HARDWARE FUNDAMENTALS AND INSTALLATION 1

Outline

- Common Computer Components
- Hardware Selection
- Power Supply
  - Installation
  - Molex Berg Connector
- Cooling
- Fans
- Motherboards
  - ATX
  - Micro-ATX
  - Mini-ITX
  - Nano-ITX
  - Pico-ITX

Outline

- Jumpers
- Expansion Buses
- Motherboard Installation
- Central Processing Unit Features
- ARM- System on a Chip
- CPU Sockets
  - SECC
  - PGA
  - LGA

- Intel CPU Sockets
  - LGA 775
  - LGA 1155
  - LGA 1156
  - LGA 1366
  - LGA 2011
- AMD CPU Sockets
  - 940
  - AM2
  - AM2+
  - AM3
  - AM3+
  - FM1
  - F

Outline

- CPU Installation
- SIMM
- DIMM
- SO-DIMM
- Rambus
- ROM
- SRAM
- SDRAM
- DDR SDRAM
- DDR2 SDRAM
- DDR3 SDRAM
- Parity Memory
- ECC

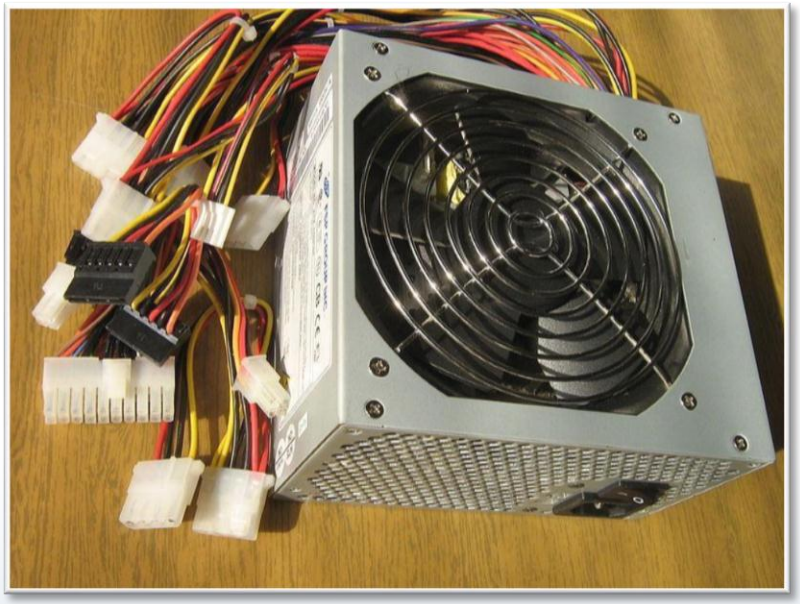
Common Computer Components

- System Unit – everything inside the tower/case
- Displays
- Input Devices
- External Devices

- Technical needs: software, application use, features, speed, capability, connection standards, etc.
- Power usage: ensure power supply can meet power demands of all system components, seek energy efficient systems
- Compatibility: size, connections
- Cost vs. performance

Power Supply

- Rating:
  - In Watts 250-1000, usually 300-500
- Efficiency: 75-90%
- Varies with number of molex and SATA connectors
- MB, PATA connectors compatible with ATX and Micro-ATX standard



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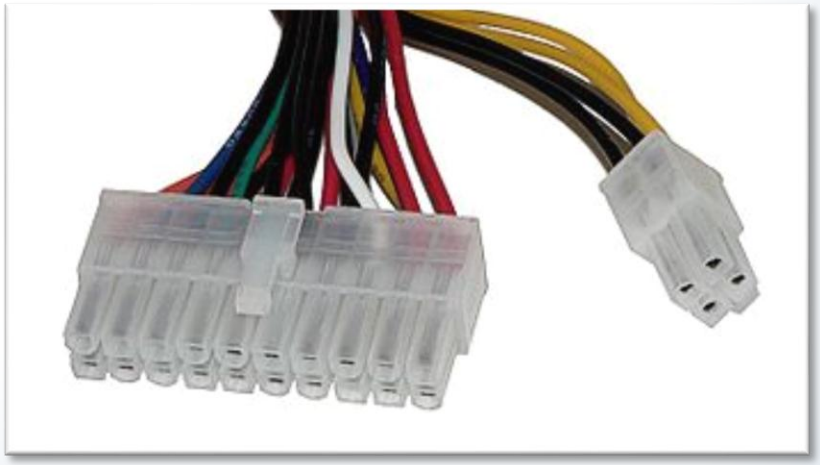
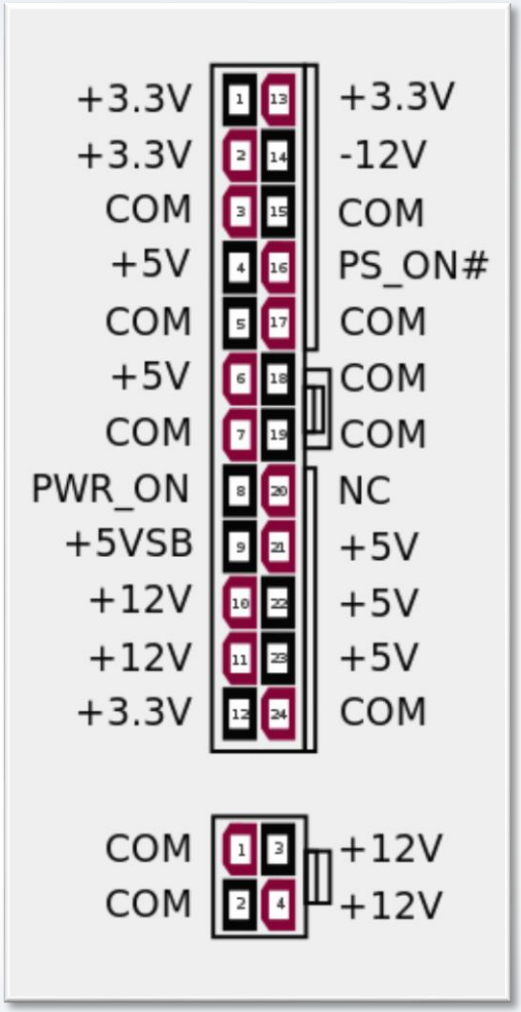
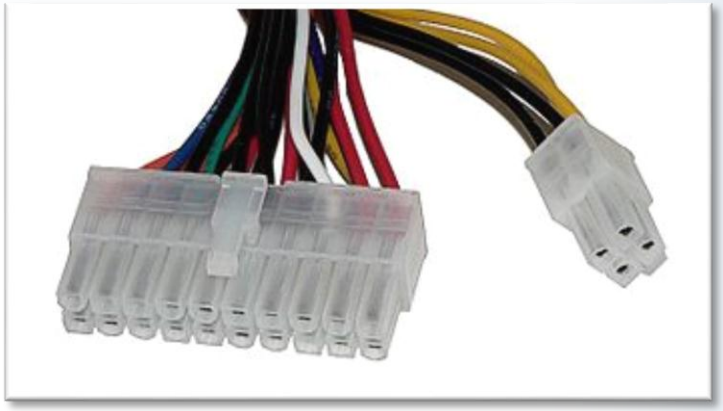


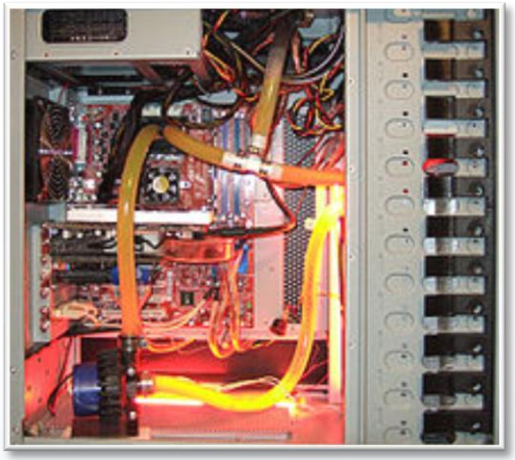
Power Supply Molex/Berg Connector

- 20 / 24 pin
- Jr – 4,6,8 pin
  - GPU, PCIe
- 3.3, 5, 12 V
- Disk Drive
  - 4 pin
  - 5,12 V
  - PATA, floppy



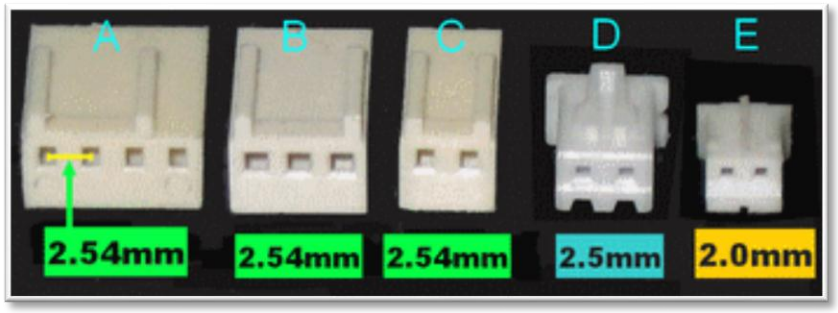


- Heat Sink
- Fan + Heat Sink
- Thermal Compounds
- Phase change
- Liquid Nitrogen
- Liquid Helium
- Liquid H2O



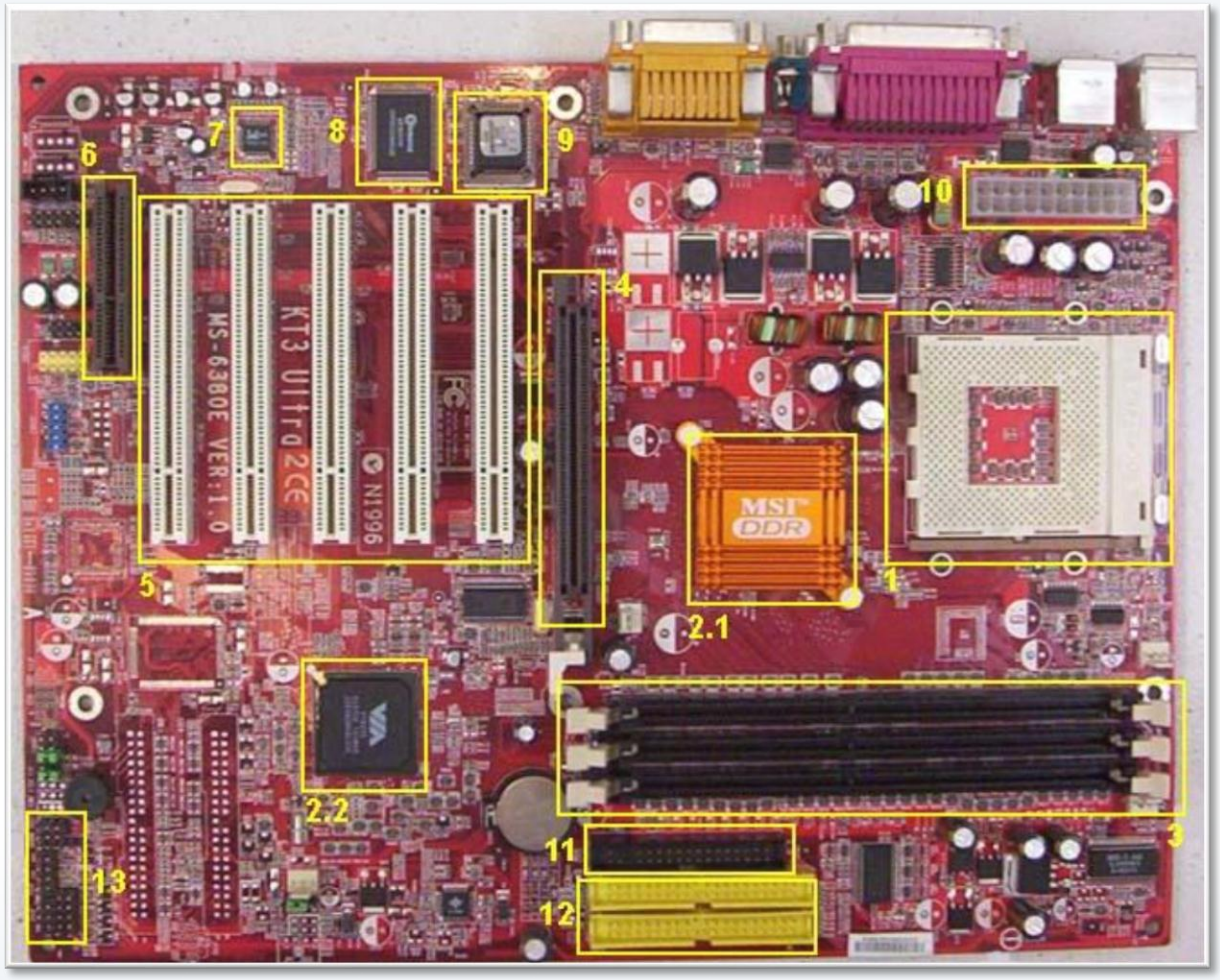
Fans

- Active cooling of CPU, Power Supply, Motherboard Chips, GPU, Case



- Advanced Technology Extended
- Intel – 1995
- Includes power supply and size standards: 20 pin power connector, 12V, 5V, 3V, I/O ports, PS/2, 12” x 9.6”

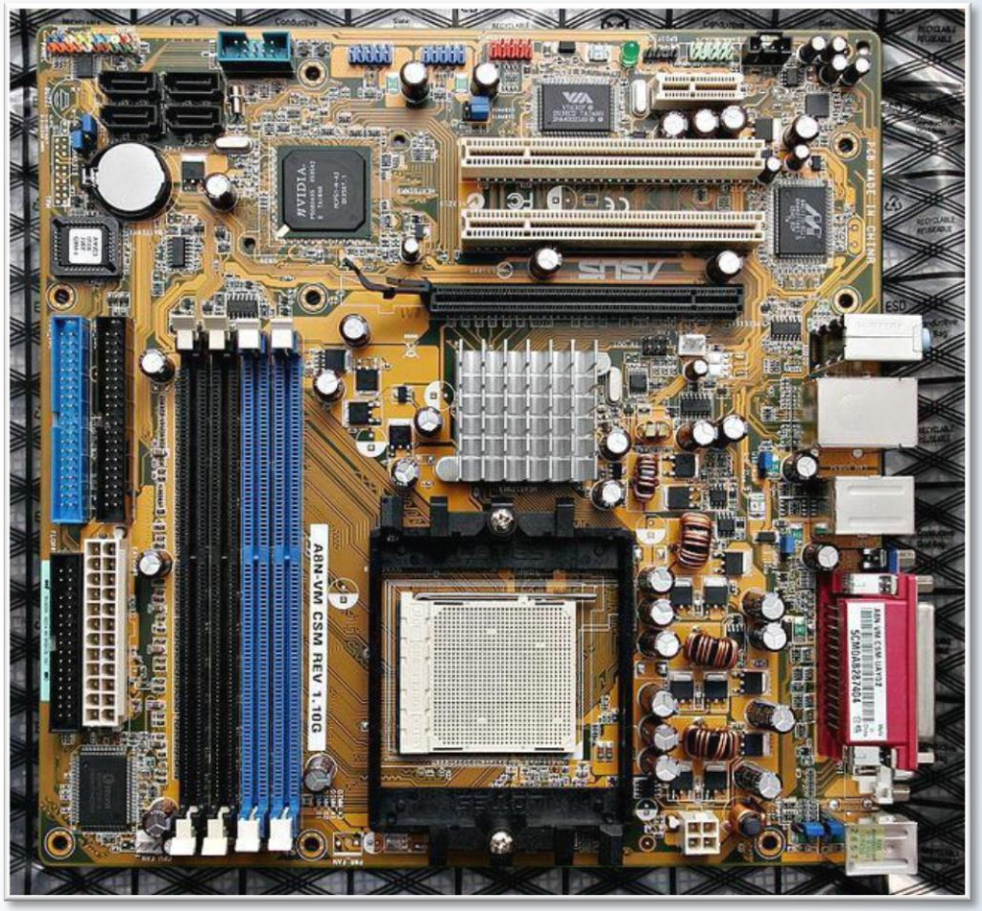
Motherboards - ATX



- 1. Processor socket
- 2. Chipset
- 3. RAM slots
- 4. AGP graphic card slot
- 5. PCI slots
- 6. CNR modem slot
- 7. Audio chip
- 8. I/O chip
- 9. BIOS
- 10. ATX power connector
- 11. Floppy drive connector
- 12. ATA connectors
- 13. Connectors for buttons, indicator lights etc.

