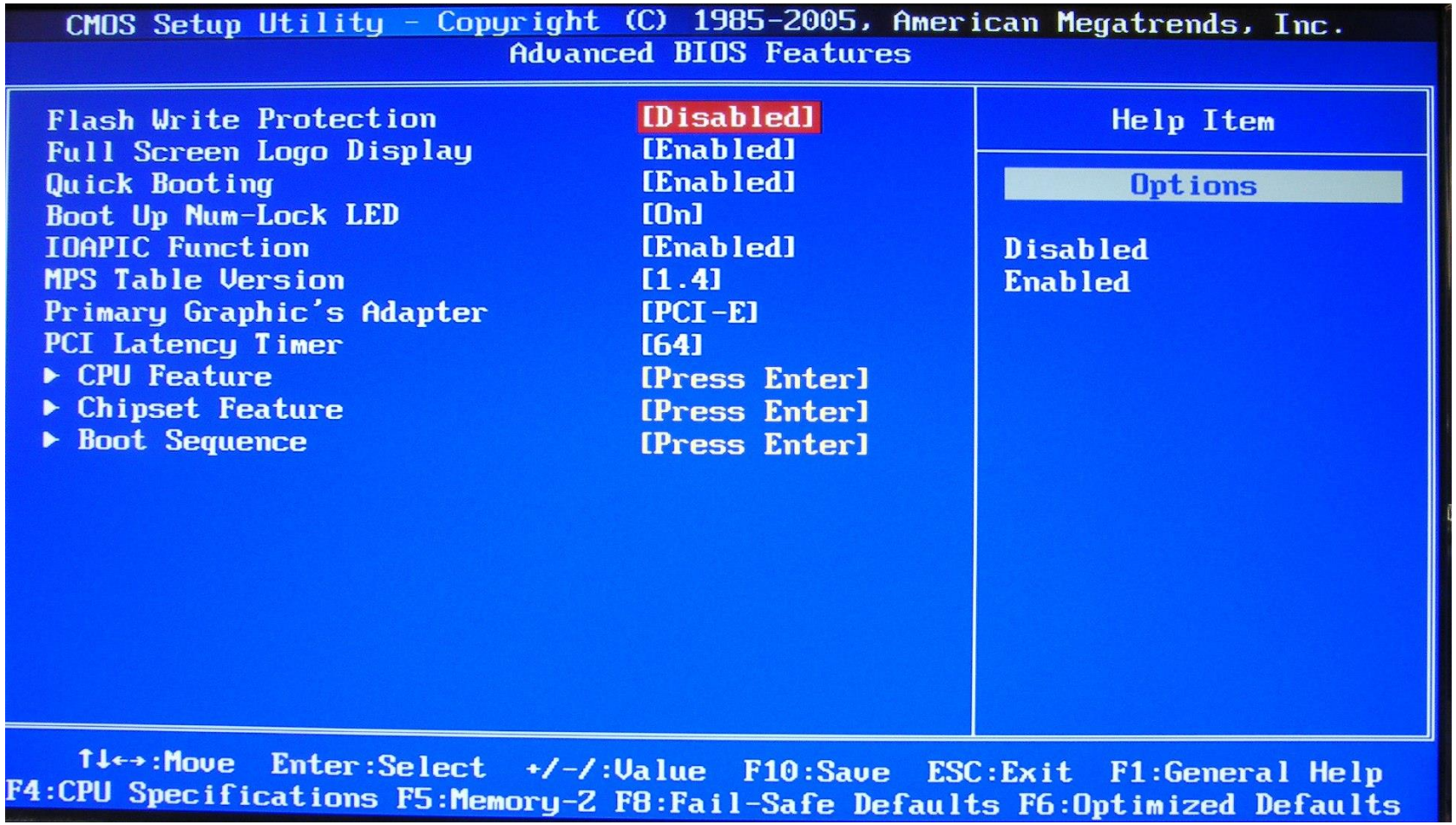
CMOS setup utility interface



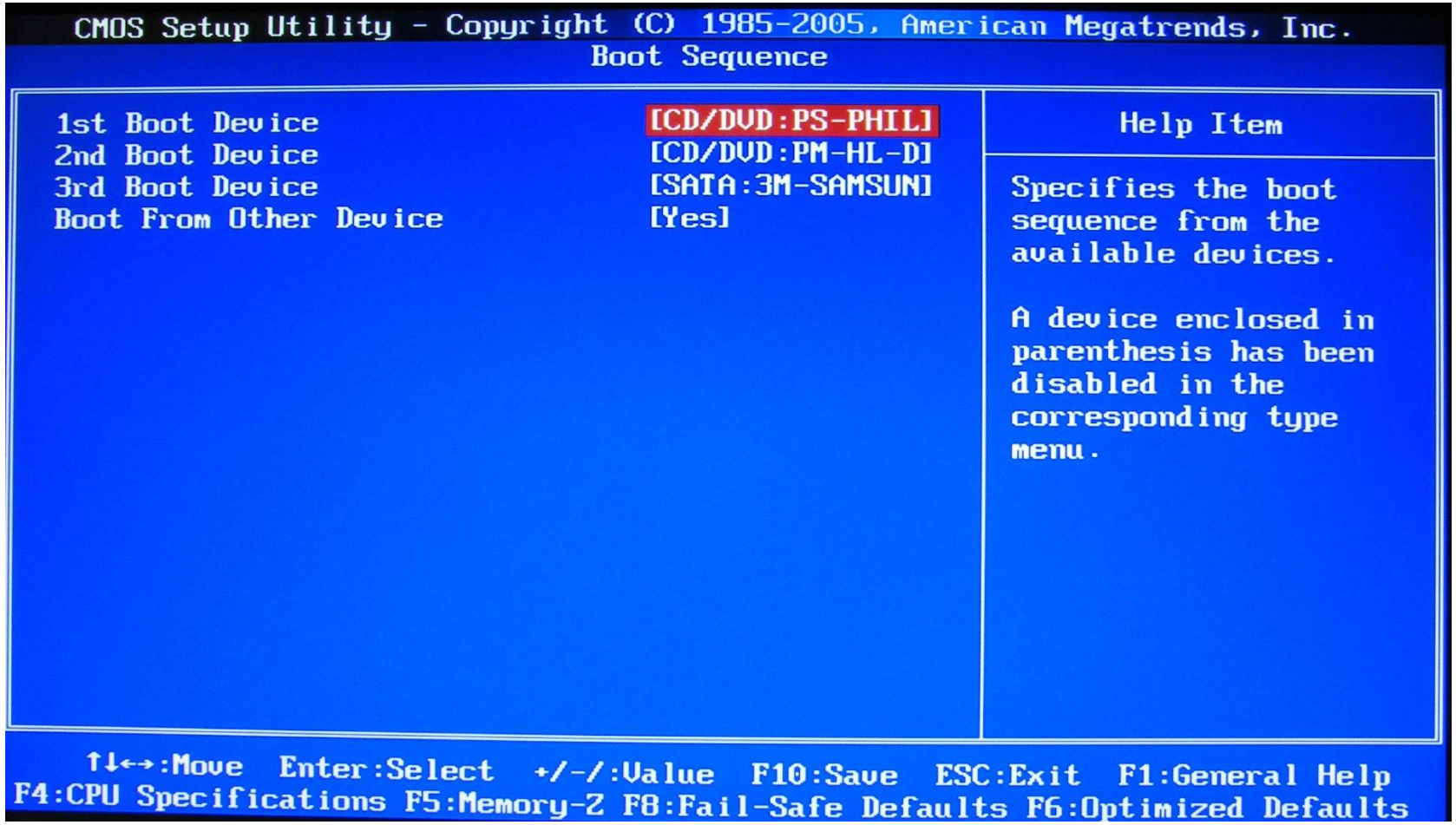
System information



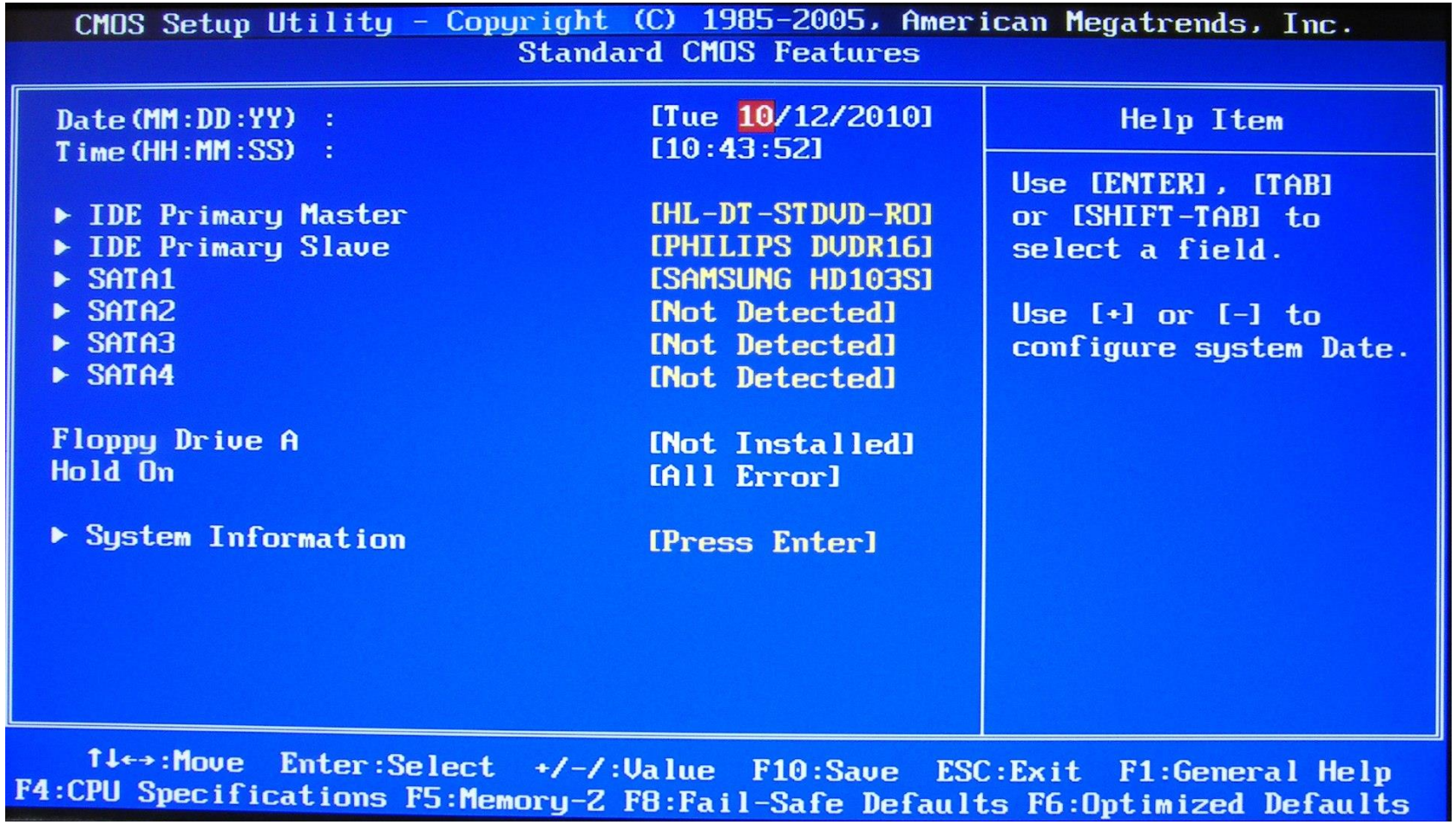
Advanced BIOS features



Boot sequence



Standard CMOS features



PROCESSING DEVICES

The CPU

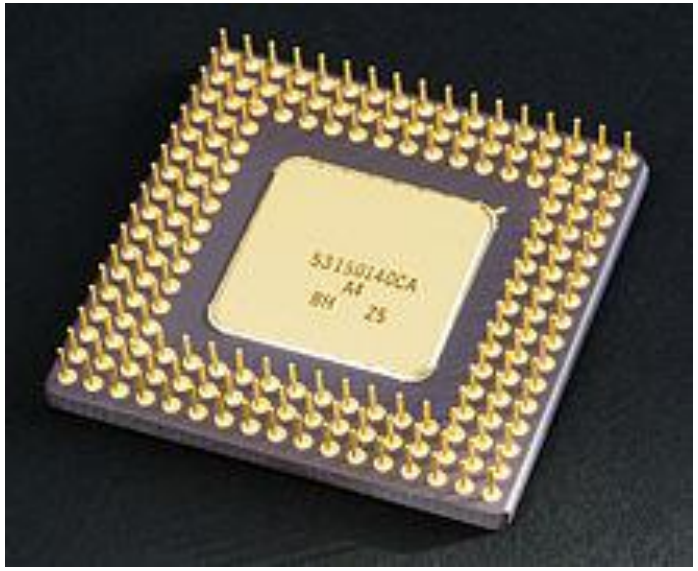
The central processing unit (CPU) is the portion of a computer system that receives, decodes instructions from memory and executes them by performing the basic arithmetic and logic operations.

The CPU is commonly referred to as the “Brain” of the computer because it plays a role similar to the brain in people.

Microprocessor

- On personal computers and small workstations, the CPU is housed in a single silicon chip called a microprocessor.
- A Microprocessor is a single processor chip that contains all the components of the CPU. The Intel 4001 was first Microprocessor(1971)
- Modern CPUs are small and square and contain multiple metallic connectors or pins on the underside.

- The CPU is inserted directly into a CPU socket, pin side down, on the motherboard.
- Each motherboard will support only a specific type (or range) of CPU



