PC & PC based System

Module 1

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Introduction to Computer Hardware

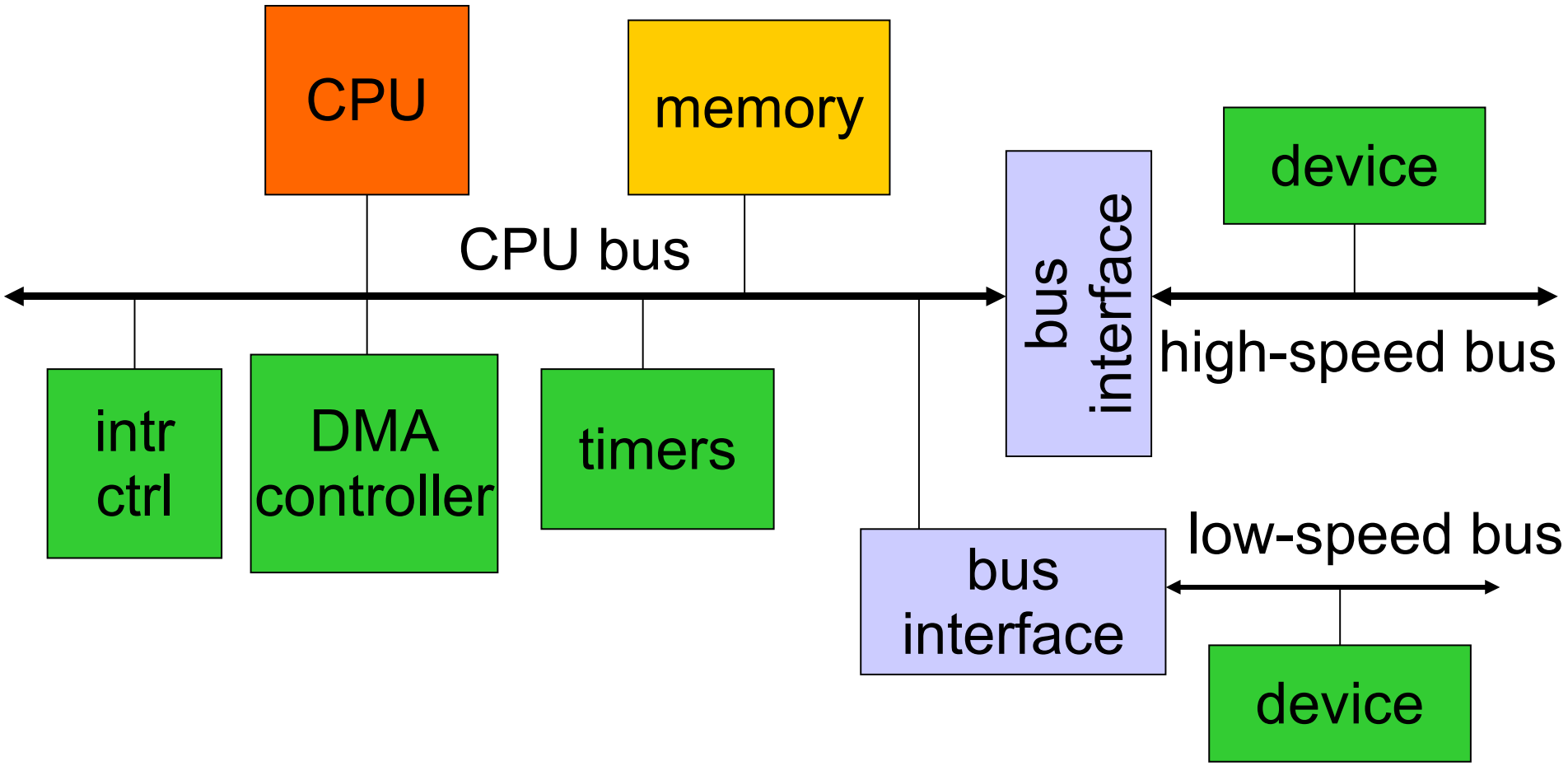
- Case
- Power switch
- Reset switch
- Hard drive
- Floppy
- CD/DVD
- Zip drive
- Serial ports
- Parallel port
- USB port
- Keyboard/mouse
- Network card
- Modem
- Sound card
- Video card
- RAM
- Motherboard
- Bus
- Fan
- Cables