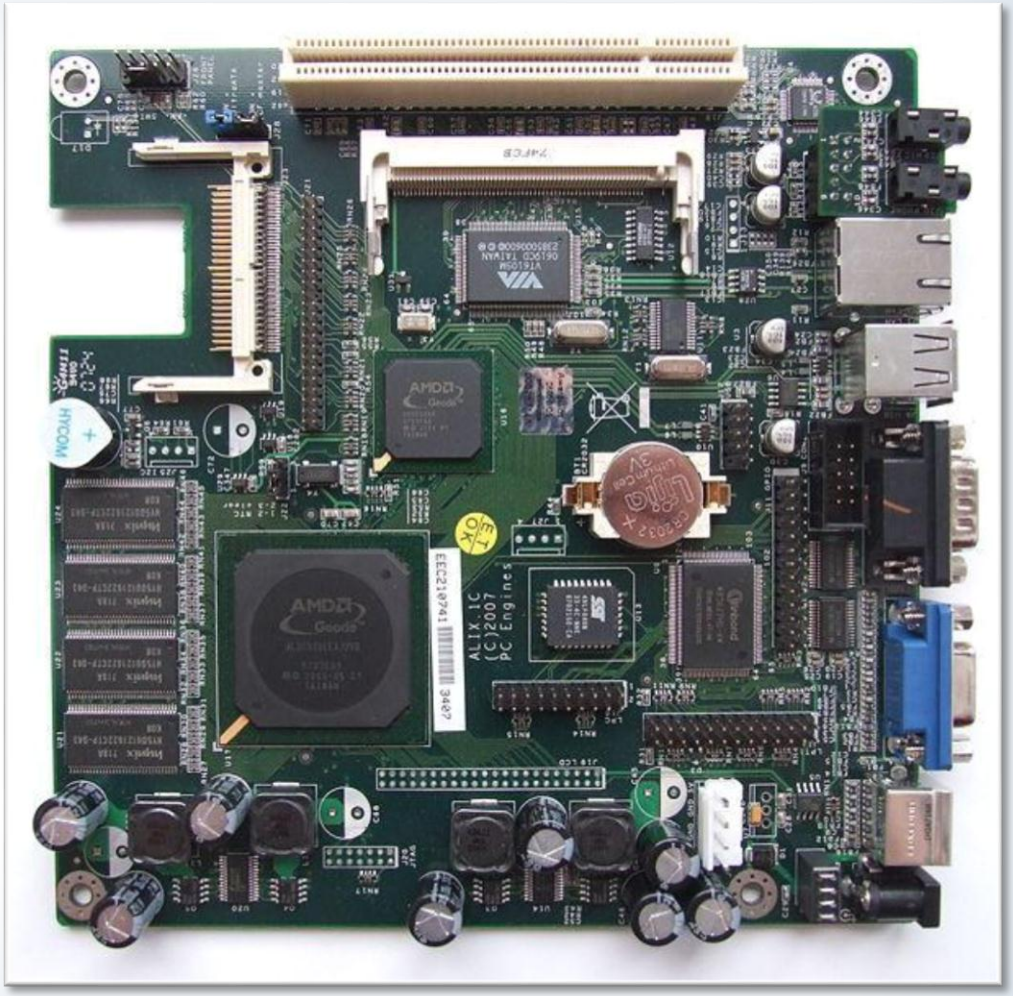
Motherboards – Micro - ATX

- Compatible with ATX
- Intel – 1997
- Home and small PC cases
- 9.6” x 9.6”



