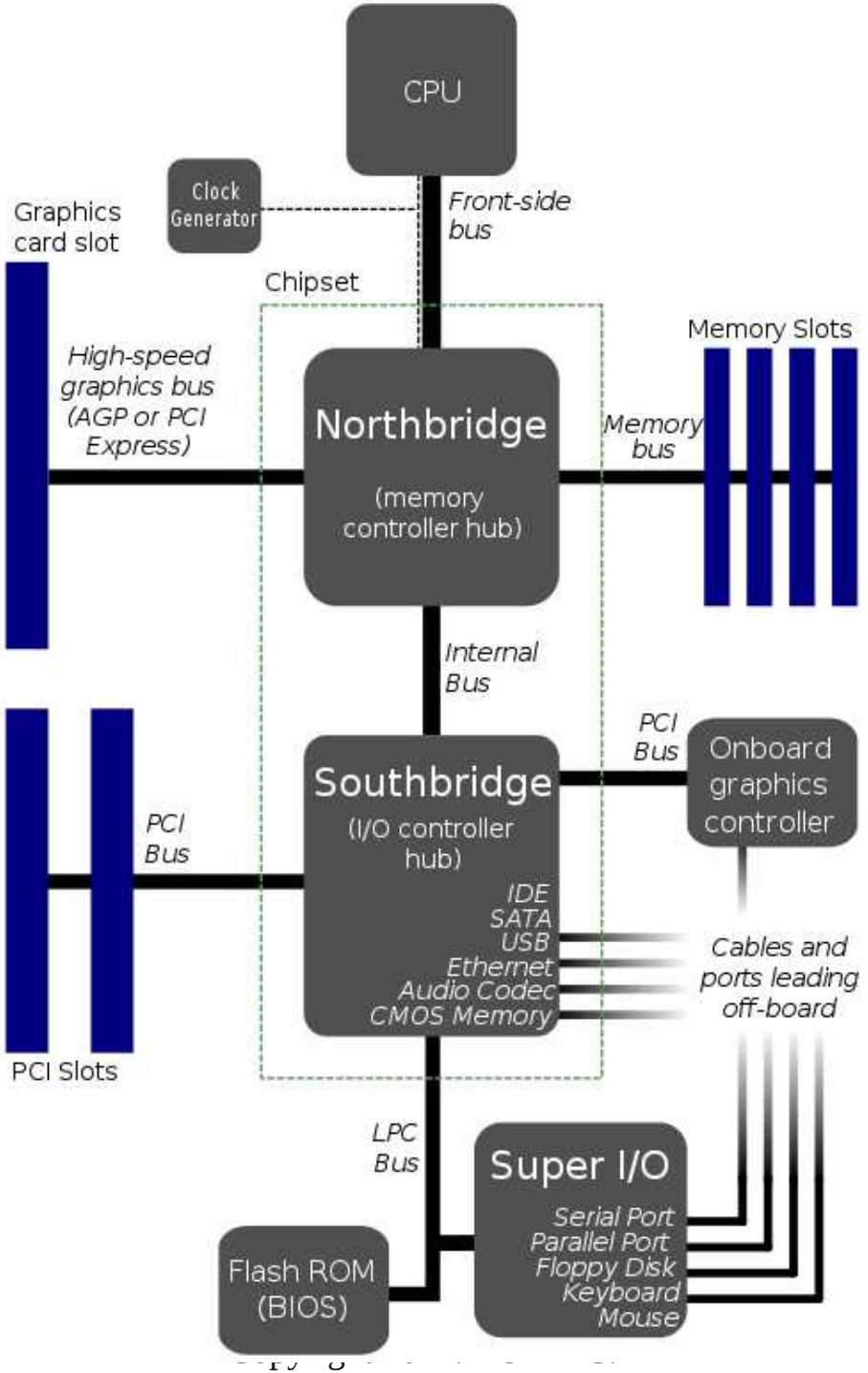
# Computer Bus

- A term from computer architecture, which refers to the subsystem that transfers data between the components inside a computer, or between computers.
- A computer contains
  - CPU
  - Memory
  - Peripheral Components
- CPU and memory are tightly coupled.
- Other components use the bus which is used to reduce effects of von Neumann bottleneck.