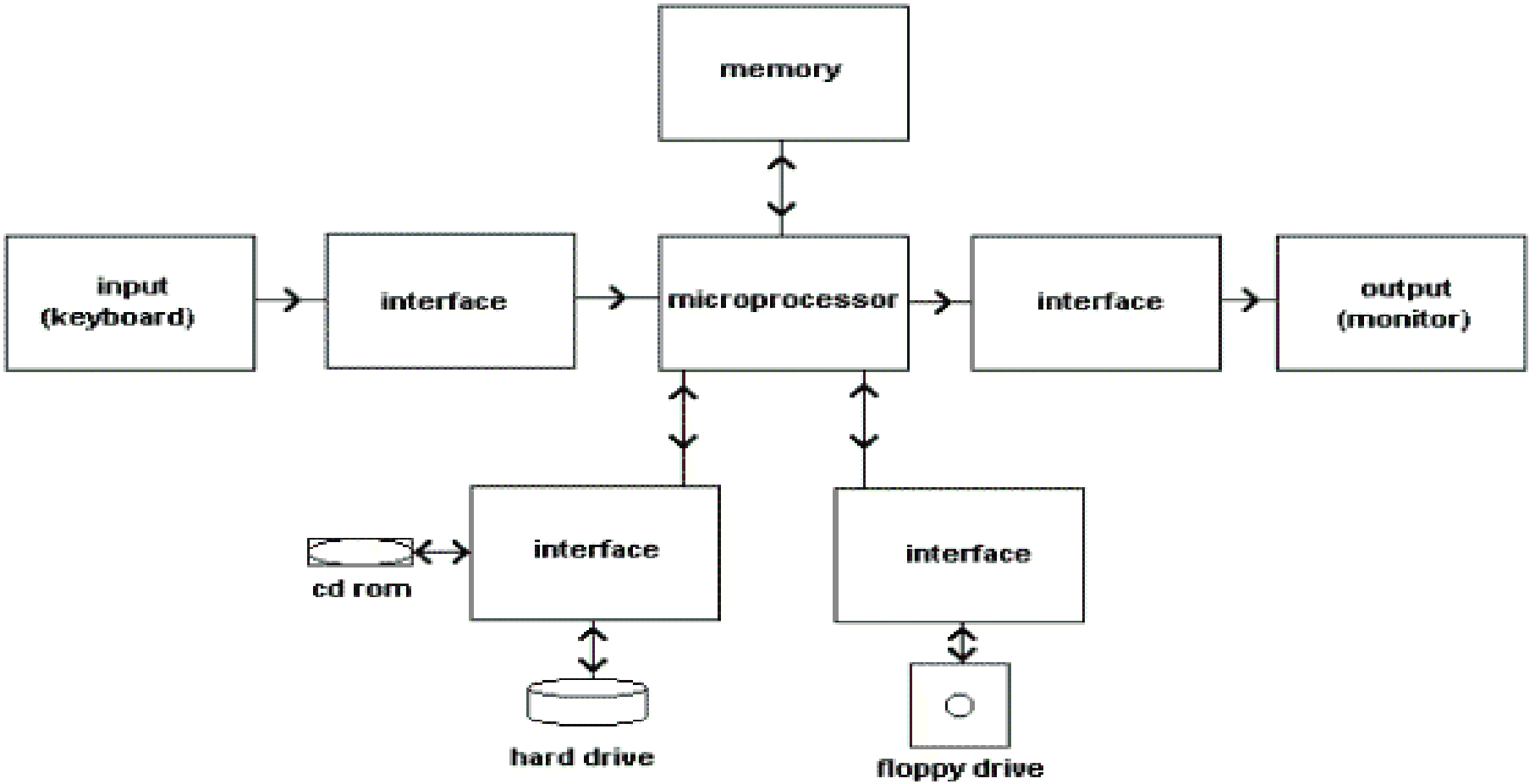
Hardware platform architecture

Contains several elements:

- CPU;
- bus;
- memory;
- I/O devices: networking, sensors, actuators, etc.

Fundamental Building Blocks of the PC




memory
input
(keyboard)
interface
microprocessor
interface
output
(monitor)
interface
interface
cd rom
hard drive
floppy drive

Study of Mother Board

The Main Printed Circuit Board Inside The PC That Contains and Controls The Components That Are Responsible For Processing Data.

- Holds The Processor
- Memory
- Expansion Slots
- Connects Directly or Indirectly to Every Part of The PC

MB Integrated devices (Basic)

- Keyboard Port
- Floppy Controller
- IDE (Integrated Device Electronics) Interface
- Serial and Parallel communication ports
- Audio, video, modem, network and SCSI

Made Up Of:

- A Chip set (known as the “glue logic”)
- Some Code in ROM
- Various Interconnections or Buses