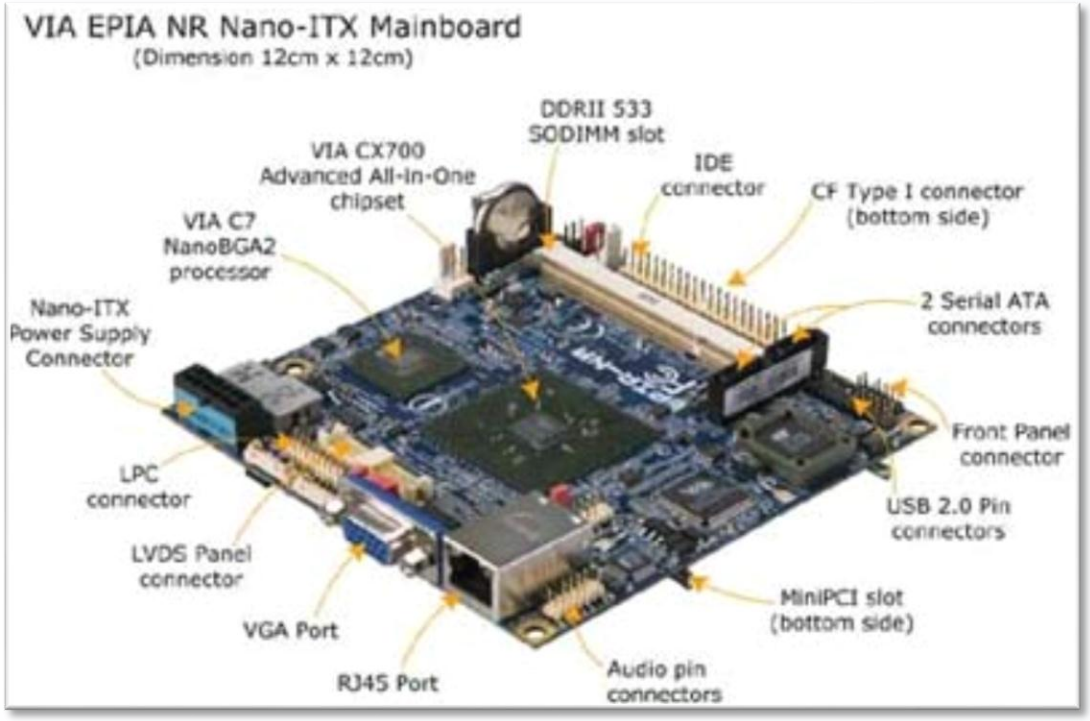
Motherboards – Mini - ITX

- VIA - 2001
- Low power
- Small form factor PC

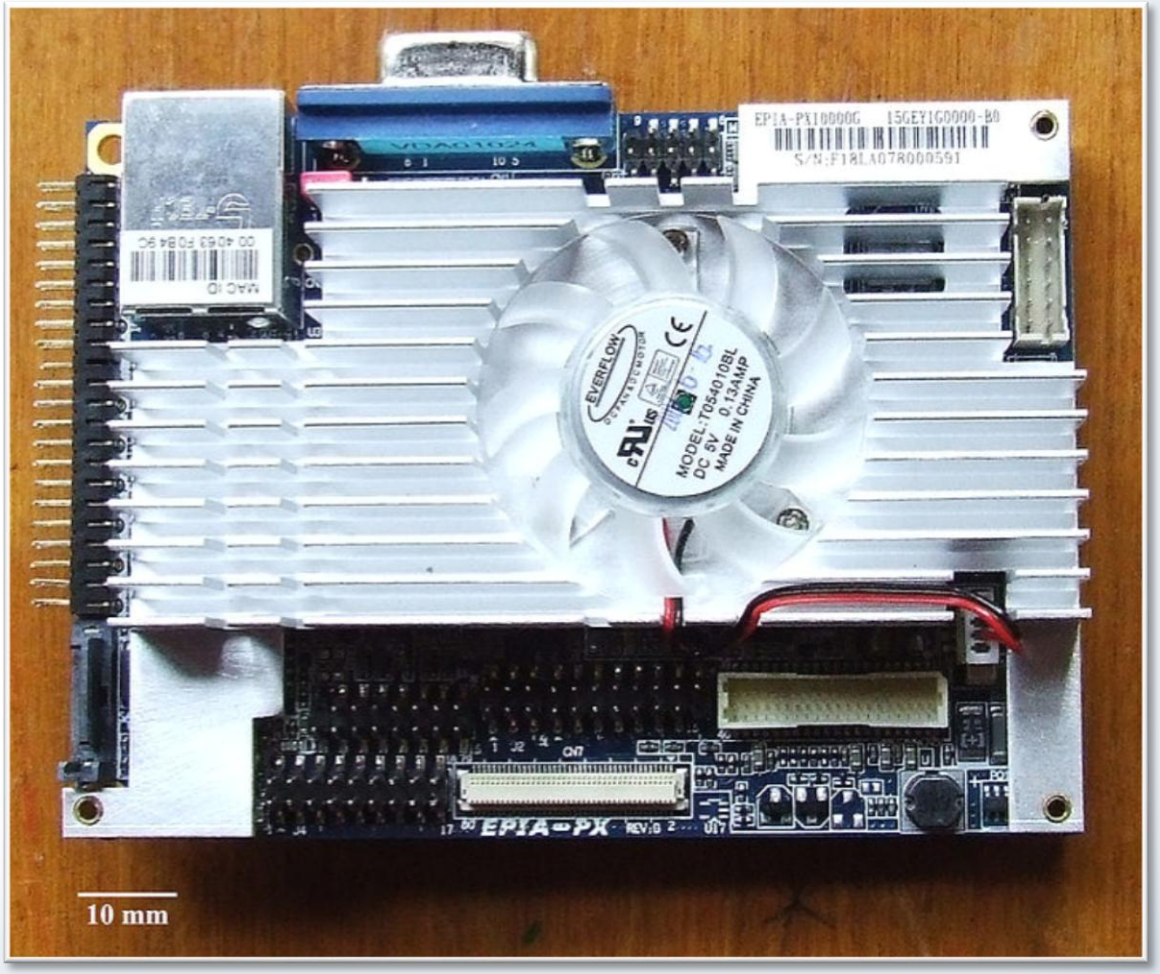


Motherboards – Nano - ITX

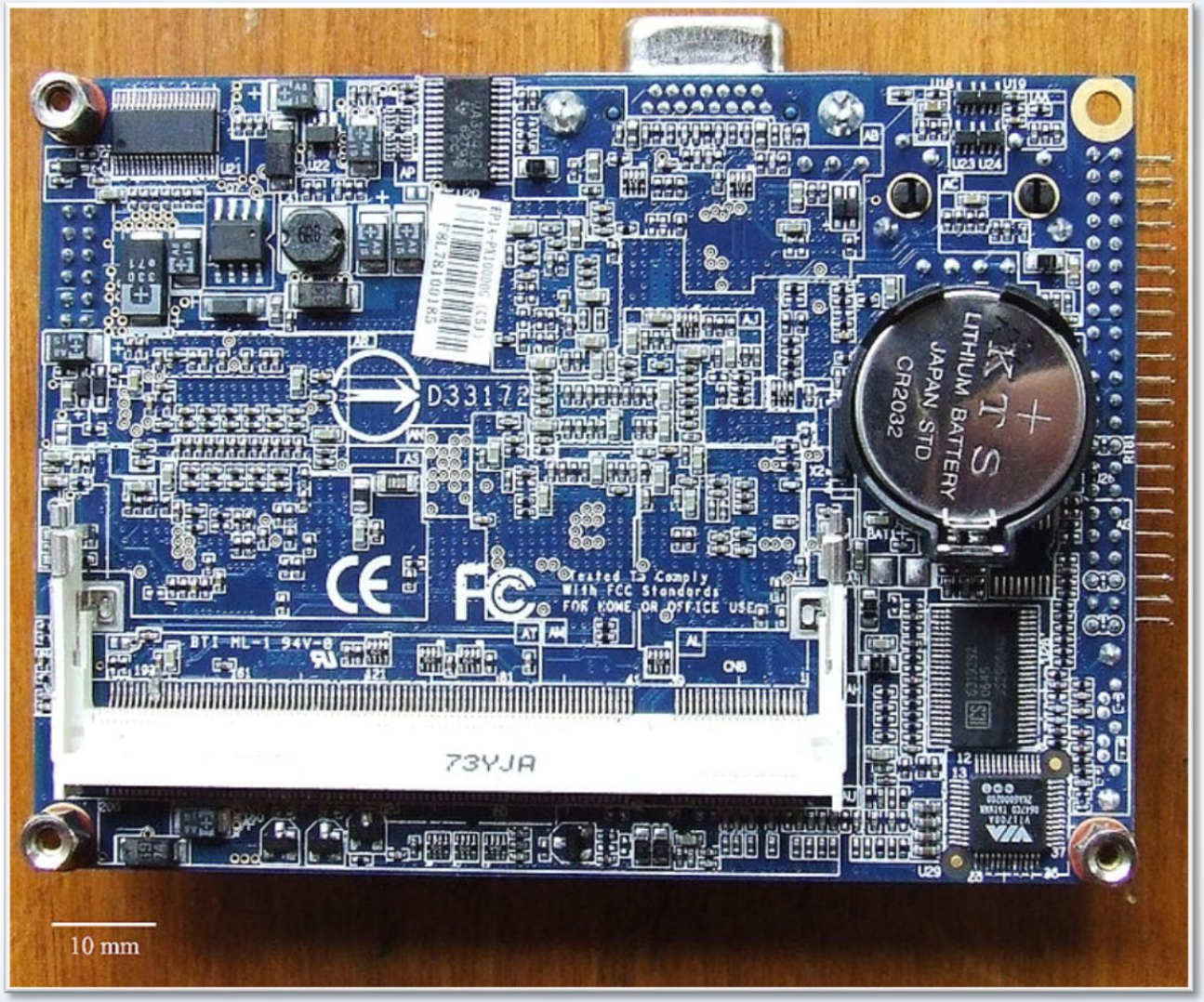
- Set top box
- PVRs
- Media center



- Smaller than Nano-ITX
- Uses less energy
- Embedded
- Mobile devices

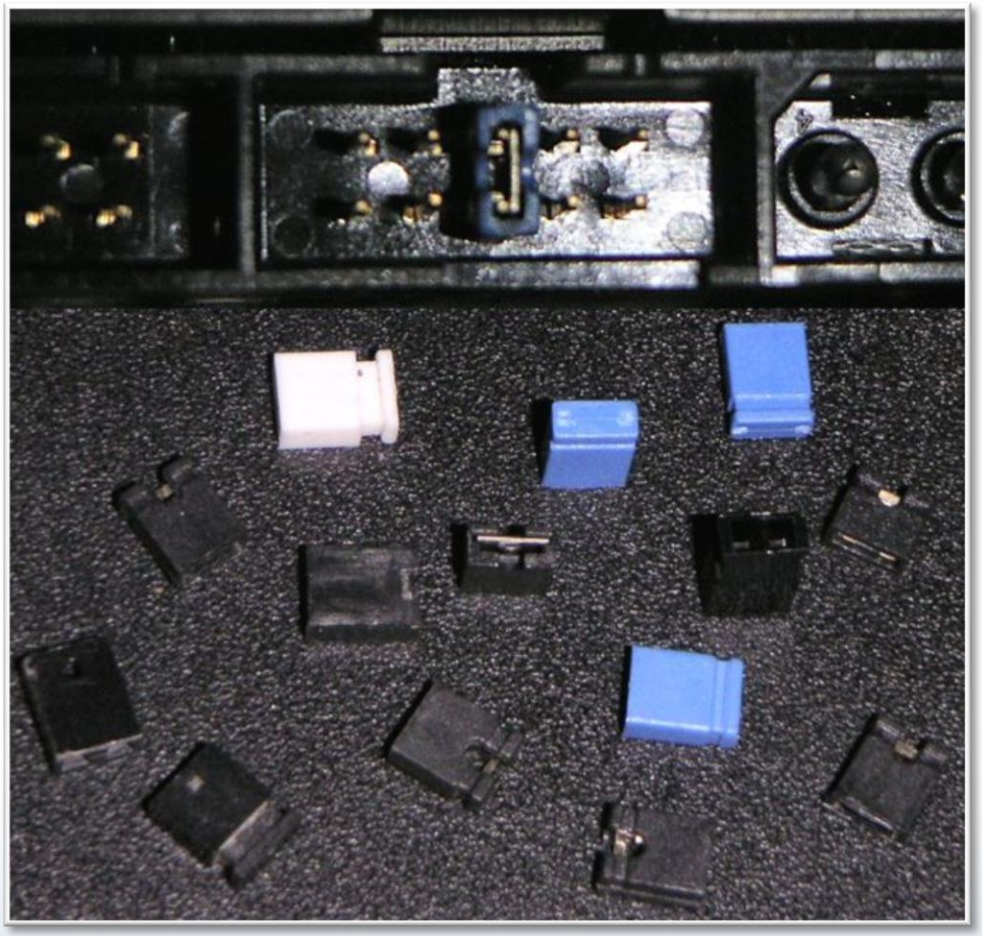


Motherboards – Pico - ITX

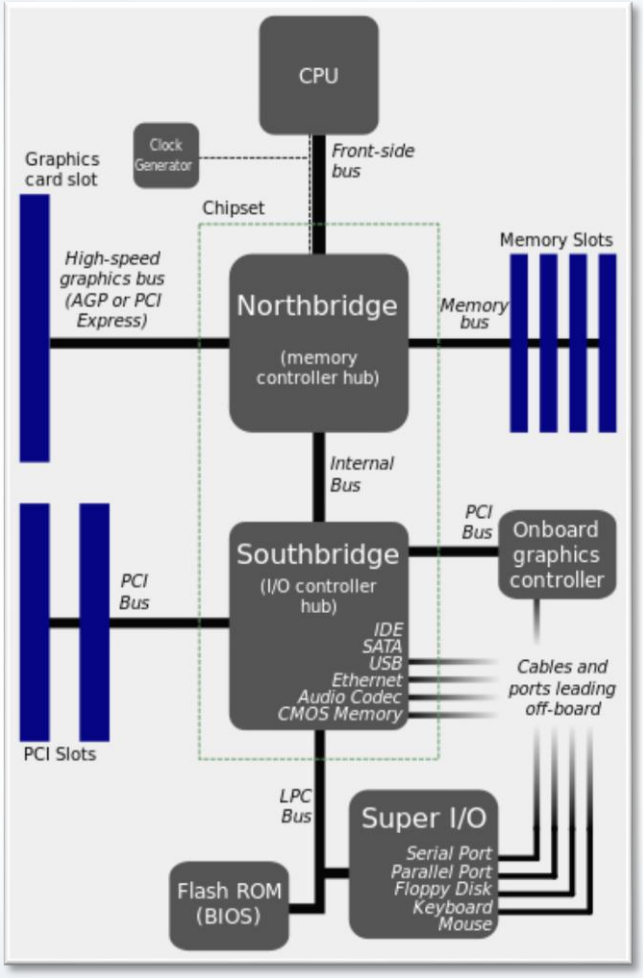


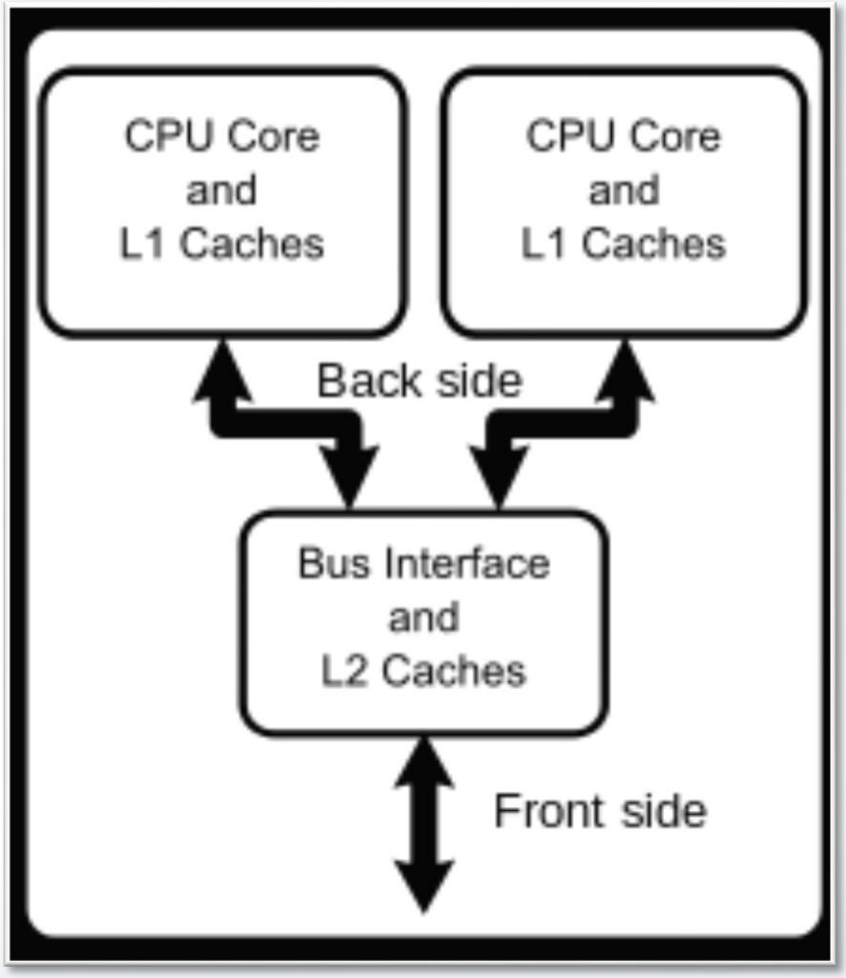
Jumpers

- Short length conductor that allows configuration of computer hardware



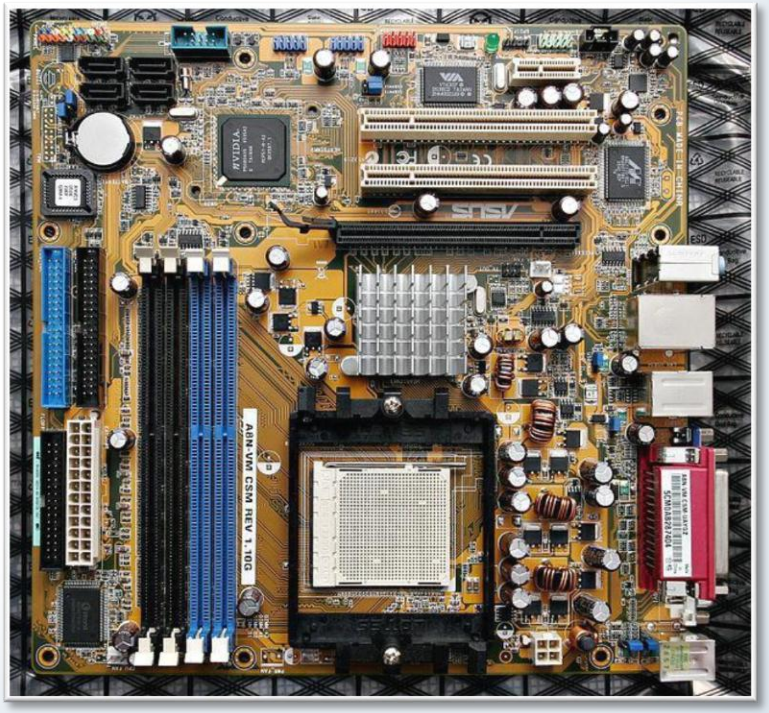
Expansion Buses





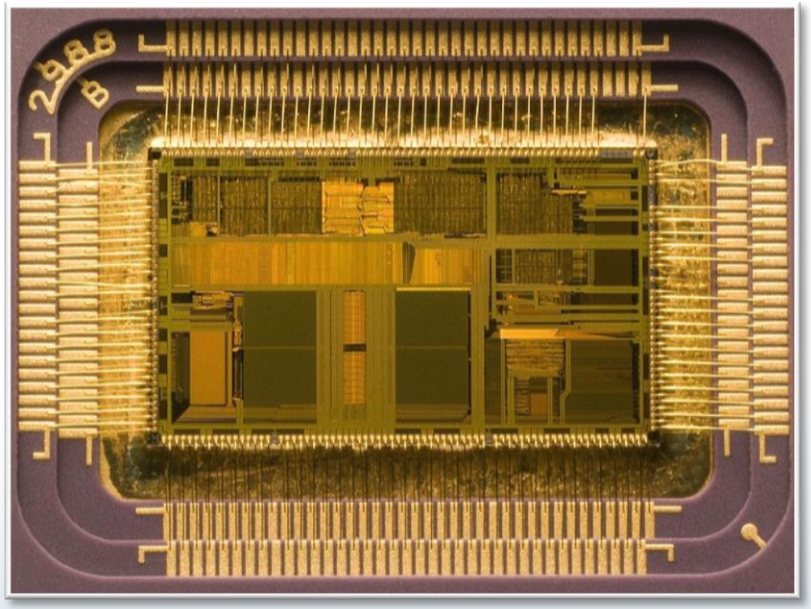
Motherboard – Installation

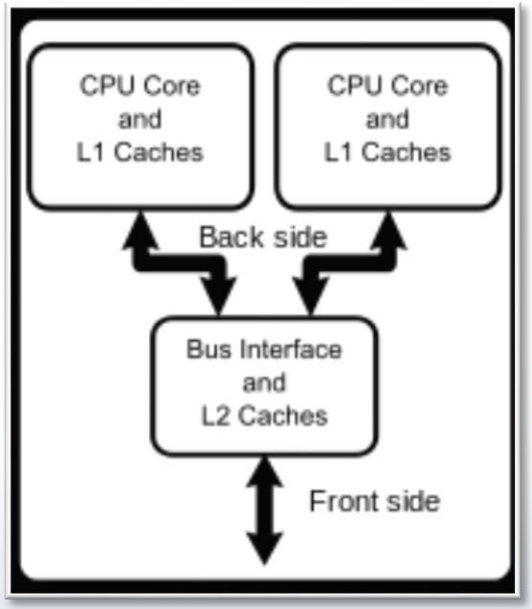
- Power off and unplug everything, open the system case, ground yourself
- Insert motherboard and screw down to case
- Insert CPU, expansion cards, RAM, drives, etc.
- Connect internal devices
- Connect internal power connectors
- Replace case
- Connect external devices
- Adjust BIOS if needed
- Test system



Central Processing Unit Features

- Real Speed – Mhz and Ghz
- Actual Speed – dependent on features
- Multiple cores (2,4,6,8,10,12,16,etc)
- Multiprocessor motherboard
- Multi-core processor (2 – 16)
- Cache – L1, L2 – each core, L3 shared among cores

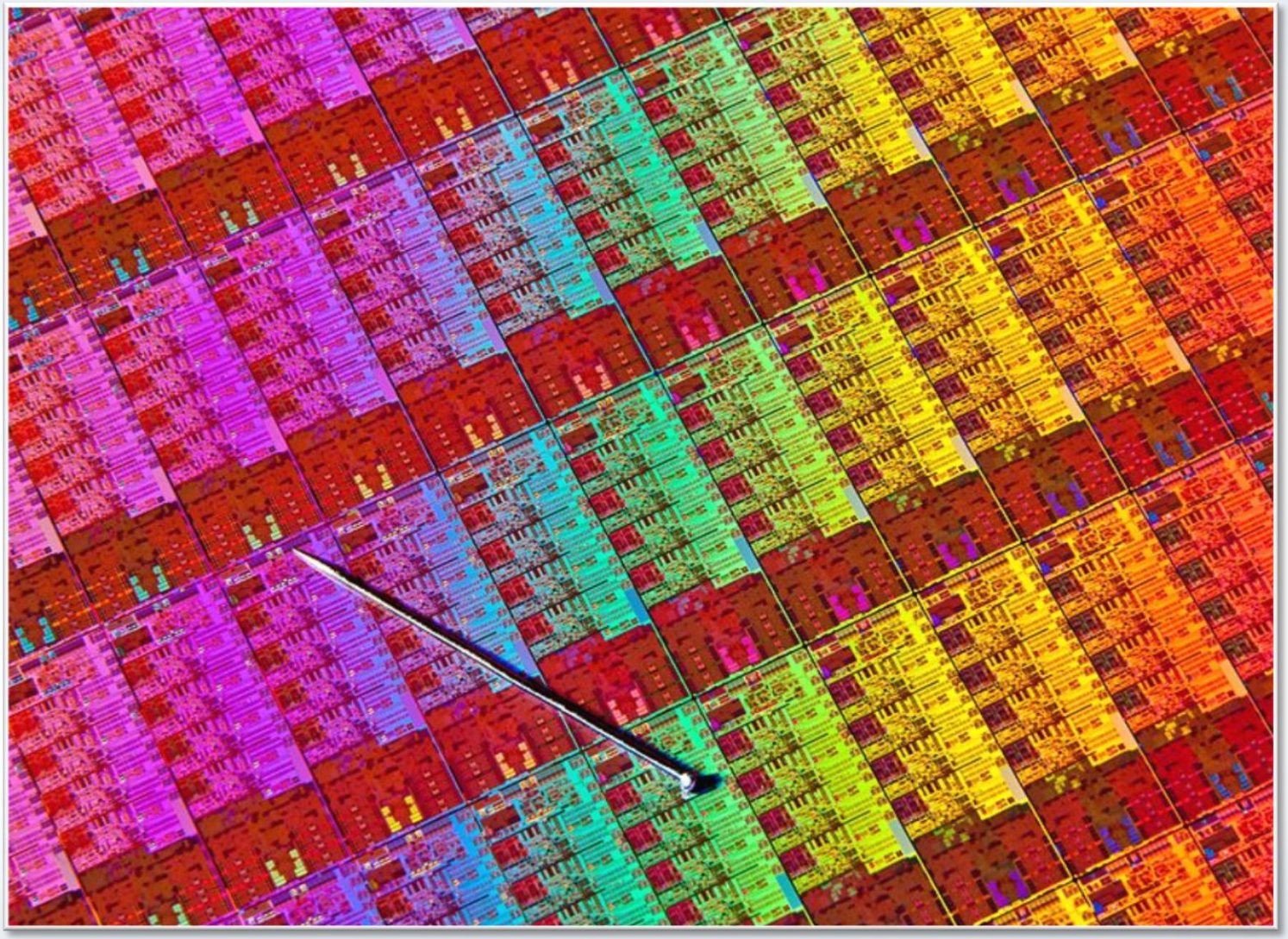




- HT – HyperThreading – creates virtual cores, OS must support this
- VT – Virtualization technology
- MMX, 3D Now, SSE, SSE2, SSE3, SSE4
- Integrated GPU
- Speed throttling – power saving

- Data processing path – 32bit / 64bit
  - 64bit advantage: speed, increased memory (32bit = 4GB max, 64bit =
  - Software needs to be compatible
- Architectures/instruction sets
  - X86-32 - 32bit,
  - X86-64 - IA64 – 64bit
  - ARM - 32 and 64bit
  - PowerPC- 32 and 64bit
  - MIPS - 32 and 64bit