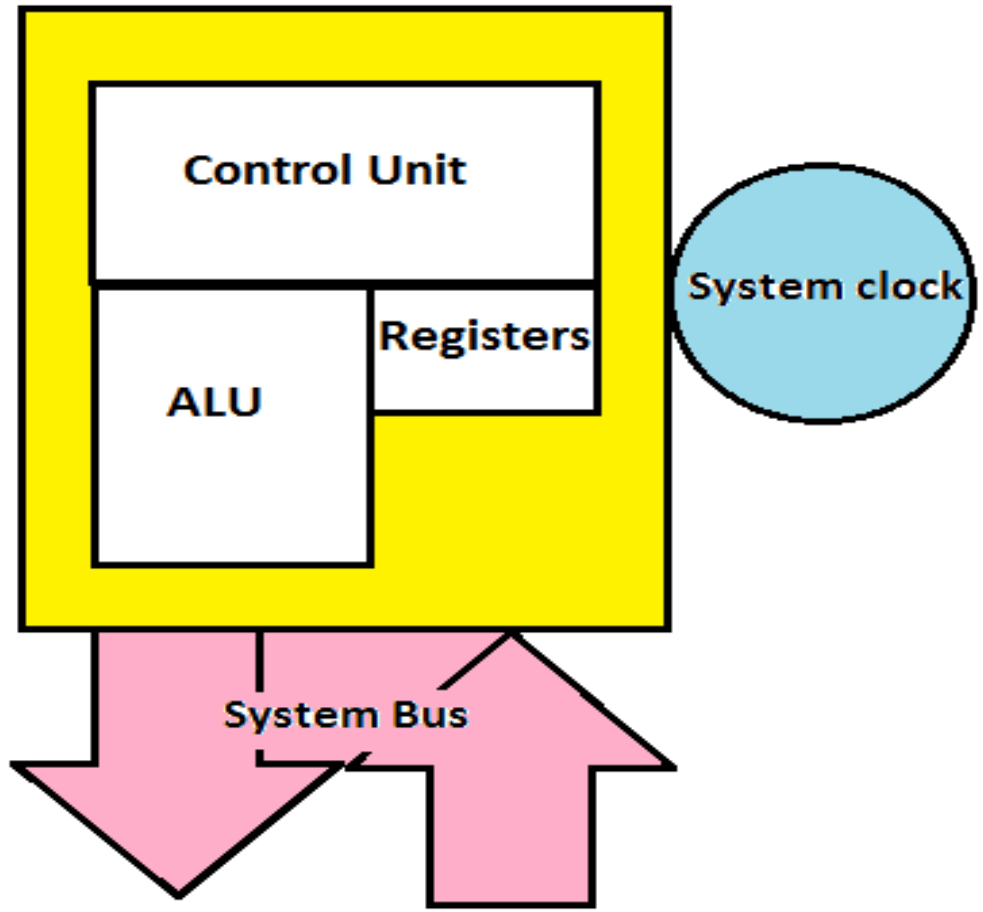
An Intel 80486DX2 from below

An Intel 80486DX2 CPU from above

CPU Socket

Components of a CPU

- Arithmetic logic unit (ALU),
- Control unit (CU),
- Registers.