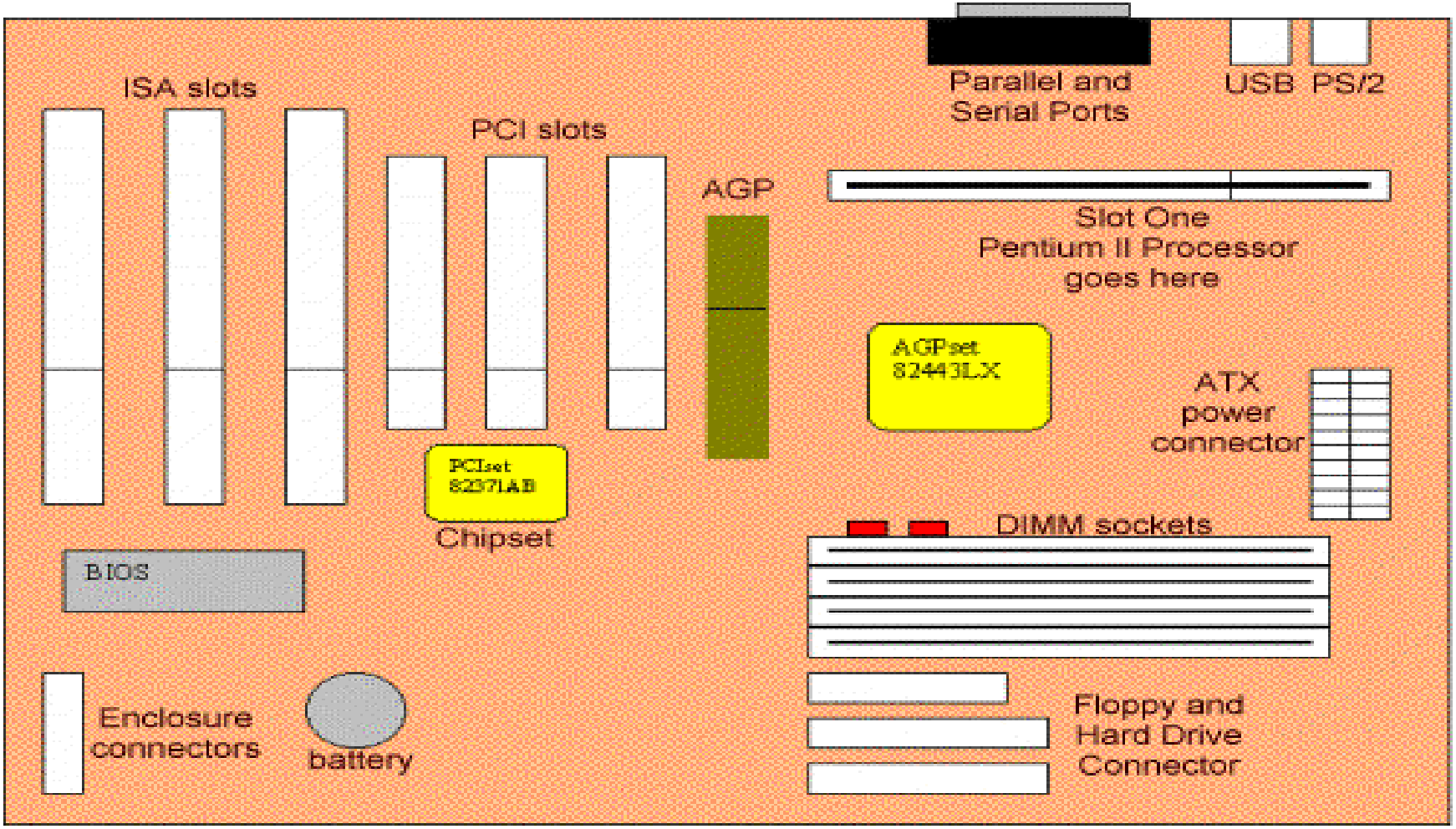
The Motherboard Affects…

- The type, speed and number of CPUs
  - Need to match socket and system bus speed
- The chipset
  - Each motherboard has a specific chipset
- Cache type and size
- Expansion cards
  - Must have proper bus and enough slots
- RAM
  - Must match type, speed, have enough slots

The Motherboard Affects…

- Case and power supply
  - Board must fit in case
  - Power supply connection must match
- Keyboard connector
- Embedded components
  - On-board video / sound vs. expansion card
  - On-board bus/port controllers

Basic Motherboard



Software in Mother Board

- Three softwares are stored in *ROM*
- Small but very *Critical Program*
  - POST
    - Program that initialize and test each components of the MB every time it startup to make sure that every thing is ready to run.
  - BIOS
    - Very small Program that enables the system to communicate with Hardware device during booting.
  - System Program
    - Used to configure the feature found on MB.

CMOS RAM

Motherboards include a separate block of memory made for low power consumption CMOS RAM chips, which is kept alive by a battery even when the PC's power is off.

Motherboard Determines:

- CPU type and speed
- Chip set
- Secondary cache type
- Types of slots
- Number of slots
- Type of memory

- Number of memory sockets and maximum memory
- Type of case
- ROM
- Plug & Play compatibility
- Type of keyboard

Form Factors of MB

- Specifications for its general shape and size.
- Also specifies
  - What type of case and power supply will be supported
  - The placement of mounting holes
  - The physical layout and organization of the board
-

The Succession of Motherboard Form Factors

- AT & Baby AT
- ATX
- Micro-ATX
- LPX – Low Profile eXtention
- NLX – New Low Profile eXtention
- BTX - Balanced Technology Extended

Comparison of Form Factors

Style	Width	Depth	Where Found	Match to Case and Power Supply
Full AT	12"	11-13"	Very Old PCs	Full AT, Full Tower
Baby AT	8.5"	10-13"	Older PCs	All but Slimline, ATX
ATX	12"	9.6"	Newer PCs	ATX
Mini ATX	11.2"	8.2"	Newer PCs	ATX
LPX	9"	11-13"	Older Retail PCs	Slimline
Mini LPX	8-9"	10-11"	Older Retail PCs	Slimline
NLX	8-9"	10-13.6"	Newer Retail PCs	Slimline

Standard External I/O ports and Connectors

- DB-25F Parallel Printer Port
  - Includes
    - Enhanced Parallel Port (EPP)
    - Extended Capabilities Port (ECP)
- DB-25M & DB-9M RS-232 Serial A sync Comm Port
- DB-9F Video Out
  - may be a
    - Monochrome Display Adapter (MDA)
    - Color / Graphic Adapter (CGA)
    - Enhanced Graphic Adapter (EGA)
- DB-37F External Floppy disk Drive
- DB-15F Game Port
- DB-HD15F High Density
  - To attach
    - Video Graphic Array (VGA)
    - Extended Graphic Array (XGA) & Super XGA (SXGA)