Central Processing Unit Features



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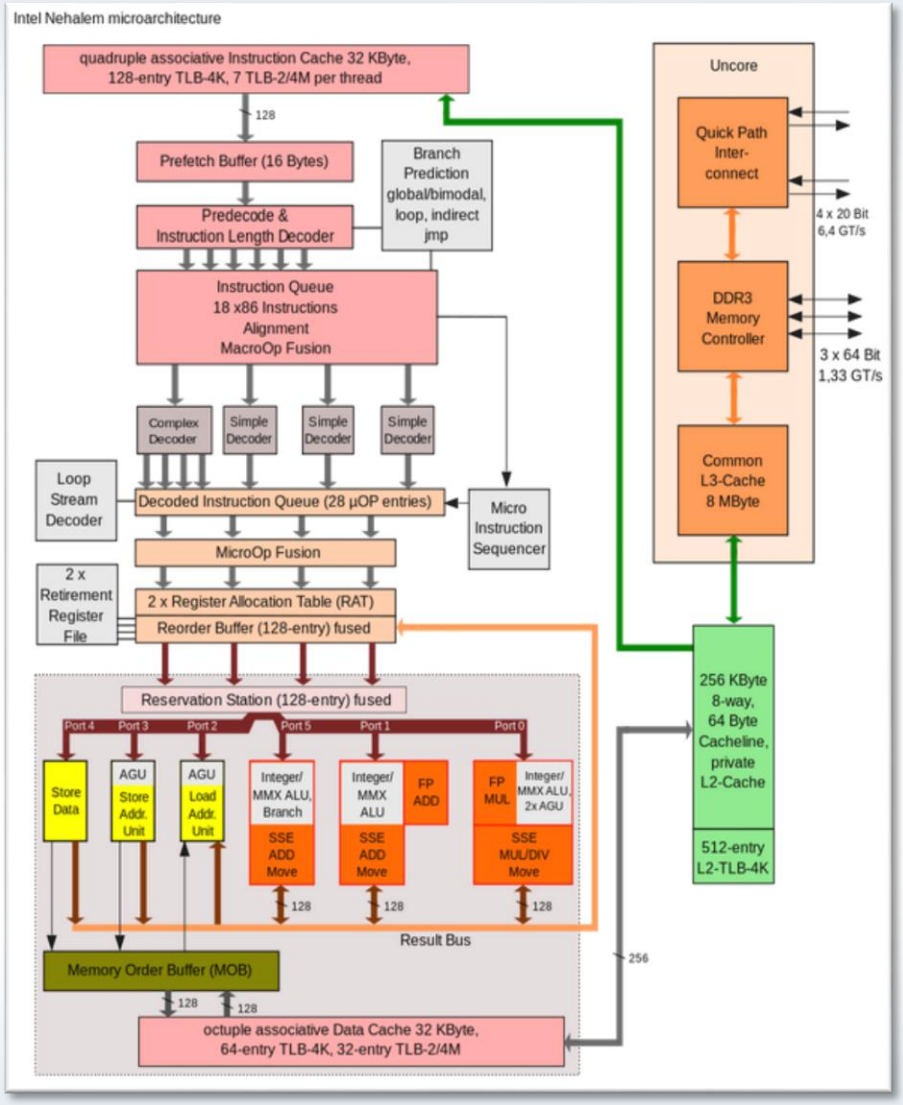
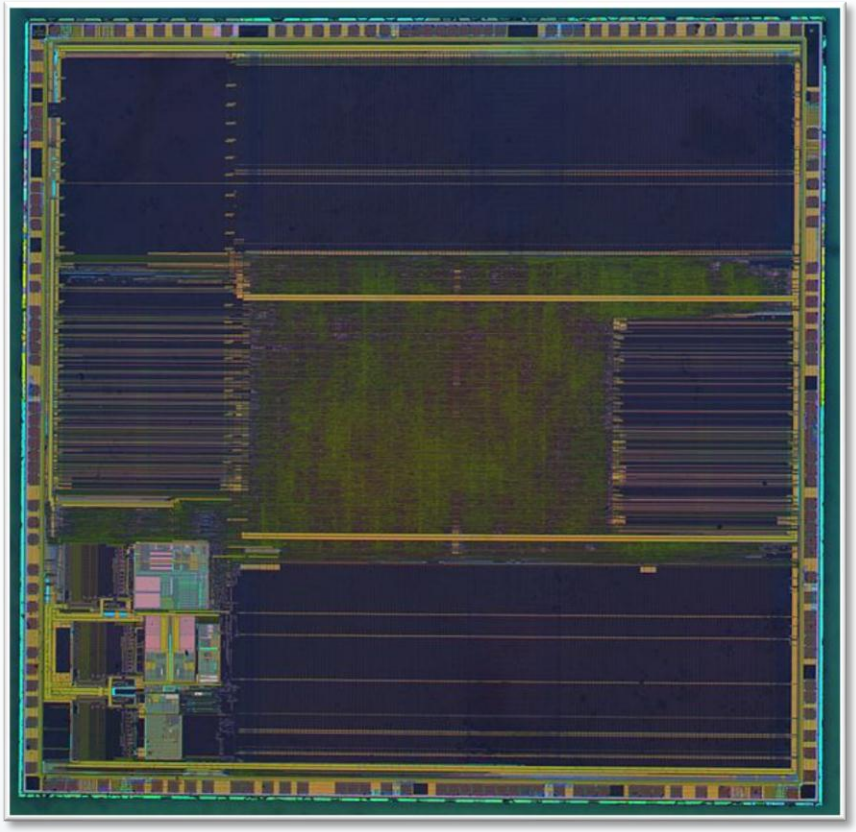
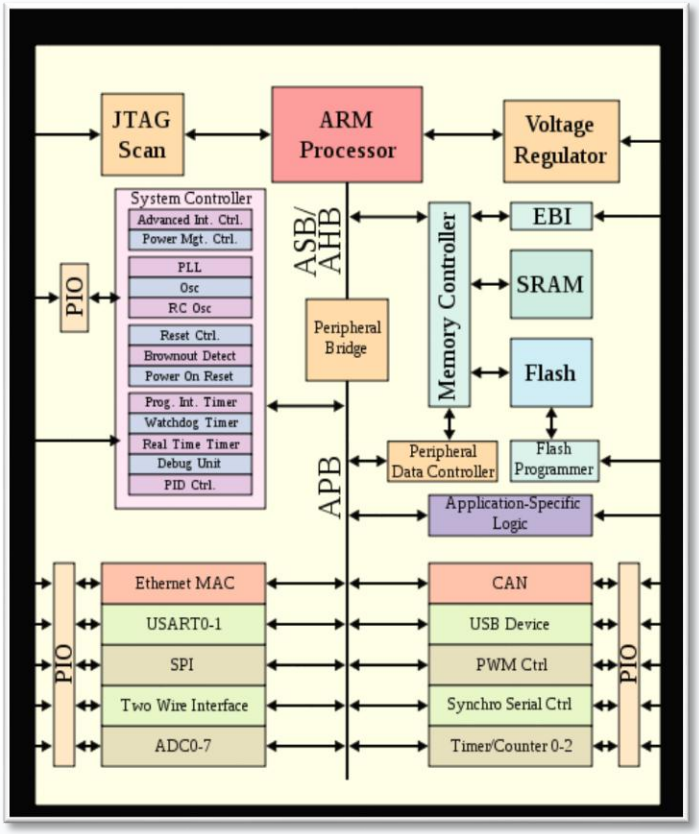


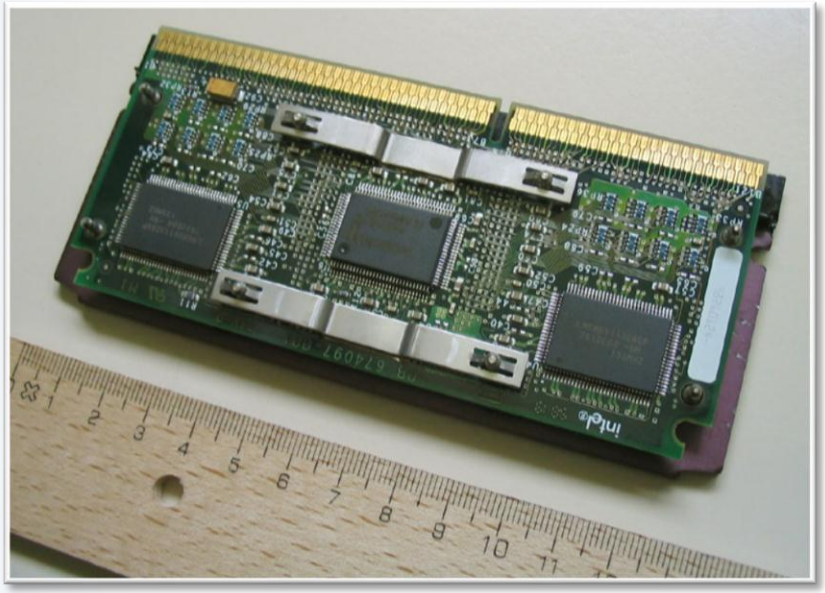
ARM – System on a Chip





CPU Sockets - SECC

- Single Edge Contact Cartridge
- Intel Pentium II



CPU Sockets – PGA

- Pin Grid Array
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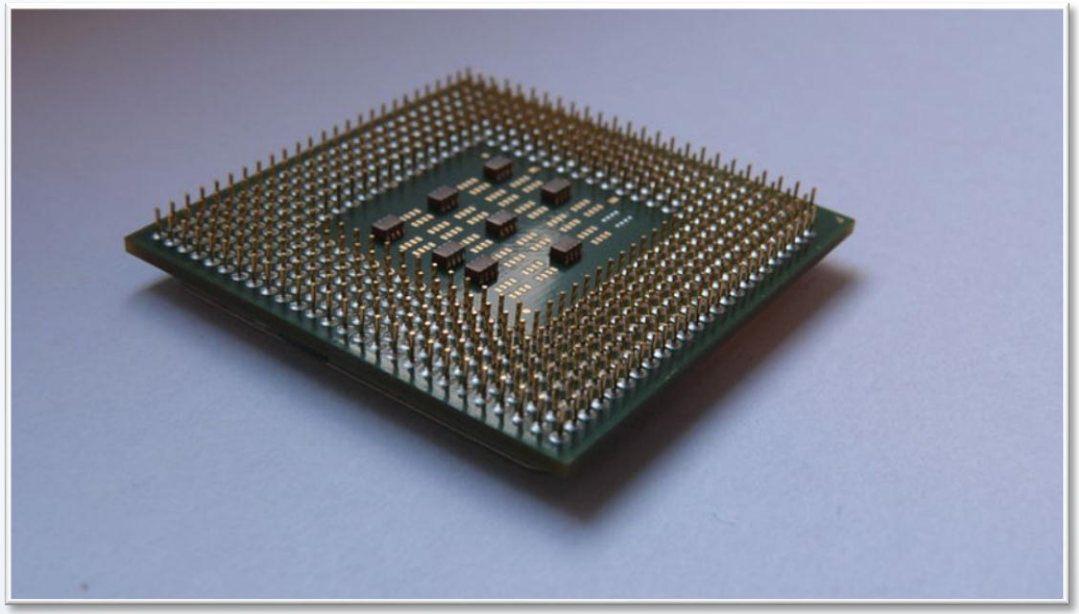
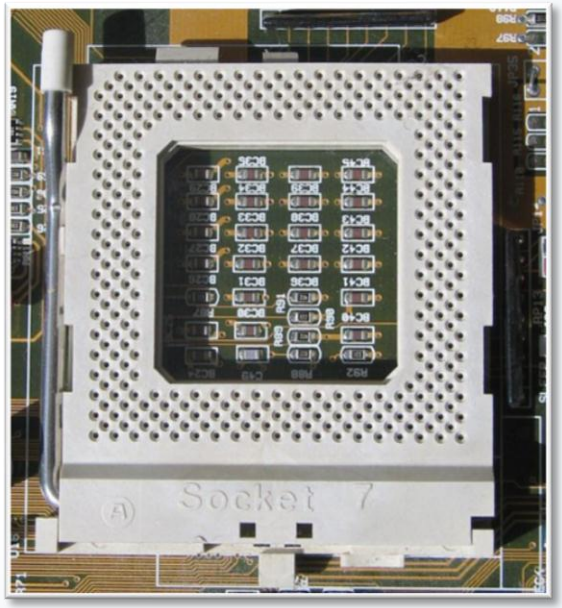
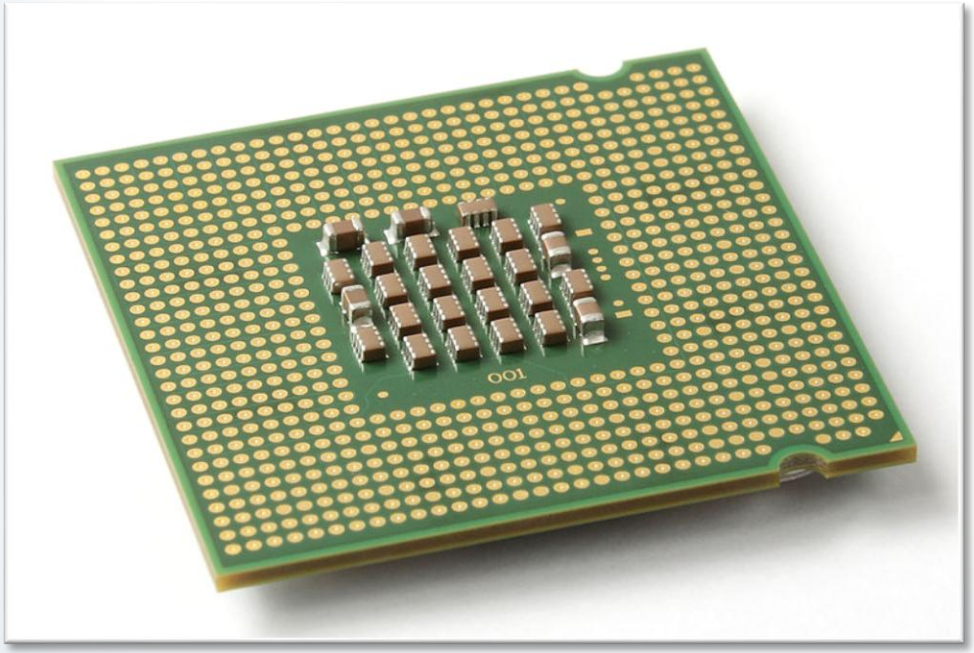
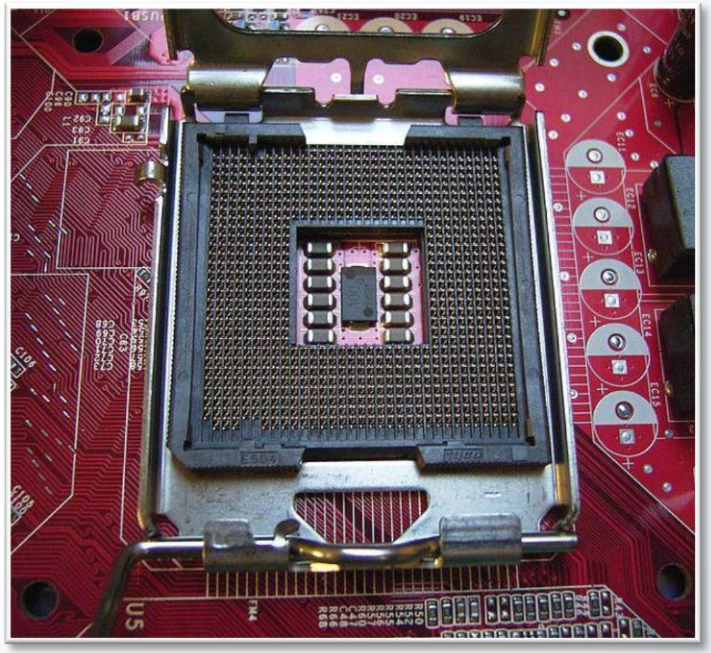