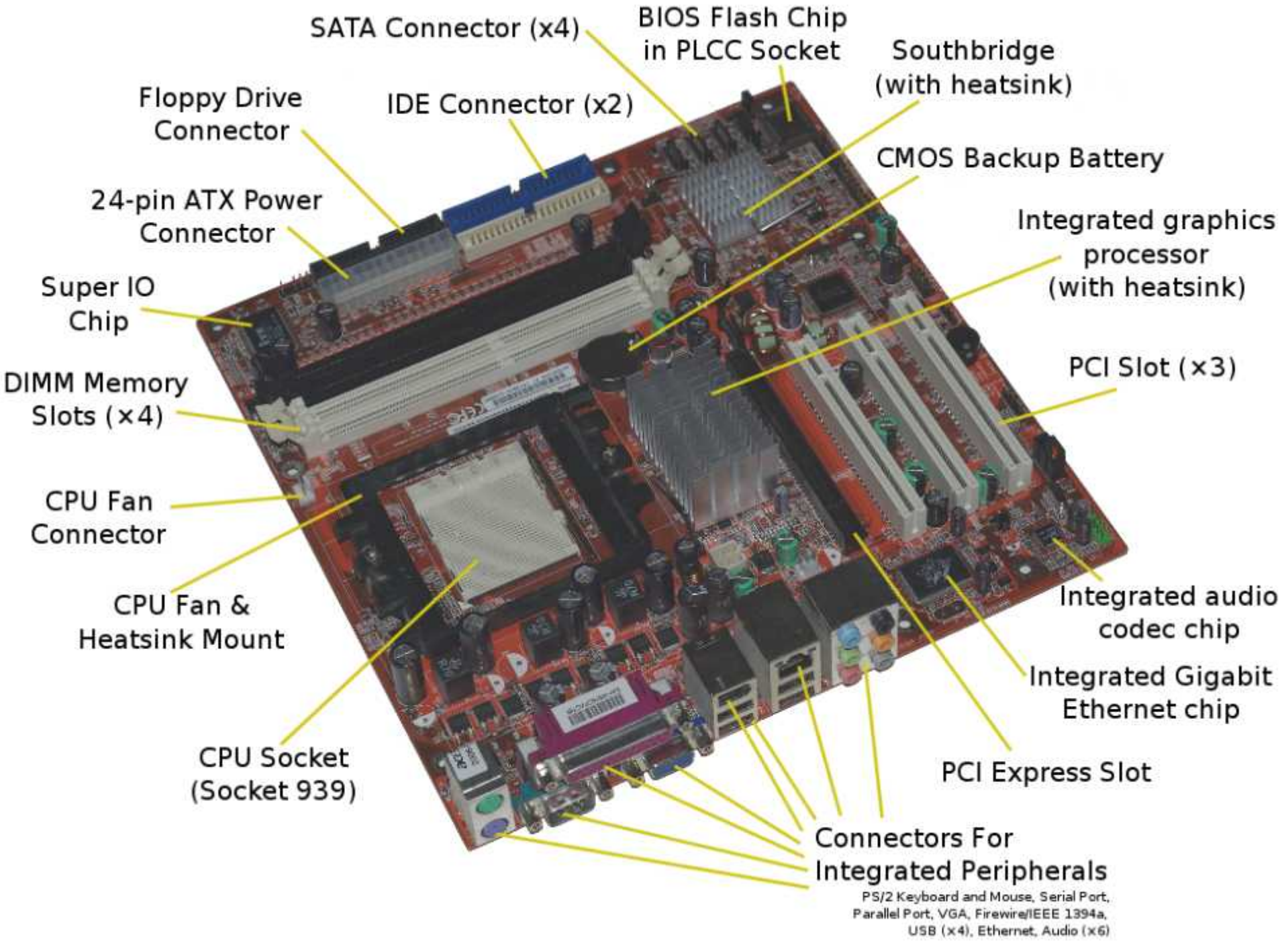
# Motherboard

- A PC motherboard is the main circuit board within a typical desktop computer, laptop or server. Its main functions are as follows:
  - To serve as a central backbone to which all other modular parts such as CPU, RAM, and hard drives can be attached as required to create a modern computer;
  - To accept (on many motherboards) different components (in particular CPU and expansion cards) for the purposes of customization;
  - To distribute power to PC components;
  - To electronically co-ordinate and interface the operation of the components.