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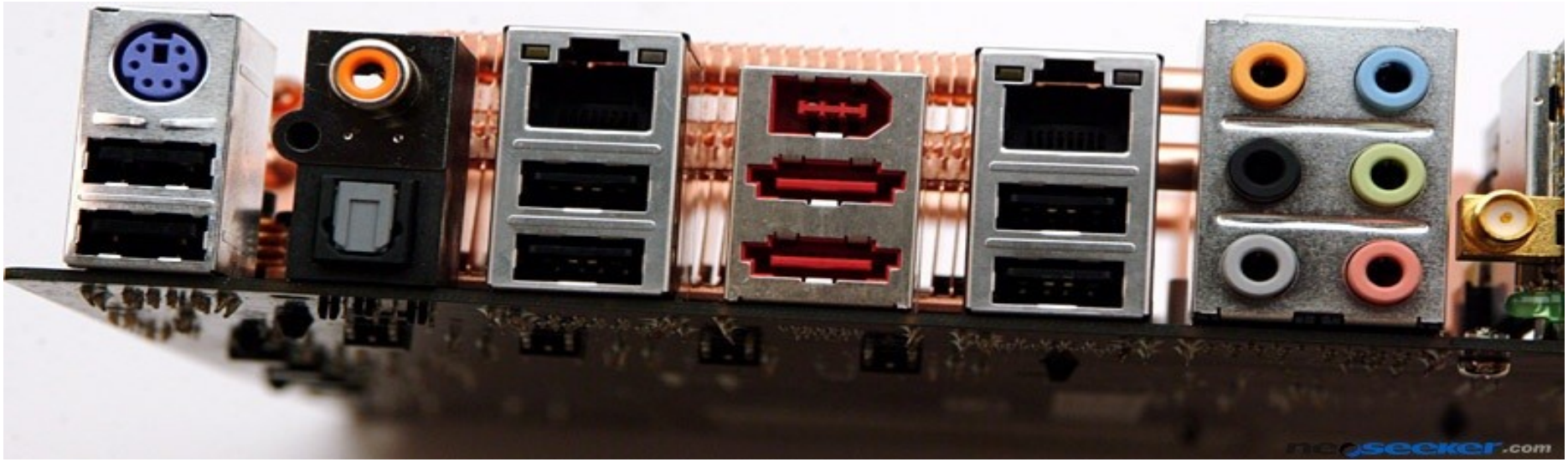
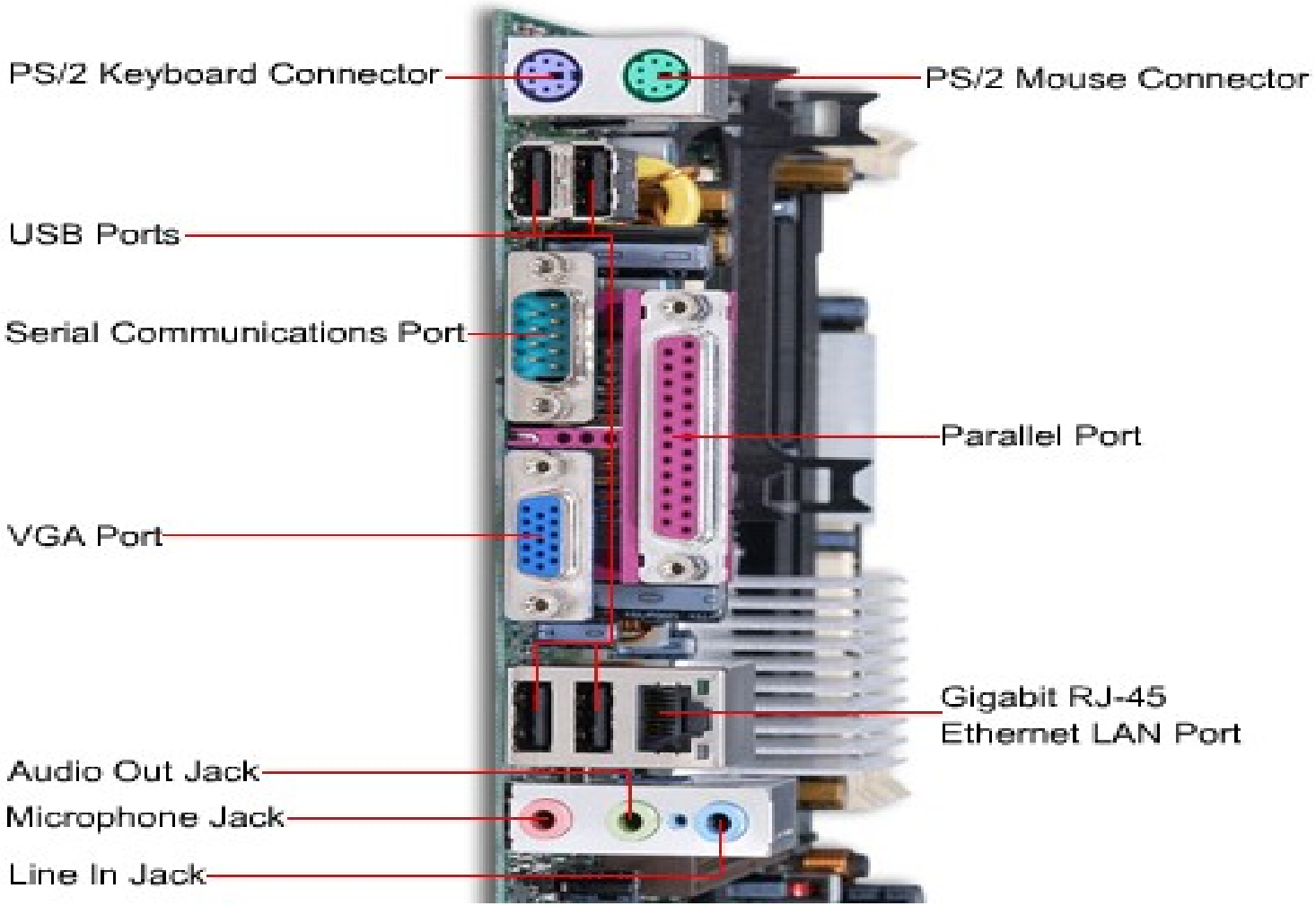
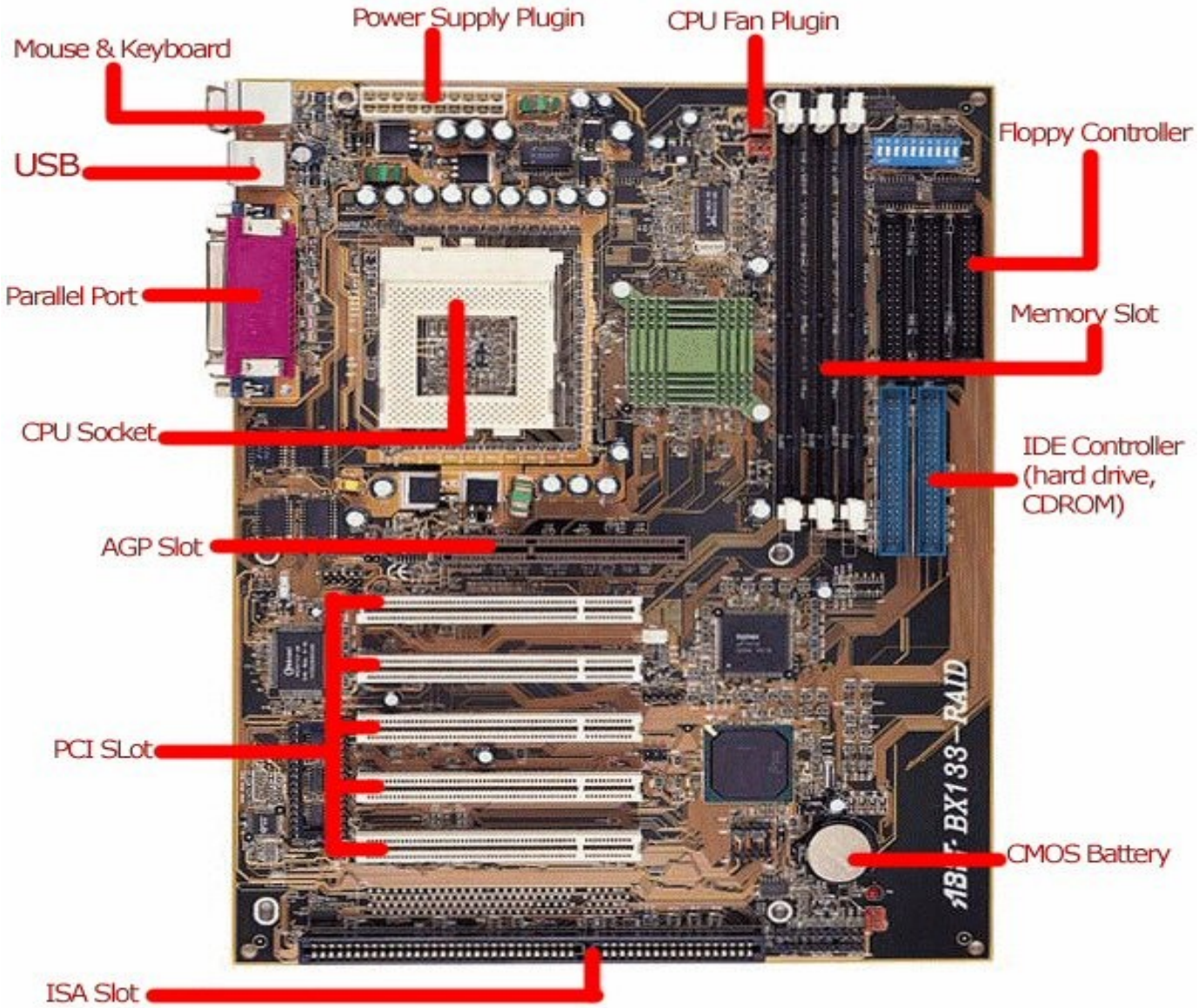
- RJ-45 Ethernet connector
- BNC Baby-N connector (British Navel Connector)
- 5-Pin DIN Keyboard Connector
- 6-Pin Mini-DIN PS/2 -type
- 4-Pin Mini-Din S-Video (Super Video)
- USB
- IEEE-1394 (FireWire and i.Link) 4/6-pin connector