Control Unit
Registers
ALU
System clock
System Bus

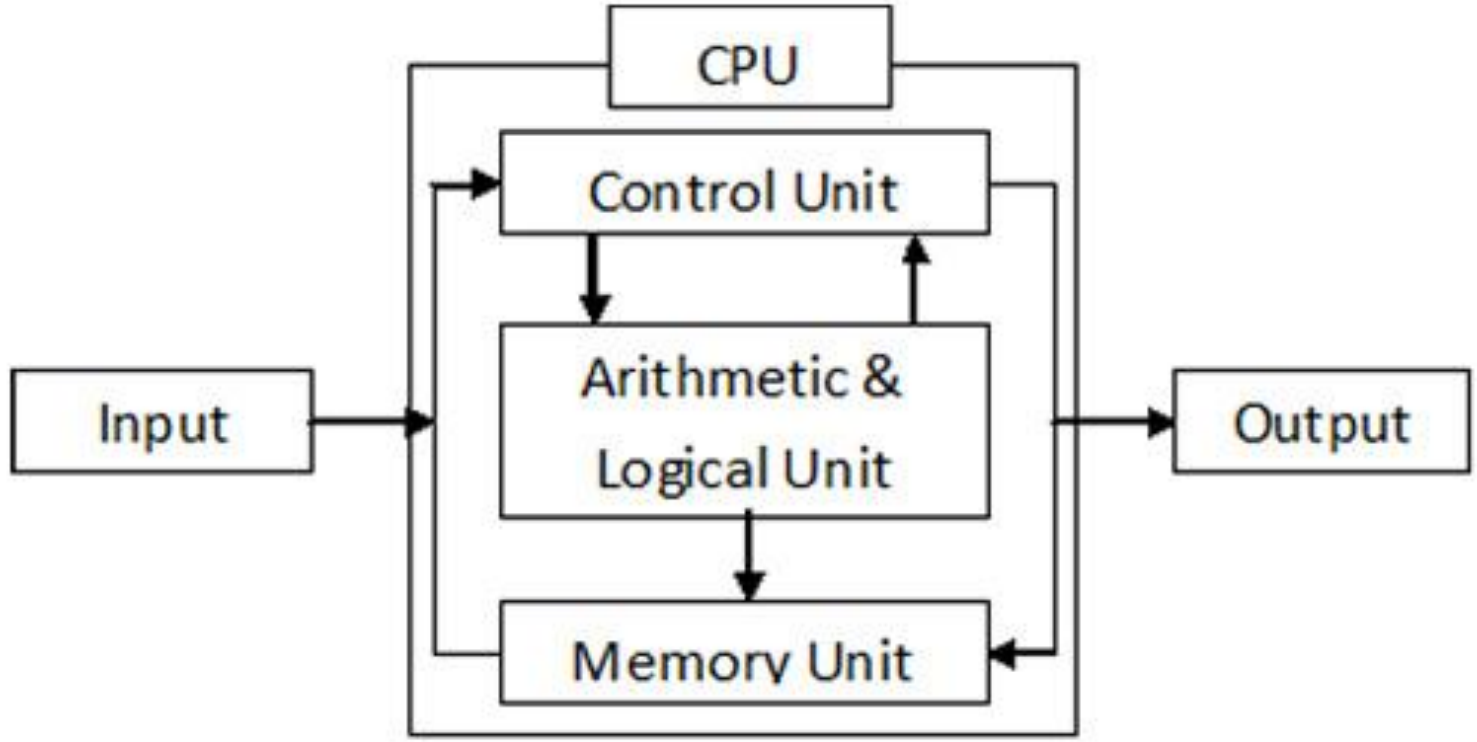


Fig. Block Diagram of Computer

The Control Unit

- Is a component of the computer's central processing unit (CPU) which directs the operations of the CPU, by controlling communication and co-ordination between the CPU and the input/output devices.
- The control unit reads and interprets instructions and determines the sequence for processing the data.

- The control unit extracts instructions from memory and translates them.
- The control unit directs other parts of the CPU to execute program instructions.

The functions of Control unit (CU)

- Controls the computer's operations by directing the flow of information between the CPU, main memory and other devices.
- The CU controls and determines which instructions the CPU execute next.
- It coordinates activities of other units within the CU itself, i.e. ALU and registers.
- The CU Fetches and sends commands to system devices and peripherals.

- The CU interprets commands i.e. it is the intermediary between the user and the computer.
- The CU directs the movements of electronic signals between the CPU, input, memory and output devices.

Arithmetic/logic unit (ALU)

The arithmetic logic unit performs the execution of instructions by carrying out the arithmetic, comparison, and logical operations.

Arithmetic operations include addition, subtraction, multiplication, and division.

Comparison operations involve comparing one data item to another, and determining if the first item is greater than, equal to, or less than the other item.

- Logical operations work with conditions and logical operators such as AND, OR, and NOT. Some common logic comparison symbols include the following:= equal to, < less than, etc.

Registers

- A register is a very small amount of very fast memory that is built into the CPU to hold a set of data and instruction one at a time during processing.
-

- Registers have a specific storage capacity; the size of the registers can affect the speed and performance of the processor.

Types of Registers

- Normally 14 registers are present in a microcomputer. The most commonly used registers are:

(1) Program counter. This is processor memory whose only function is to hold the memory address of the next instruction to be fetched, after executing the current instruction. It is also called the instructions address register, control register or sequence control register.

(2) Instruction registers or current instruction register (CIR). This is a 32-bit register. It is used to store the current instructions which are being executed.

(3) Memory address register (MAR). The address or the memory location from which data has to be read is stored here.

(4) Memory buffer registers (MBR). The data read from the memory location is stored in these registers.

(5) General-purpose registers. They are used as a scratch pad by the CPU to store the result and the intermediate result during a processing.

(6) Accumulator. This stores the result of the last processing step of the ALU.

(7) Address registers. This holds the location of the next piece of data.