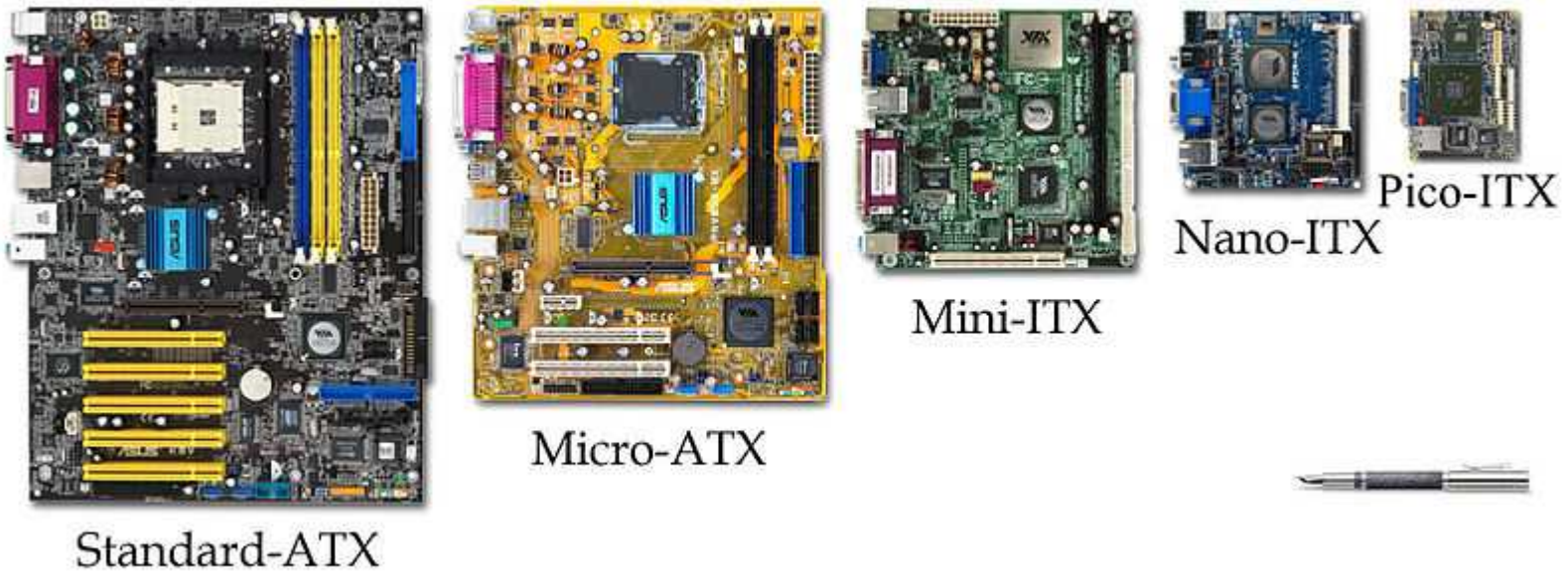



http://en.wikipedia.org/wiki/File:Motherboard_diagram.svg


SATA Connector (x4)
BIOS Flash Chip in PLCC Socket
Southbridge (with heatsink)
Floppy Drive Connector
IDE Connector (x2)
CMOS Backup Battery
24-pin ATX Power Connector
Integrated graphics processor (with heatsink)
Super IO Chip
PCI Slot (×3)
DIMM Memory Slots (×4)
CPU Fan Connector
CPU Fan & Heatsink Mount
Integrated audio codec chip
Integrated Gigabit Ethernet chip
CPU Socket (Socket 939)
PCI Express Slot
Connectors For Integrated Peripherals
PS/2 Keyboard and Mouse, Serial Port, Parallel Port, VGA, Firewire/IEEE 1394a, USB (×4), Ethernet, Audio (×6)