I/O Connectors *(Back Panel)*



Component Layout - ATX



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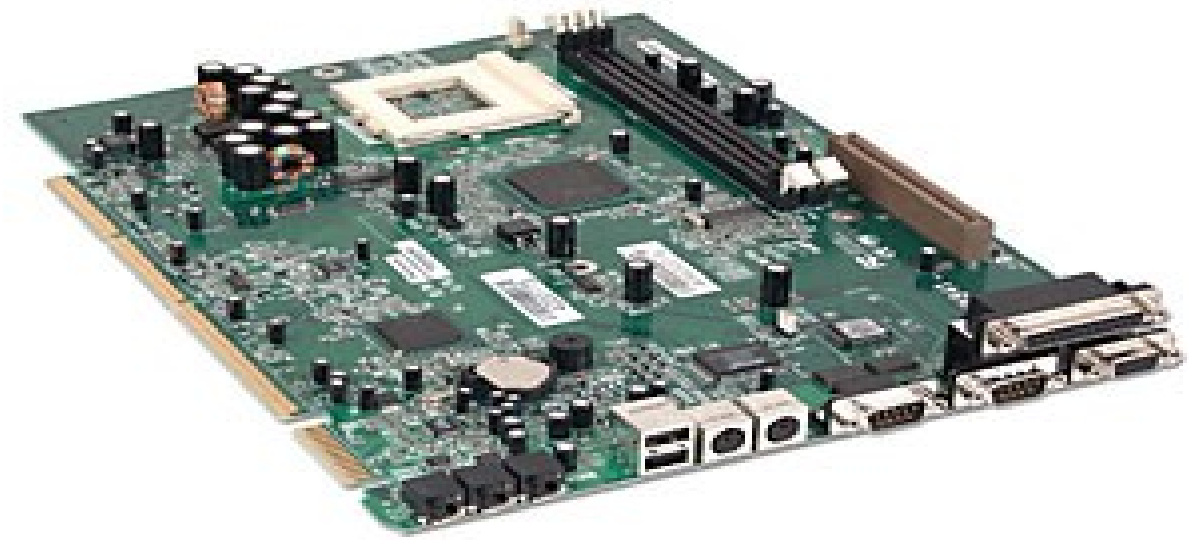
NLX



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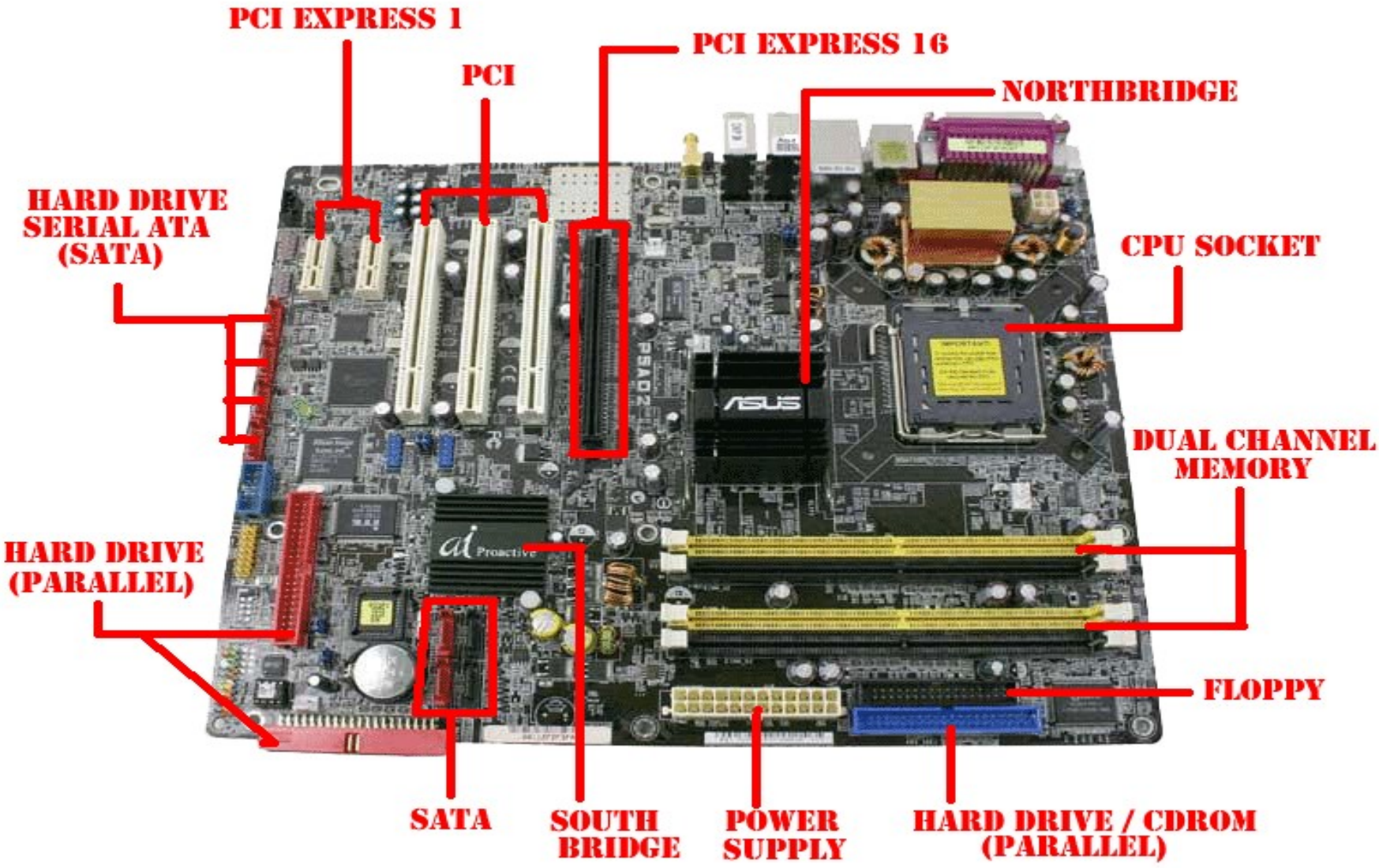
BTX