CPU Sockets – LGA

- Land Grid Array
- Intel P4, Xeon, Core, Core 2, Sandy Bridge
- AMD Opteron





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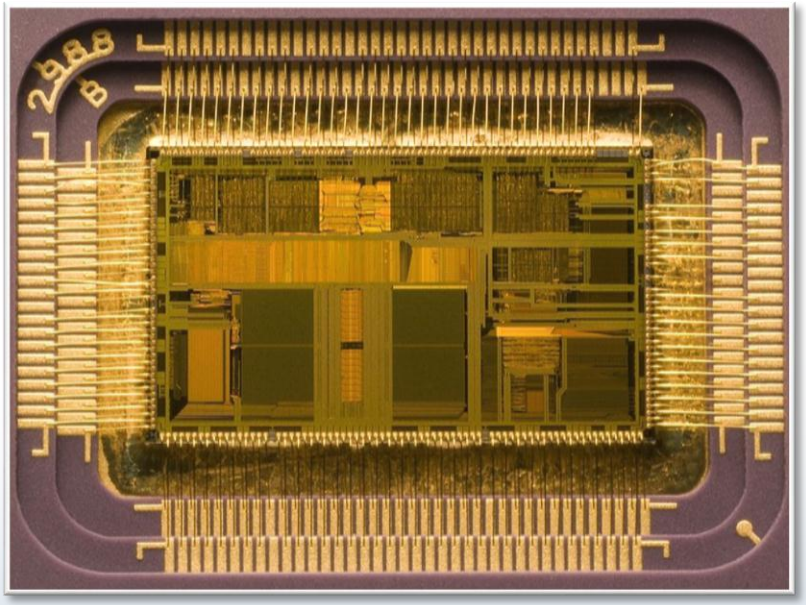

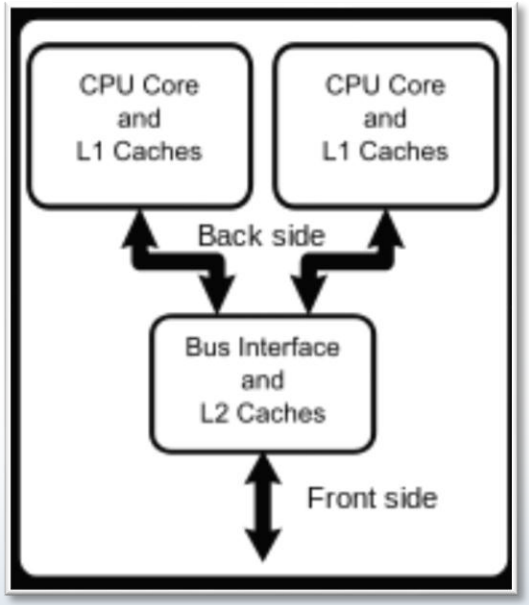

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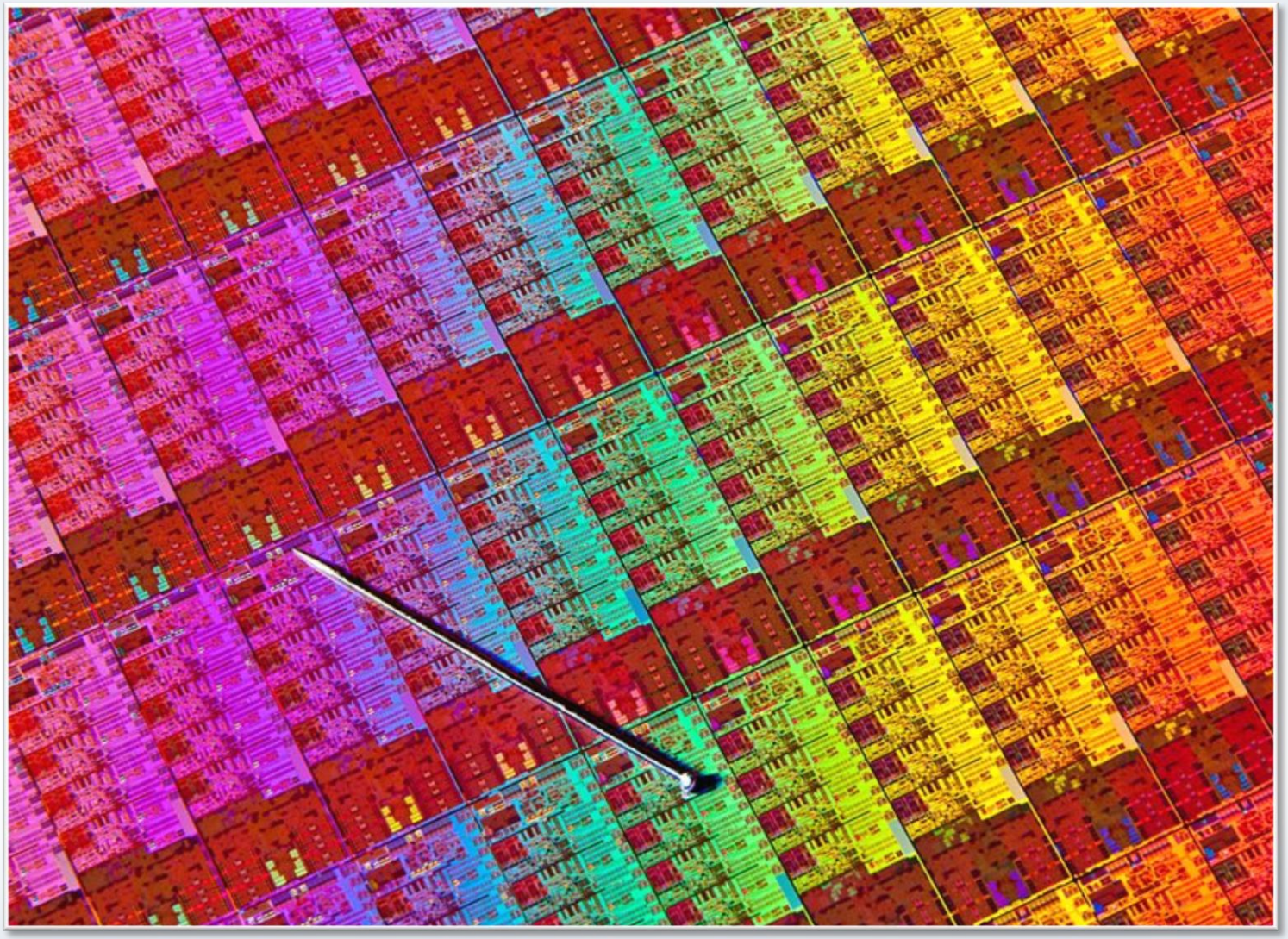
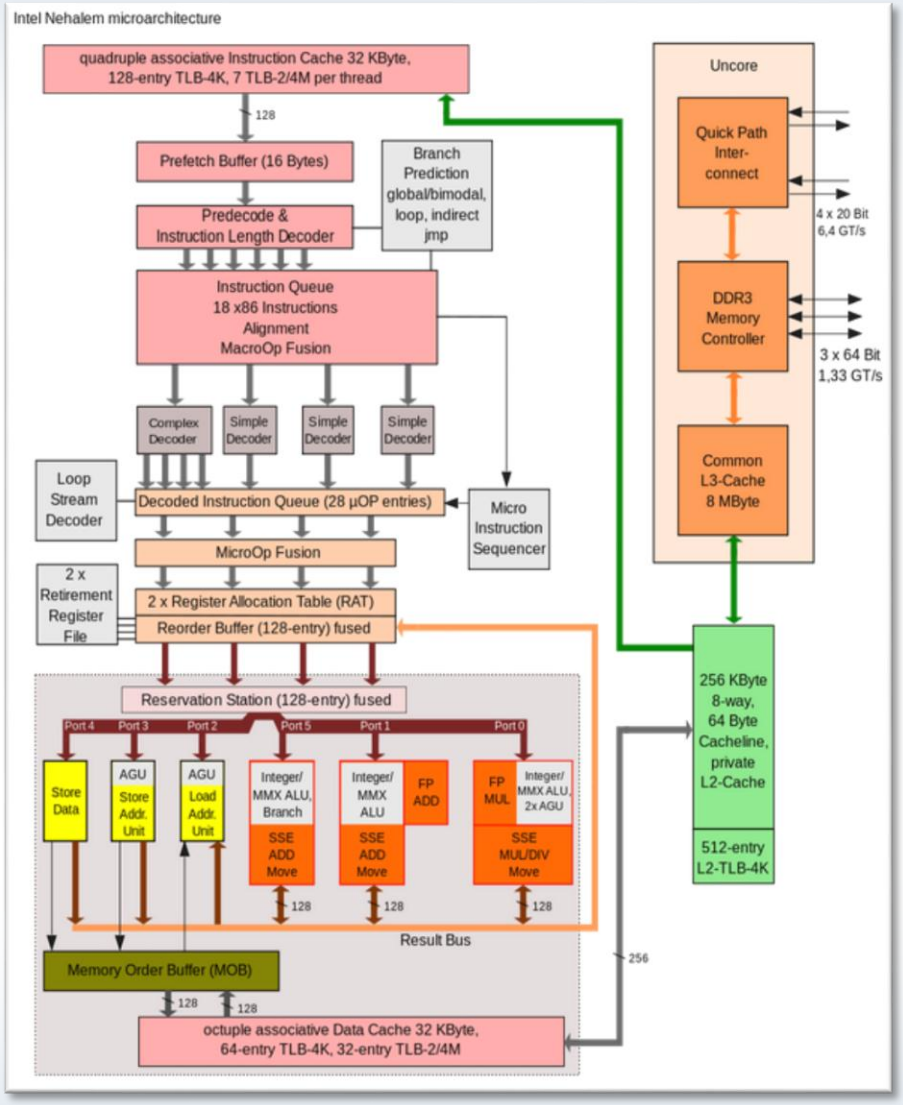


Central Processing Unit Features



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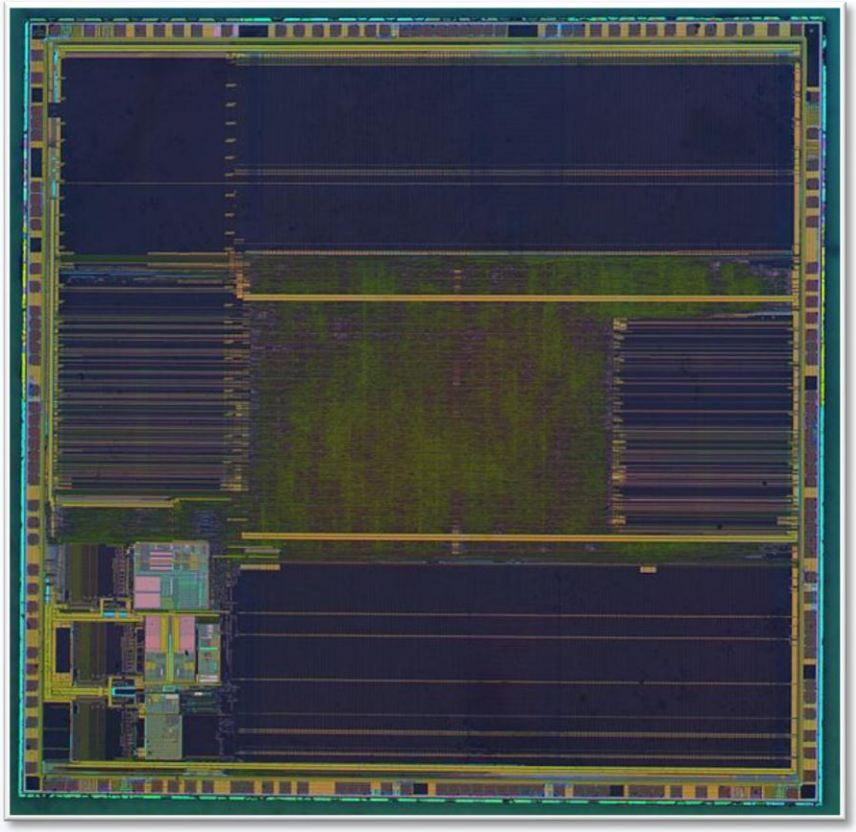

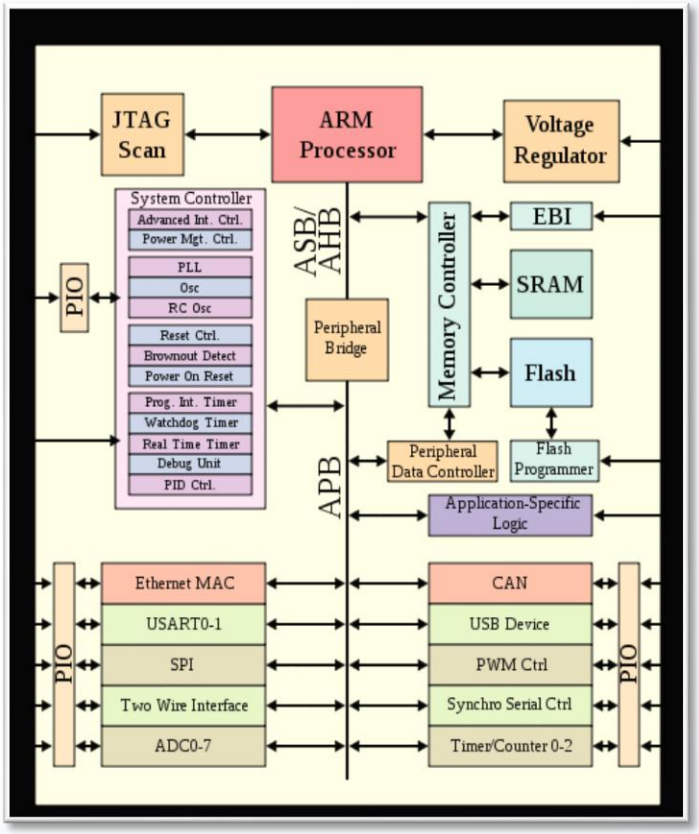

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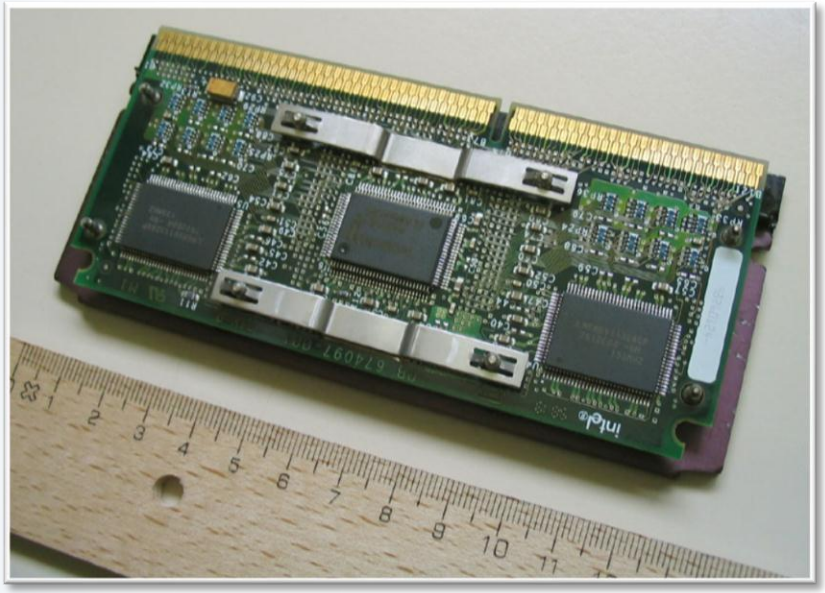