# Motherboard form factors

http://www.formfactors.org/




http://en.wikipedia.org/wiki/File:VIA_Mini-ITX_Form_Factor_Comparison.jpg

# CPU Socket

- A CPU socket or CPU slot is a mechanical component that provides mechanical and electrical connections between a microprocessor and a printed circuit board (PCB).
  - This allows the CPU to be replaced without soldering.
- Intel – LGA1155, LGA2011
- AMD – AM3+, FM1

# Computer Cooling

- Computer cooling is required to remove the waste heat produced by computer components, to keep components within permissible operating temperature limits.
- Components that are susceptible to temporary malfunction or permanent failure if overheated include integrated circuits such as CPUs, chipset, graphics cards, and hard disk drives.
- Computer fans are very widely used to reduce temperature by actively exhausting hot air.

# PCI

- Conventional PCI (Peripheral Component Interconnect) is a computer bus for attaching hardware devices in a computer.
  - From 1993 by Intel.
- Can be either part of the circuit fitted into the motherboard itself or can be an expansion card which fits into a PCI slot.
- PCI cards included network cards, sound cards, modems, extra ports such as USB or serial, TV tuner cards and disk controllers.

# PCI Express

- PCI Express (Peripheral Component Interconnect Express), officially abbreviated as PCIe, is a computer expansion bus standard designed to replace the older PCI, PCI-X, and AGP bus standards.
- PCIe has numerous improvements over the aforementioned bus standards
  - higher maximum system bus throughput
  - lower I/O pin count and smaller physical footprint
  - better performance-scaling for bus devices
  - a more detailed error detection and reporting mechanism
  - native hot-plug functionality

# SATA

- Serial ATA (SATA or Serial AT Attachment) is a computer bus interface for connecting host bus adapters to mass storage devices such as hard disk drives and optical drives.
- Designed to replace the older parallel ATA (PATA) standard (often called by the old name IDE)
- SATA host-adapters and devices communicate via a high-speed serial cable over two pairs of conductors.
- SATA uses the same basic ATA and ATAPI (ATA Packet Interface) command-set as legacy ATA devices.
- The SATA Spec includes logic for SATA device hotplugging.

# USB

- Universal Serial Bus (USB) is an industry standard developed in the mid-1990s
  - Defines the cables, connectors and communications protocols used in a bus for connection, communication and power supply between computers and electronic devices.
- USB is not a true bus, meaning only the root hub sees the entire electrical communications.
  - There is no method to monitor upstream communications from a down stream device.
- USB Implementers Forum (USB-IF).

# USB

- The design architecture of USB is asymmetrical in its topology
  - A host
  - A multitude of downstream USB ports
  - Multiple peripheral devices connected in a tiered-star topology.
- Additional USB hubs may be included in the tiers
  - Branching into a tree structure with up to five tier levels.
- A USB host may implement multiple host controllers and each host controller may provide one or more USB ports.
- Up to 127 devices, including hub devices if present, may be connected to a single host controller.

# USB

- USB 1.0 – January 1996
  - 1.5 Mbit/s "Low Speed"
  - 12 Mbit/s "Full Speed"
- USB 1.1 – September 1998
- USB 2.0 – April 2000
  - 480 Mbits/s
- USB 3.0 – November 2008
  - 5 Gbits/s “SuperSpeed”

# IEEE 1394 (Firewire)

- The IEEE 1394 interface, developed in late 1980s and early 1990s by Apple as FireWire, is a serial bus interface standard for high-speed communications and isochronous real-time data transfer.
- FireWire is also available in wireless, fiber optic, and coaxial versions using the isochronous protocols.
- FireWire is essentially a peer-to-peer network (where any device may serve as the host or client), allowing multiple devices to be connected on one bus.

# Bluetooth

- Bluetooth is a open wireless technology standard for exchanging data over short distances (using short-wavelength radio transmissions in the ISM band from 2400–2480 MHz) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security.
- Created by telecoms vendor Ericsson in 1994
- It was originally conceived as a wireless alternative to RS-232 data cables.
- It can connect several devices, overcoming problems of synchronization.