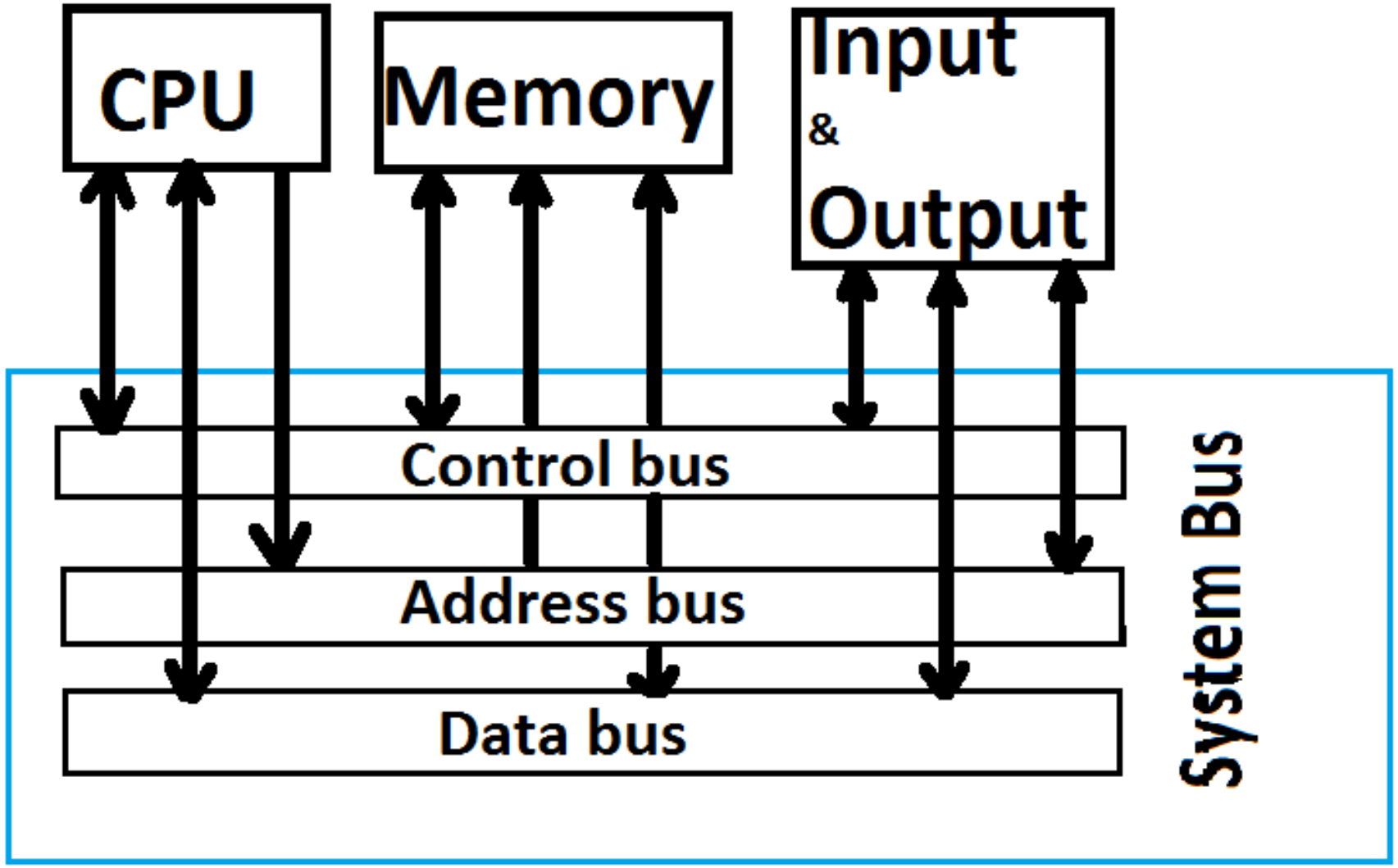
(8) Storage registers. This holds the information on its way to and from the main memory.

The system Bus

A computer system bus is an electronic pathway that the processor/CPU uses to send and receive data to and from memory and other input/output devices.

The system bus, is a combination of three separate kinds of buses: the data bus, the address bus, and the control bus.

Control bus + Address bus + Data bus = System Bus



The Data bus

- The data bus carries the data between the microprocessor(CPU) and other components.
- The size of the data bus (number of lines) determines the amount of data that can be transmitted simultaneously. The wider the data bus the more the amount of data it transmits.

The address bus

- The address bus is the set of wire traces used to identify which address/location in memory the CPU is accessing. Each line carries one bit so the number of lines (wires) in the address bus determines the amount of primary memory that can be directly addressed; therefore, the width of the address bus determines the amount of memory a system can address.

The control bus

- The control bus is the pathway through which the CPU communicates with other devices within the computer. It carries commands from the CPU and returns status signals from the devices; for example, if the data is being read from or written to the device (e.g. printer), the appropriate line (read or write) will be active.

System clock

The system clock is an internal clock that generates a signal that is used to synchronize/match the operation of the CPU and the movement of data around the other components of the computer.

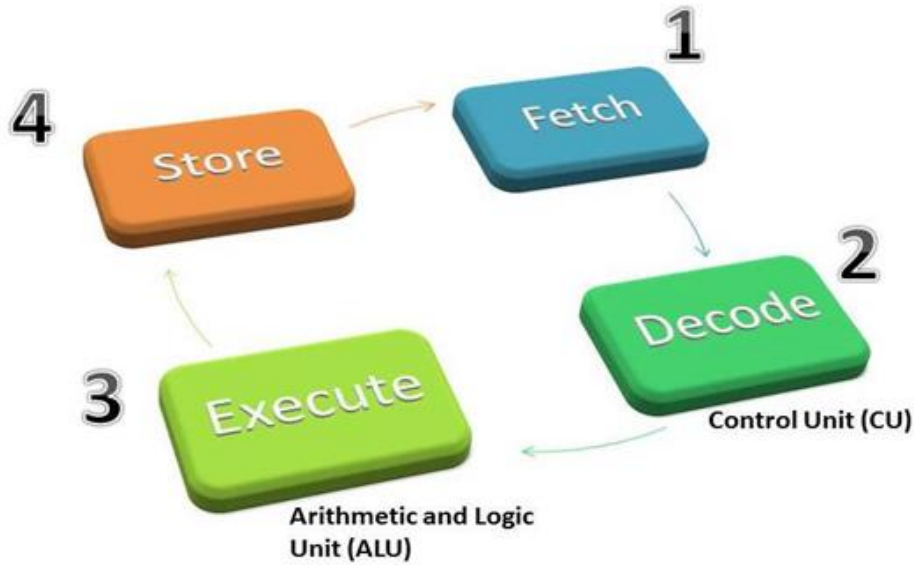
Each phase in the ‘fetch-decode-execution’ cycle takes one pulse of the clock to be executed.