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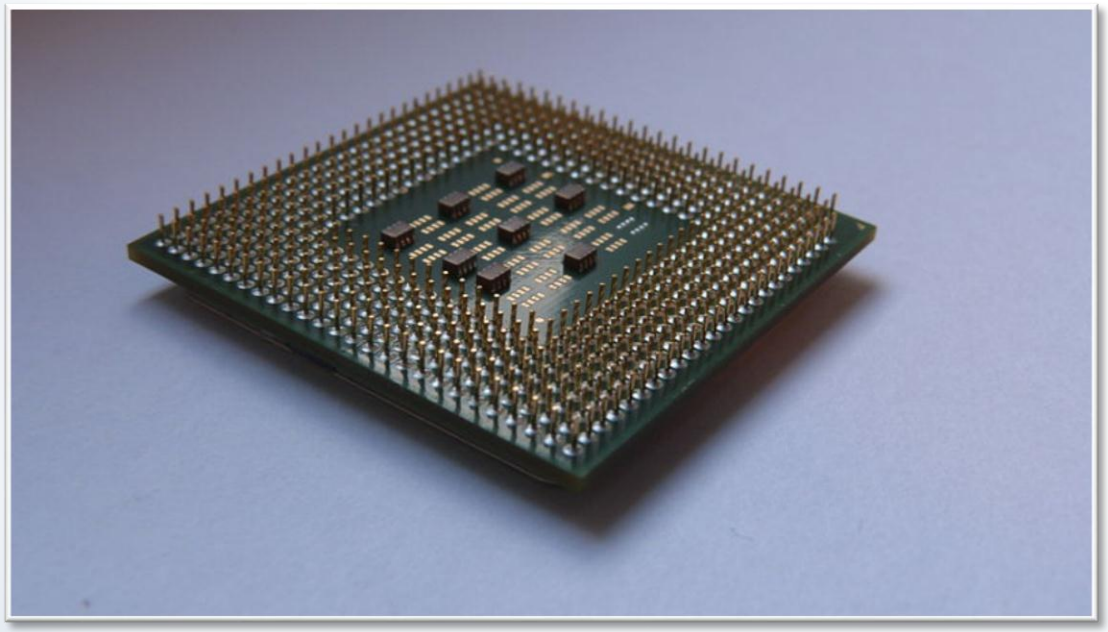

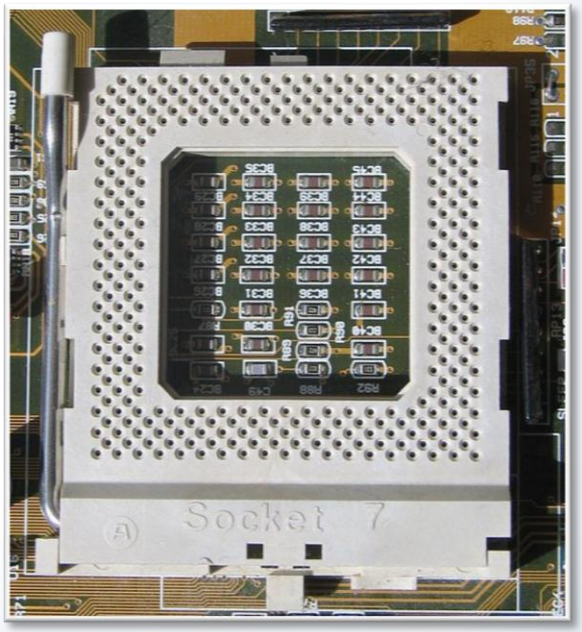

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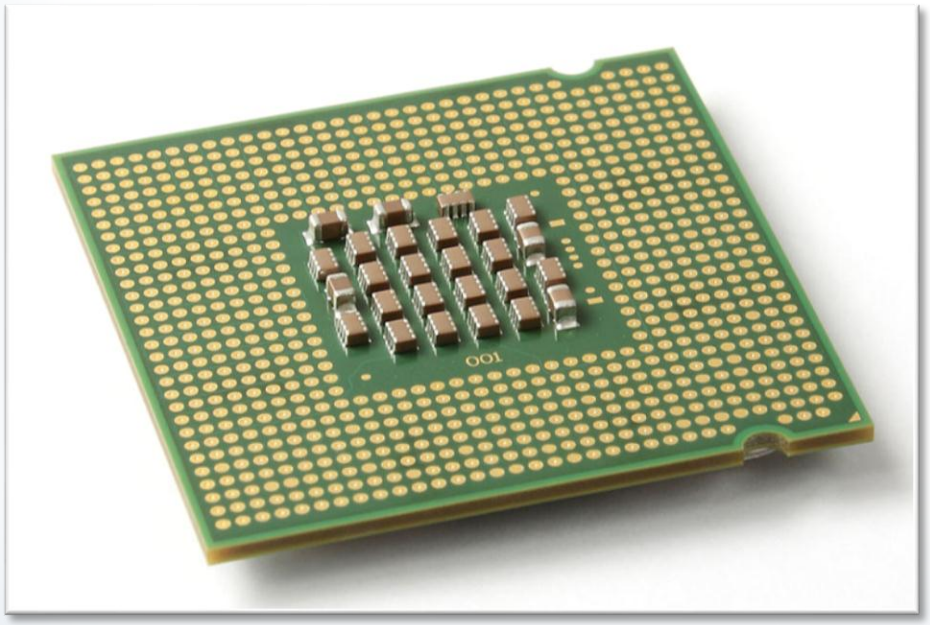
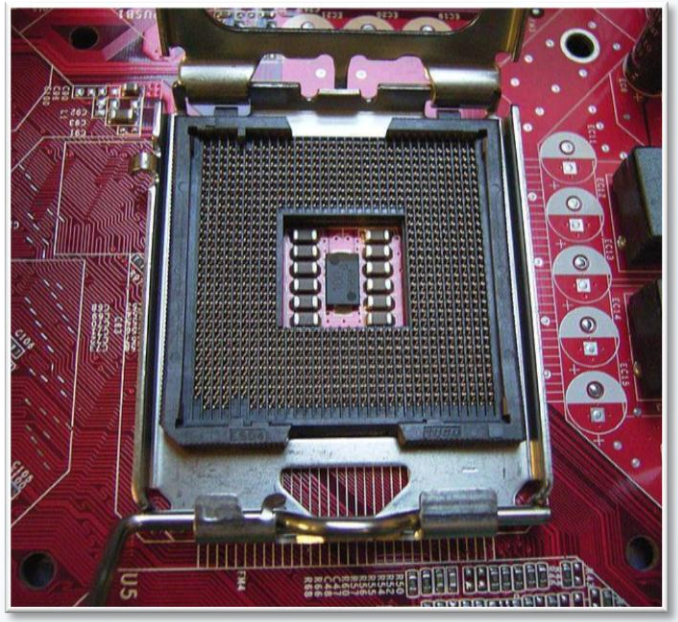
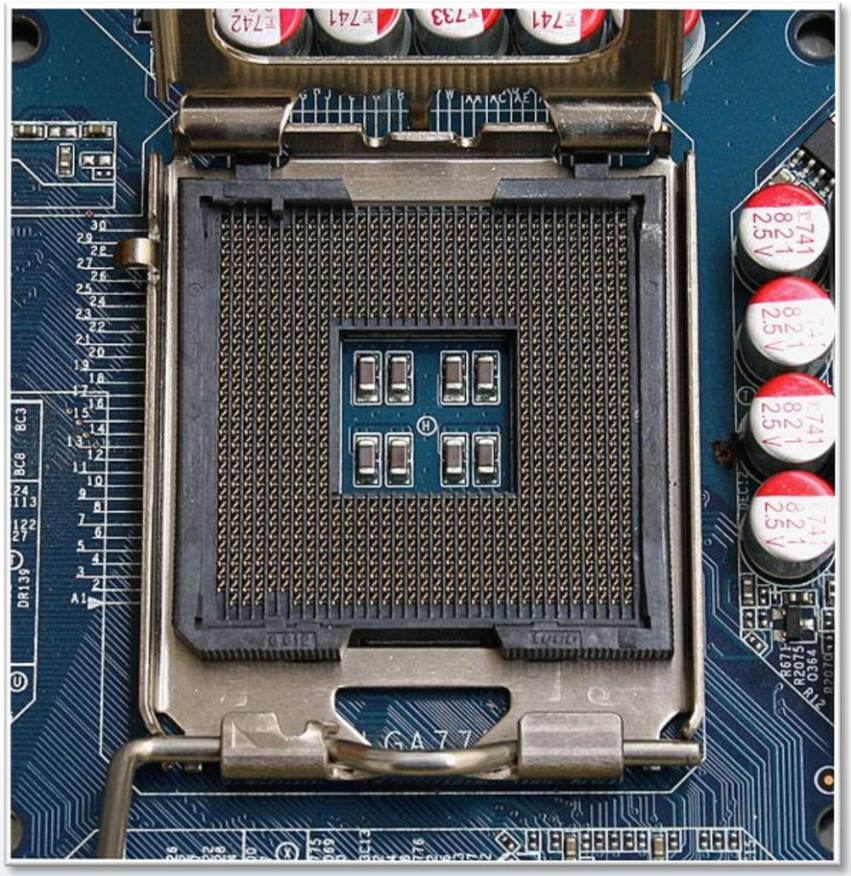




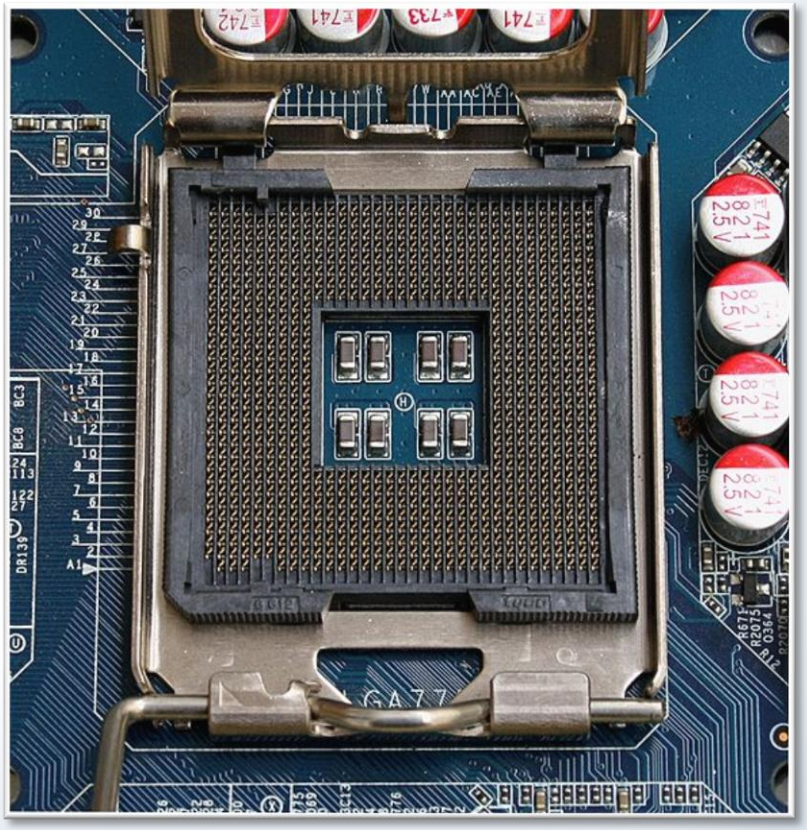
Intel CPU Sockets

- Intel: LGA, 775, 1155, 1156, 1366
- List of 80x86 sockets and slots



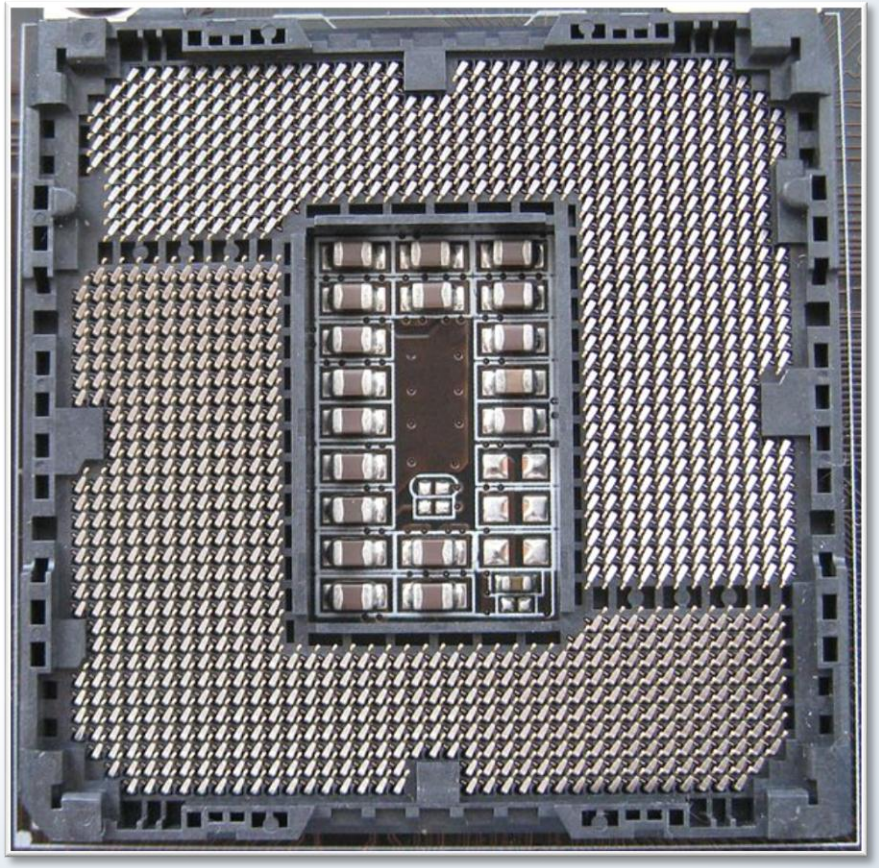
Intel CPU Socket – LGA 775

- Socket T
- 775 pins
- Pentium 4/D/Extreme, Celeron, Celeron D, Core 2 Duo, Core 2 Quad, Xeon
- Consumer desktops
- List of 80x86 sockets and slots



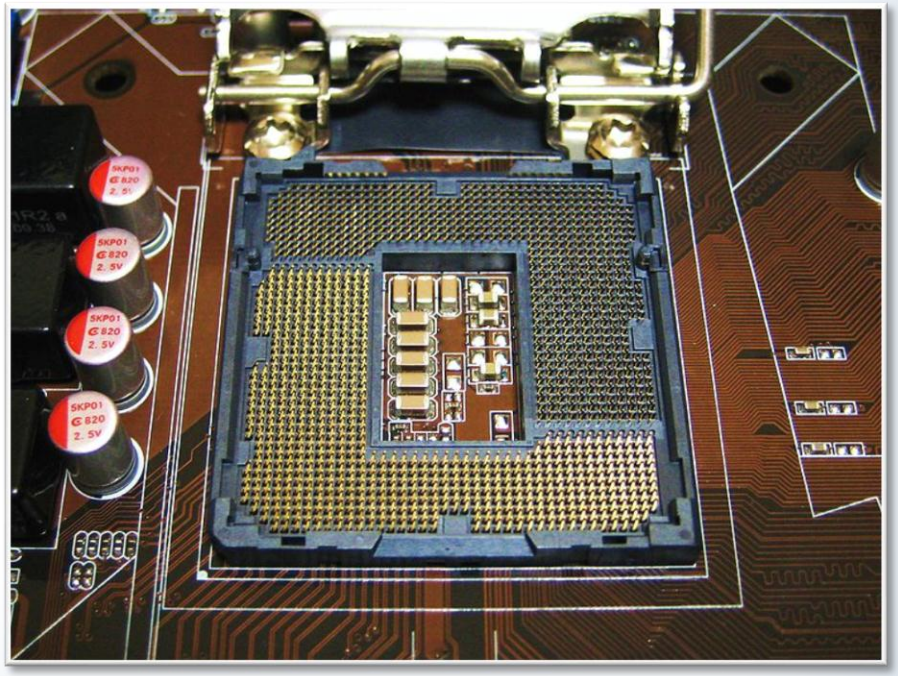
Intel CPU Socket – LGA 1155

- Socket H2
- 1155 pins
- Intel Sandy and Ivy Bridge
- Consumer desktop
- List of 80x86 sockets and slots