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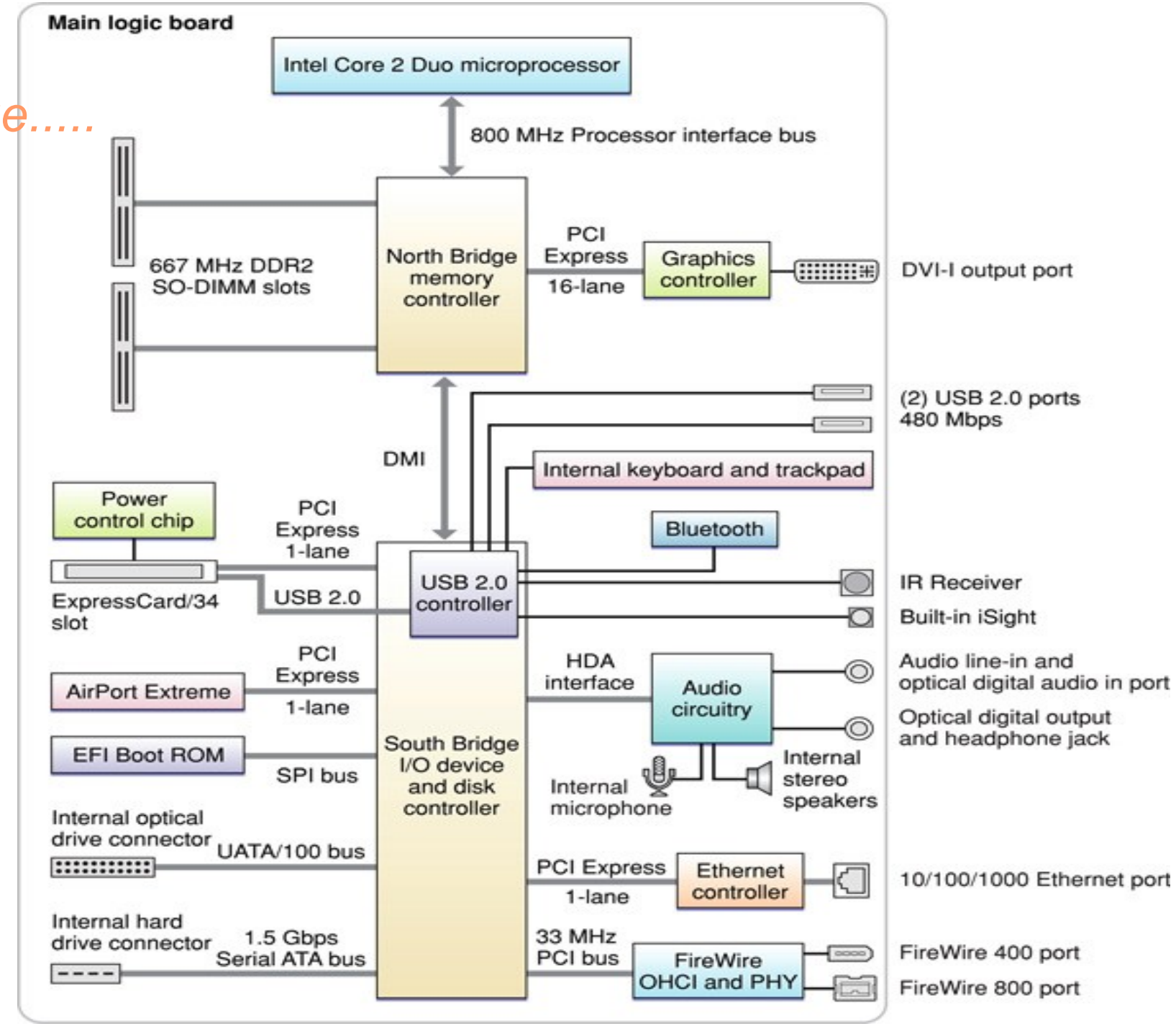
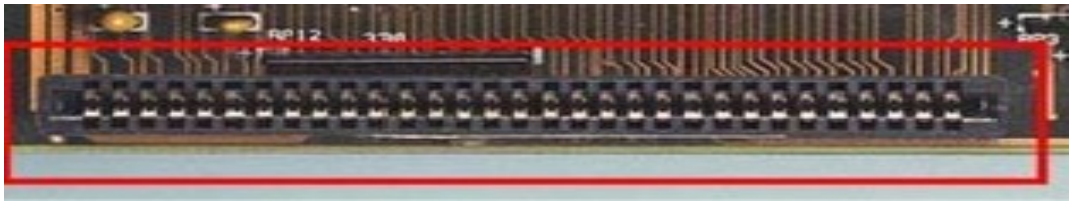

Main logic board
Intel Core 2 Duo microprocessor
800 MHz Processor interface bus
667 MHz DDR2 SO-DIMM slots
North Bridge memory controller
PCI Express 16-lane
Graphics controller
DVI-I output port
DMI
(2) USB 2.0 ports 480 Mbps
Internal keyboard and trackpad
Power control chip
PCI Express 1-lane
Bluetooth
ExpressCard/34 slot
USB 2.0
USB 2.0 controller
IR Receiver
Built-in iSight
PCI Express 1-lane
HDA interface
Audio circuitry
Audio line-in and optical digital audio in port
AirPort Extreme
Optical digital output and headphone jack
EFI Boot ROM
SPI bus
South Bridge I/O device and disk controller
Internal microphone
Internal stereo speakers
Internal optical drive connector
UATA/100 bus
PCI Express 1-lane
Ethernet controller
10/100/1000 Ethernet port
Internal hard drive connector
1.5 Gbps Serial ATA bus
33 MHz PCI bus
FireWire OHCI and PHY
FireWire 400 port
FireWire 800 port