- The unit of measure of the clock speed (clock rate) is hertz. E.g. megahertz (MHz, millions of cycles per second) or gigahertz (GHz, 1000 million cycles per second).

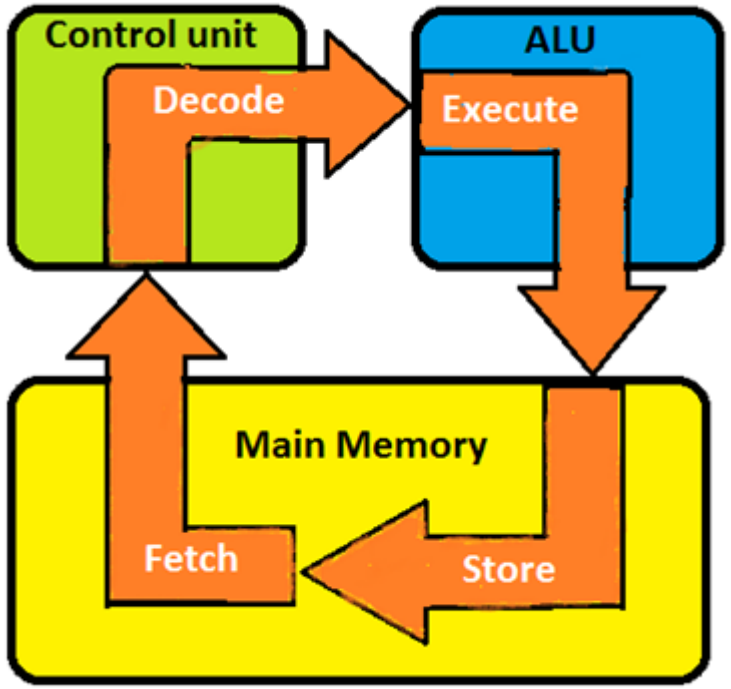
The machine cycle

- The machine cycle is the four stage process of Fetch, decode, Execute and store carried out by the CPU by which a computer retrieves a program instruction from memory, determines what actions the instruction requires, and carrying out those actions and storing the results. This cycle is repeated continuously by the central processing unit (CPU.

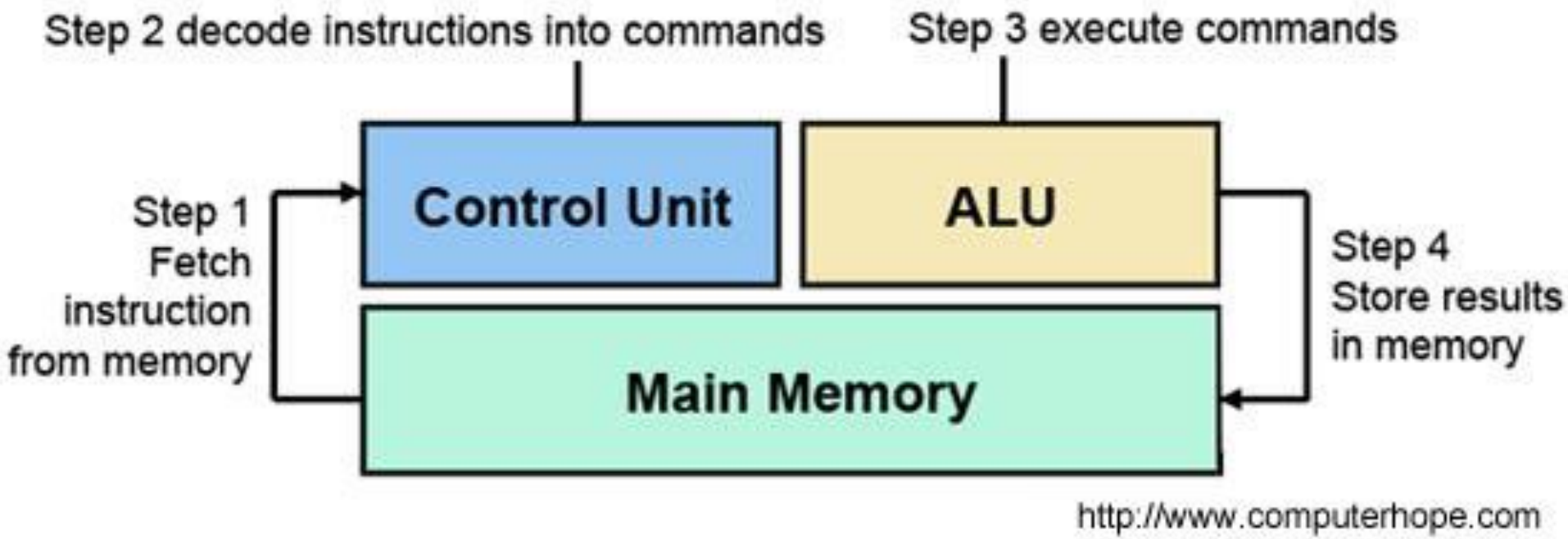
- The machine cycle, also called a processor cycle or a instruction cycle, is the basic operation performed by a central processing unit