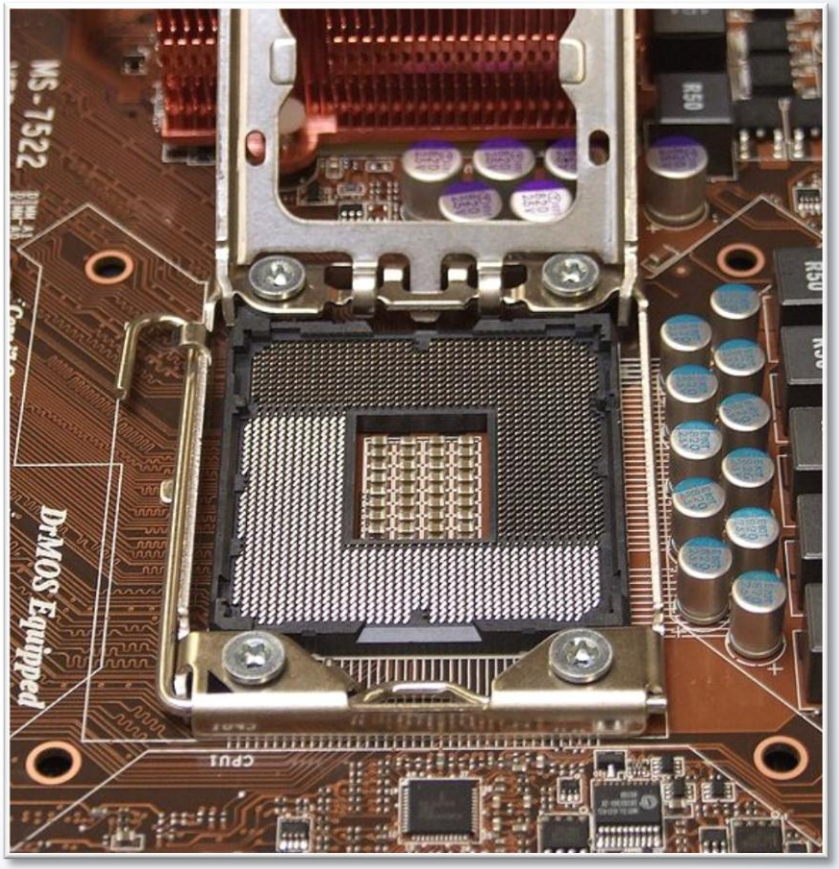
Intel CPU Socket – LGA 1156

- Socket H
- 1156 pins
- Intel Core i3/i5/i7, Xeon, Pentium, Celeron
- Consumer desktops
- Replaces LGA 1155
- List of 80x86 sockets and slots



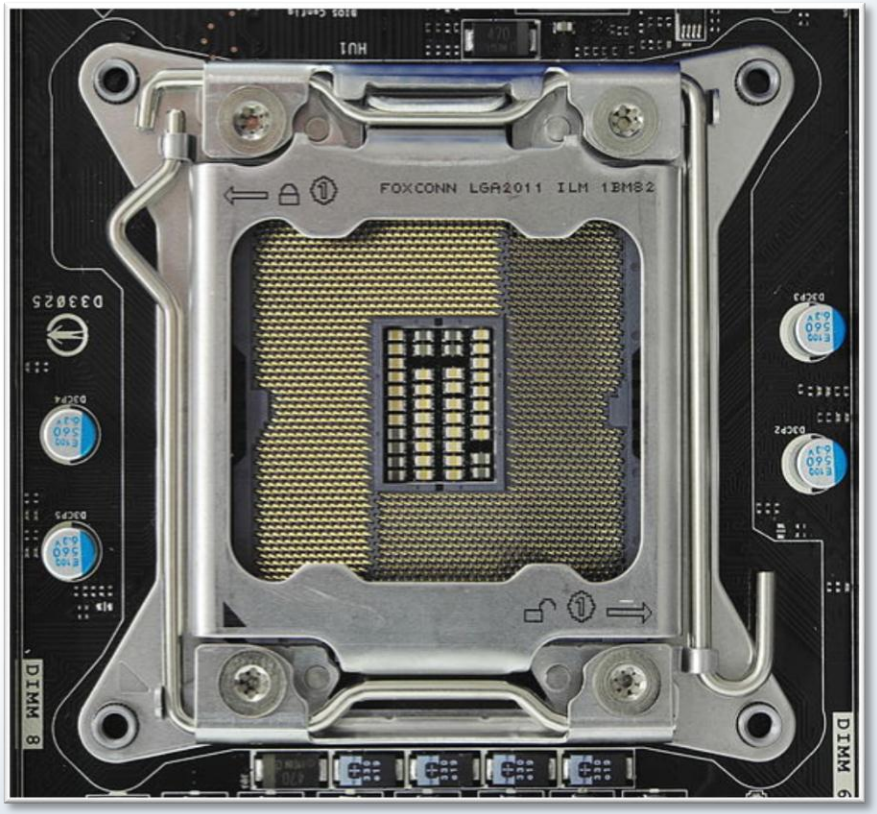
Intel CPU Socket – LGA 1366

- Socket B
- 1366 pins
- Intel X58/Xeon/Core i7
- High performance desktop
- List of 80x86 sockets and slots

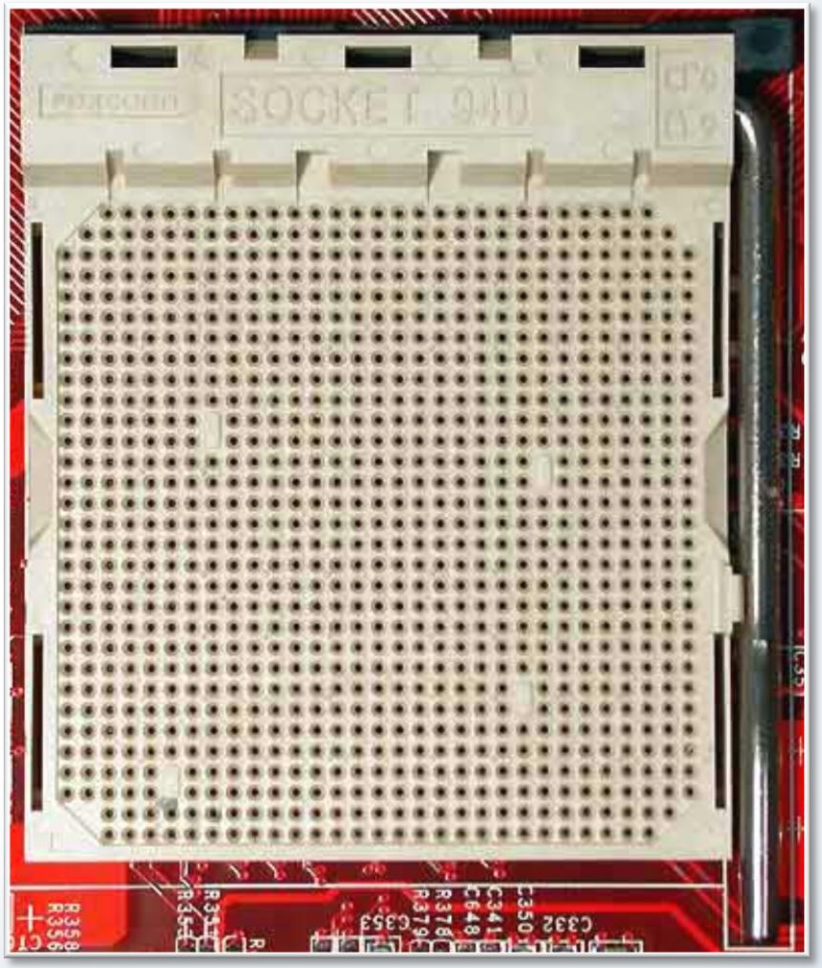


Intel CPU Socket – LGA 2011

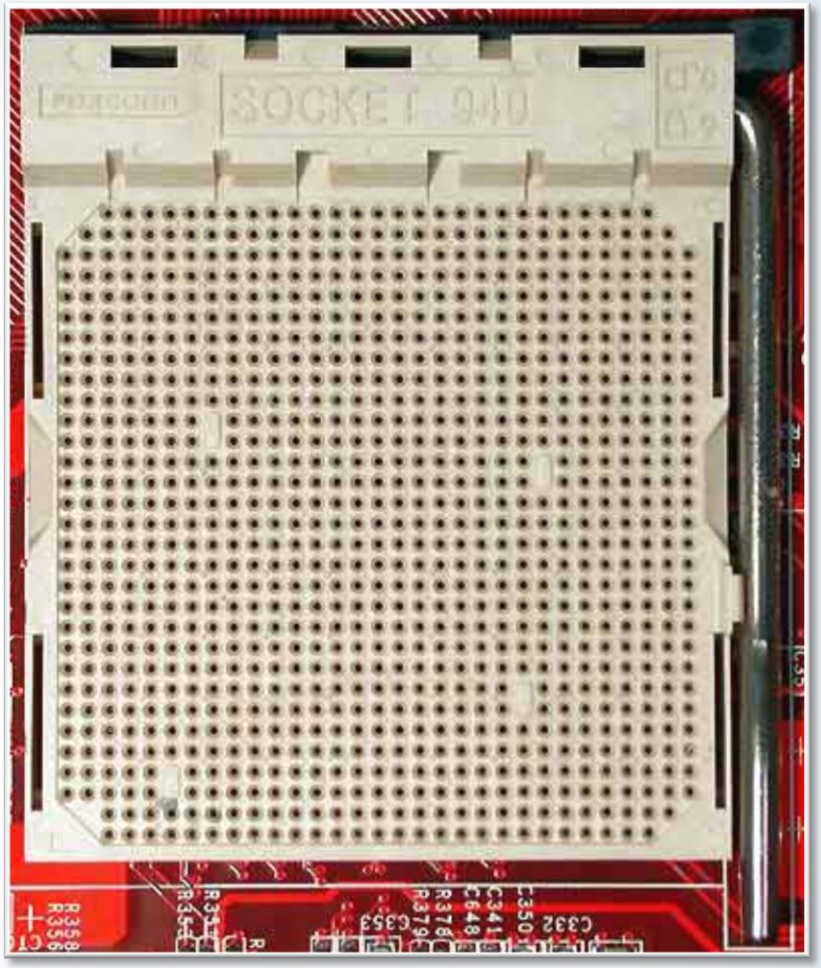
- Socket R
- 2011 pins
- Intel Sandy-E, Ivy Bridge-E
- High performance desktop and servers
- List of 80x86 sockets and slots



- AMD: 940, AM2, AM2+, AM3, AM3+, FM1, F
- List of 80x86 sockets and slots

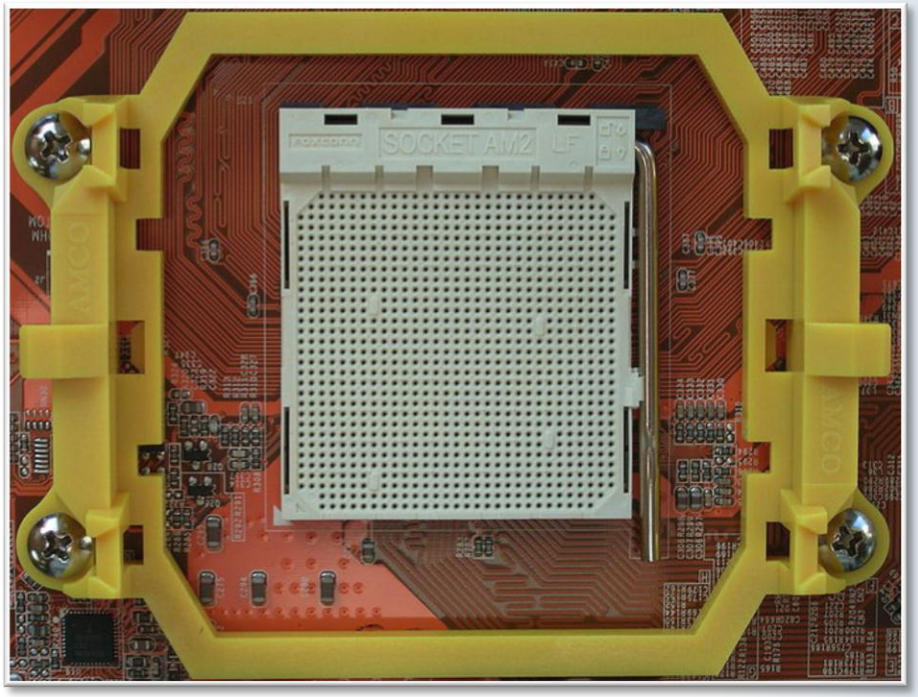


- Socket 940
- PGA 940 pins
- AMD Opteron, Athlon 64 X
- Used in 64-bit servers
- List of 80x86 sockets and slots

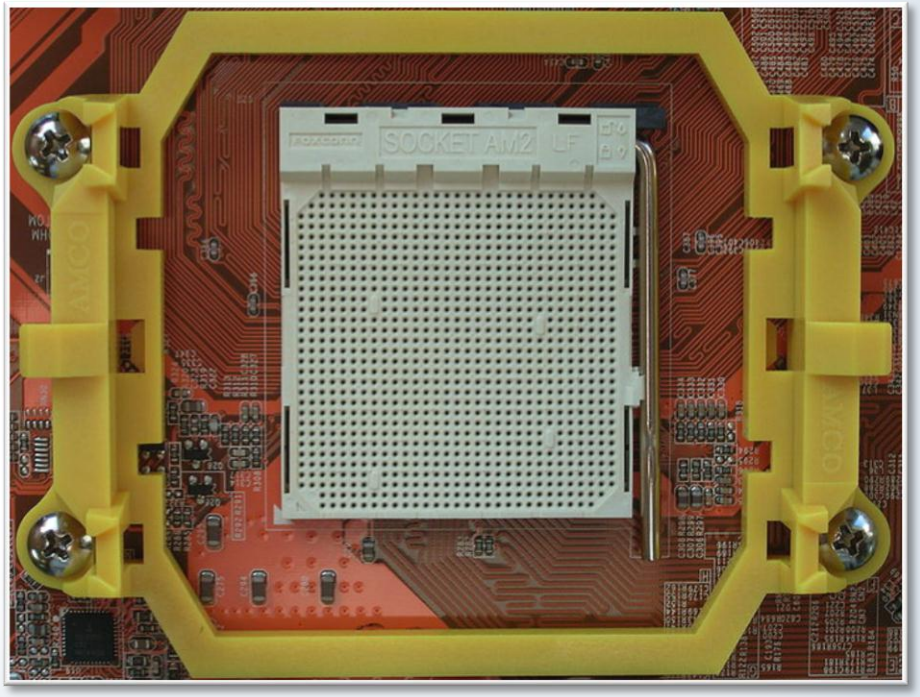


AMD CPU Socket - AM2

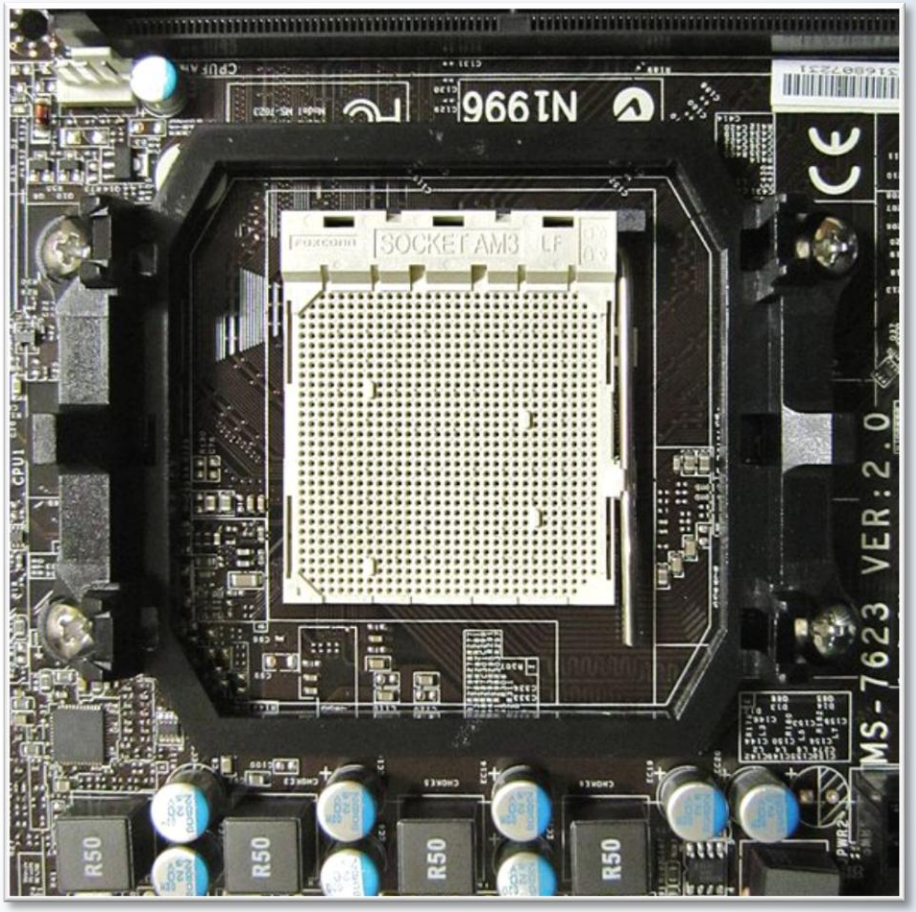
- Socket AM2
- PGA 940 pins
- DDR2
- AMD Athlon 64, Athlon 64 X2
- List of 80x86 sockets and slots