Slots & Connectors



- 8-bit
  - The 8-bit expansion bus operates at a maximum of 4.77 MHz (approx. 5 MHz), has eight interrupts, four DMA Channels, and one large 62 slot card

- ISA Bus
  - The ISA (Industry Standard Architecture) bus is a 16-bit bus with a card slightly larger than the 8-bit. The 16-bit cards have an extra piece extending beyond the 8-bit card length. This bus has 16 interrupts and 8 DMA channels. ISA also runs at 8 MHz. ISA buses are backwards compatible with the 8-bit cards.

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- MCA Bus (Same as **ISA** Bus)
  - The MCA (Micro Channel Architecture) bus was a proprietary bus designed by IBM. It is a 16-bit or 32-bit bus and it's clock speed is 10 MHz. It also offered software configuration instead of dip switches and jumper settings.

- EISA
  - EISA (Extended ISA) bus borrowed a lot of features from the MCA bus and expanded on them. It has a 32-bit bus and has more I/O addresses (Input/Output addresses or memory addresses). It also still uses the 8 MHz of the ISA bus to allow for backwards compatibility.

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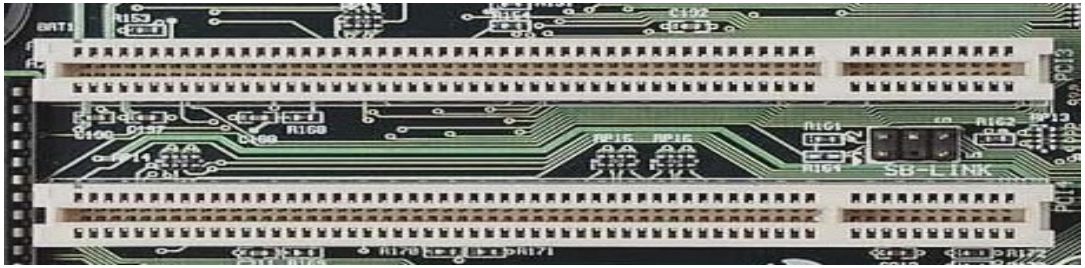
- Vesa Local Bus (VLB)
  - The VESA Local Bus (VLB) is a local bus type, meaning it is a bus which runs at the same speed as the processor. Typically, it is used for video to gain the advantage of the high speed of transfer of the processor. It is backwards compatible with the ISA, but has an extra slot to make it 32-bits.



- PCI Bus
  - PCI (Peripheral Component Interconnect) Bus is the newest and most advantageous type of all of the buses. It supports both 32-bit and 64-bit data paths to be compatible with 486 and Pentium class processors. PCI is also processor independent, allowing it to operate in Macintosh, PC, and RISC computers. PCI runs at 33 MHz and has a maximum throughput of 256 megabytes per second.

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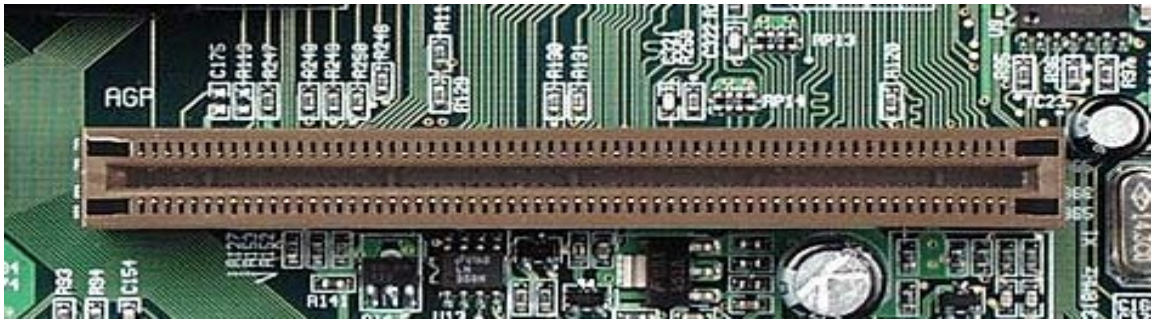

- AGP Bus
  - AGP, or Accelerated Graphics Port, is a bus technology developed by Intel to support high speed video cards. The AGP interface uses the RAM in your computer to generate 3-D images and video very quickly.

- PCMCIA Bus
  - PCMCIA (Personal Computer Memory Card Association) is the last type of bus we will discuss. It is mainly used in laptops or other small computers and in some digital camer-as. PCMCIA comes in three types, cleverly called Type I, Type II, and Type III.
  - Type I cards are 3.3 mm thick. Type II cards are the most common type and are 5 mm thick. Type III cards are mainly used for hard drives and are 10.5 mm thick.

Summary of Expansion Buses

Bus Type	Bus Size	Speed (MHz)
8-bit	8-bit	4.77
ISA	16-bit	8 (10 in turbo mode)
MCA	16-bit or 32-bit	10
EISA	32- bit	8
VESA (VL-Bus)	32-bit	Processor Speed
PCI	64 -bit	Processor Speed
PCMCA	16 -bit	33 MHz