The machine cycle



Machine Cycle



http://www.computerhope.com

Fetch

- Fetch is the process done by the Control unit of obtaining the next program instruction from memory.
- The time taken to fetch is called instruction time, or I-time.
- Before the CPU can execute an instruction, the control unit must retrieve (fetch) a command or data from the computer’s memory.

- The CPU receives two types of data: Data to be processed, and the instructions on how to process the Data
- The Instructions on how to handle the other data. That includes those messages which the user continuously send to the PC using an input device such as mouse and keyboard (e.g. messages to print, save, open, etc.).

- The second type of data is the data which must be handled according to the instructions.

Decode

- Decode means translating the program instructions into commands that the computer can process.
- The Control Unit of CPU passes the decoded information as a sequence of control signals to the ALU to perform mathematical or logic functions on them.

Execute

- This is the stage where the CPU carries out arithmetic, comparison and logical operations. Execute is the actual processing of the computer commands.
- The time taken to decode and execute is called execution time, or E-time.

Store/Writeback

- Storing/write back to memory, is what takes place when the result of the processing is written to memory such as the internal CPU register for quick access by subsequent instructions. In other cases, results may be written to the slower, but cheaper and larger, main memory(RAM), or sent to an output device.

CPU types and generations

- CPU type is described based on some of the following: manufacturer, family name, code name and processor generation.

- Intel 4001

-Intel 8085, 8086

-Intel Pentium I, II, III, and 4. (Double layer)

-Intel Celeron – Single layer, Heats up very fast, and they are cheaper if compared to double layer processor chips.

-Pentium Dual-Core

I core

-Cyrix

-Motorola 68040, 68030

-Motorola G3 and G4. They are relatively expensive and can work for months and months without heating up. They are usually used in servers systems

-i core

CPU manufacturers

The major CPU manufacturers are:

Intel Corporation, Advanced Micro Devices (AMD), Motorola Corporation and IBM.

A computer can have more than one CPU, this is what is known as Multi-processing

Some circuits can contain more than one CPU, this is what is known as Multi-core processor such as Dual core, Intel core i3, i5, i7

Major CPU brands

- Intel Pentium
- Intel Celeron
- cpu-evolution.htm

The factors that influences the processing speed of a CPU

- The clock speed/clock rate
- Instruction set
- Word size
- Cache size (used to temporarily hold instructions and data that the CPU is likely to reuse.)
- The number of CPU cores (processing units), the more the number, the more powerful because the computer can execute more instructions at a time.

The clock speed or clock rate of a CPU is the frequency at which the processor executes instructions or processes data(completes a processing cycle), clock speed is measured in terms of Hertz (megahertz, Gigahertz) the higher the value, the more powerful the CPU is; a kilohertz (kHz) is about 1000 hertz, one megahertz is equivalent to approximately one million hertz, and one gigahertz is about one billion hertz.

- **Word size**

The word size is the number of bits that the CPU can process at a time. The word size of a machine is measured in bits; CPUs can have 8-bit, 16-bit, 32-bit or 64-bit word sizes. A CPU with 16-bit word size can manipulate 16 bits at a time. Computers with a larger word size can process more data in the same amount of time than a computer with a smaller word size.

The size of main Memory and computing power of a computer

- the computer with a big amount of RAM is able to run bigger, more powerful programs, and those programs can access bigger data files, more RAM enables the computer run faster because the CPU can keep more of the active program and data in memory.

Buffer

- A buffer is the temporary storage of data delivered by the CPU in order to improve performance of the CPU by making data more accessible for the control unit by allowing faster receipt to the CPU from the computer’s main memory or delivery of data from the CPU to the main memory.

COMPUTER	CPU MODEL	WORD SIZE	CLOCK PULSE/RATE	RAM SIZE
COMPUTER A	Pentium IV	32-BIT	128 MHz	512 MB
COMPUTER B	Dual Core	64- BIT	1 GHz	128 MB

1. Which computer has better specifications and why?

2. How can computer B be made better?

Answer the questions after copying all the notes

1.Differentiate between:

- A parallel port and a Serial Port
- A Port and a Connector.
- CMOS and Access Time
- PC Card and Flash Memory Card
- A motherboard and a Chip
- Parallel Processing and Pipelining
- Bit and Byte

2.Describe the following terms as used in computers:

- A bay
- Power supply
- Bus
- Adapter/Expansion card
- Expansion slot
- Heat sink
- Memory Cache