- Socket AM2+
- PGA 940 pins
- DDR2
- AMD Athlon 64, Athlon 64 X2, Phenom, Phenom II
- Replace AM2
- List of 80x86 sockets and slots

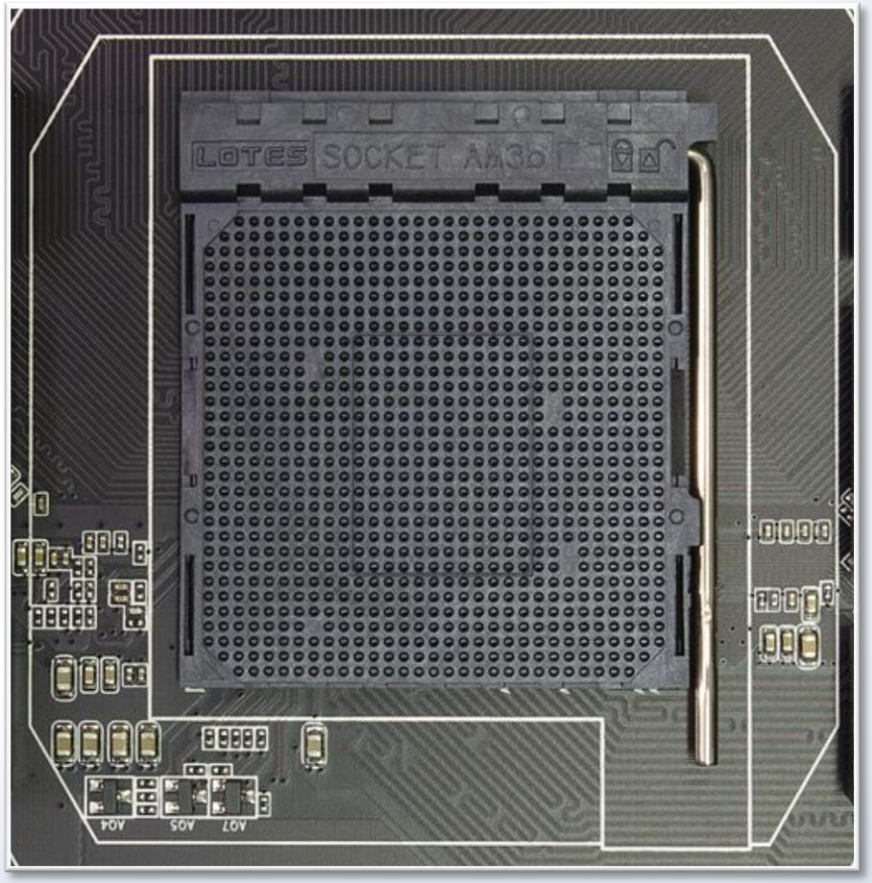


- Socket AM3
- PGA 941 pins
- AMD Athlon II, Sempron
- Replaced AM2, AM2+
- List of 80x86 sockets and slots

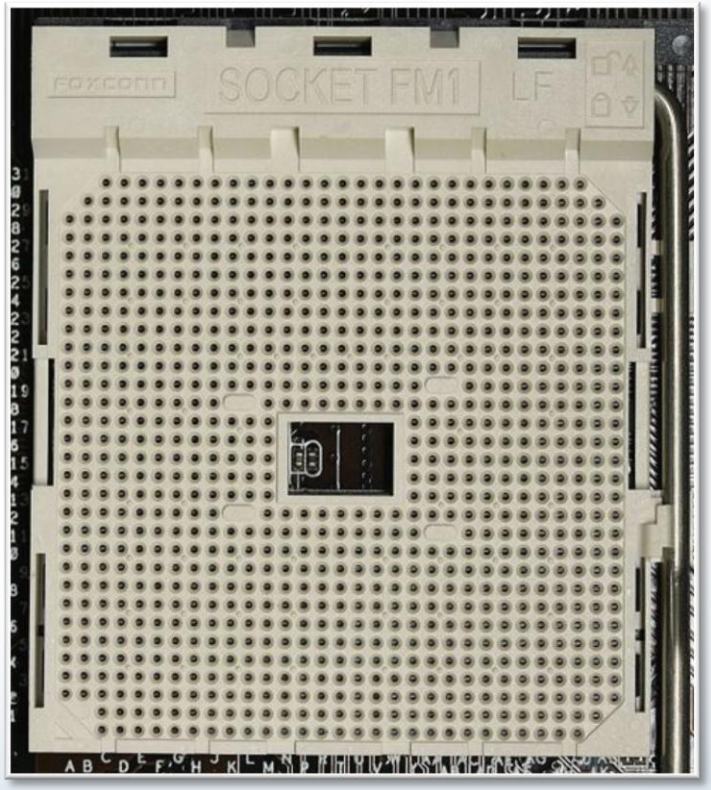


AMD CPU Socket - AM3+

- Socket AM3+
- PGA 942 pins
- AMD FX Vishera, FX Zambezi, Phenom II, Athlon II, Sempron
- Replaced AM3
- List of 80x86 sockets and slots

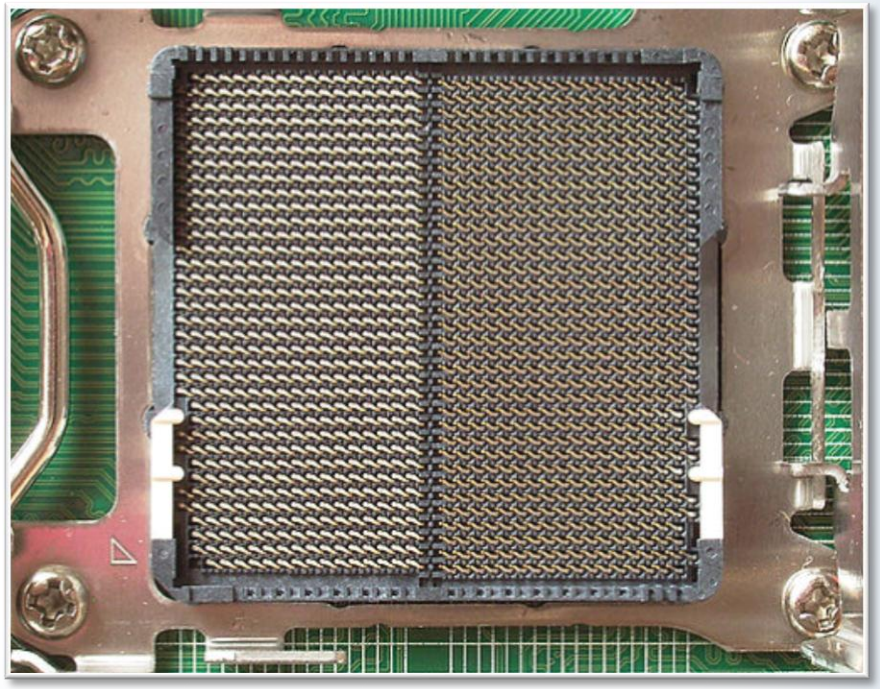


- Socket FM1
- PGA 905 pins
- AMD Liano
- 1st generation APU Accelerated Processing Unit (System on a Chip)
- List of 80x86 sockets and slots

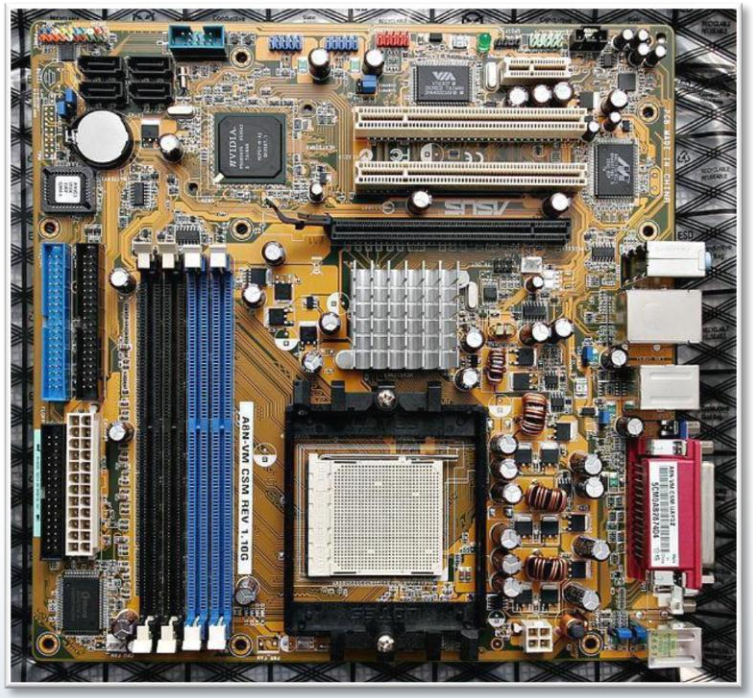


AMD CPU Socket - F

- Socket F
- LGA 1207 pins
- AMD Athlon 64 FX, Opteron
- Older
- List of 80x86 sockets and slots



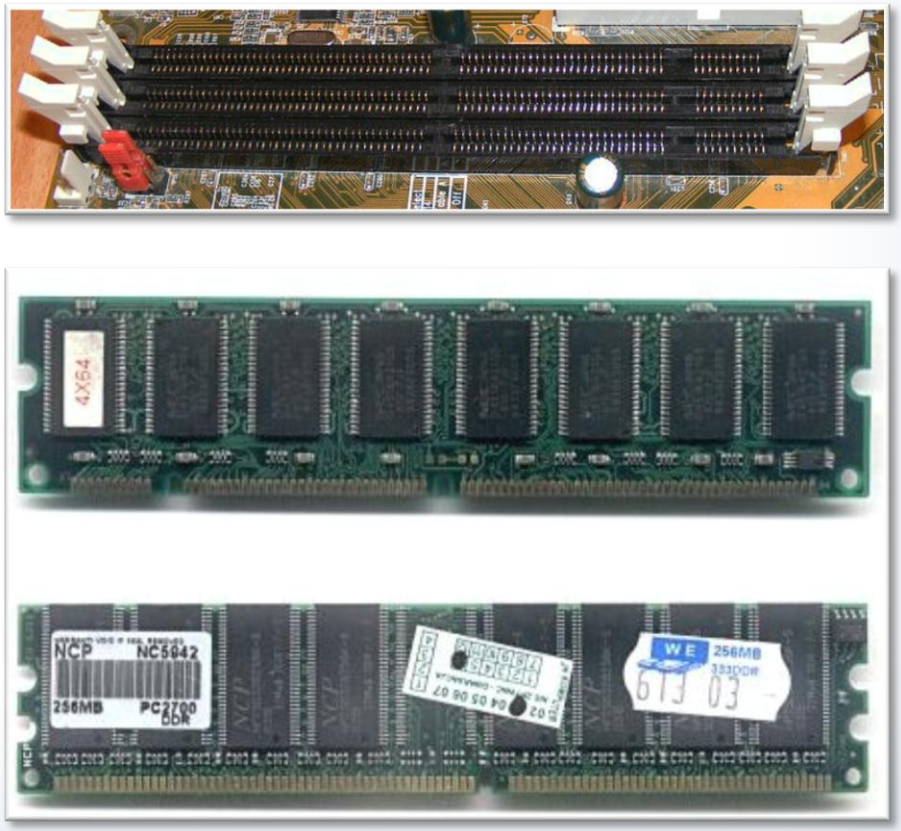
- Ensure motherboard/CPU compatibility
- Power off and unplug everything, open the system case, ground yourself
- Unhook clips for heatsink/cooling equipment
- ZIF lever up, old CPU straight out, new CPU straight in, no force, ZIF lever down



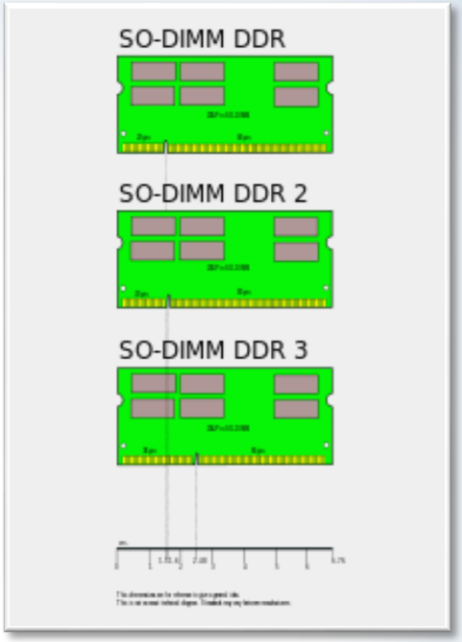
- Apply thermal conductive paste – as thin as possible while covering the entire surface area of CPU and heat sink
- Plug in fan and power connectors
- Replace the case and power cord
- Power on and test

- Single In-line Memory Module
- Same connector on both sides
- 30 or 72 pin
- 32bit data path

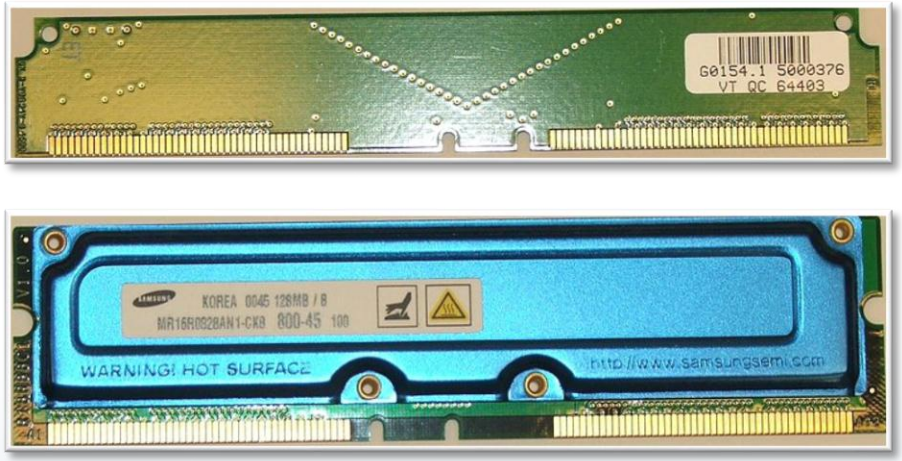
- Dual In-Line Memory Module
- SDRAM 168 pin,DDR 184 pin,DDR2/3 240 pin
- 64 bit data path



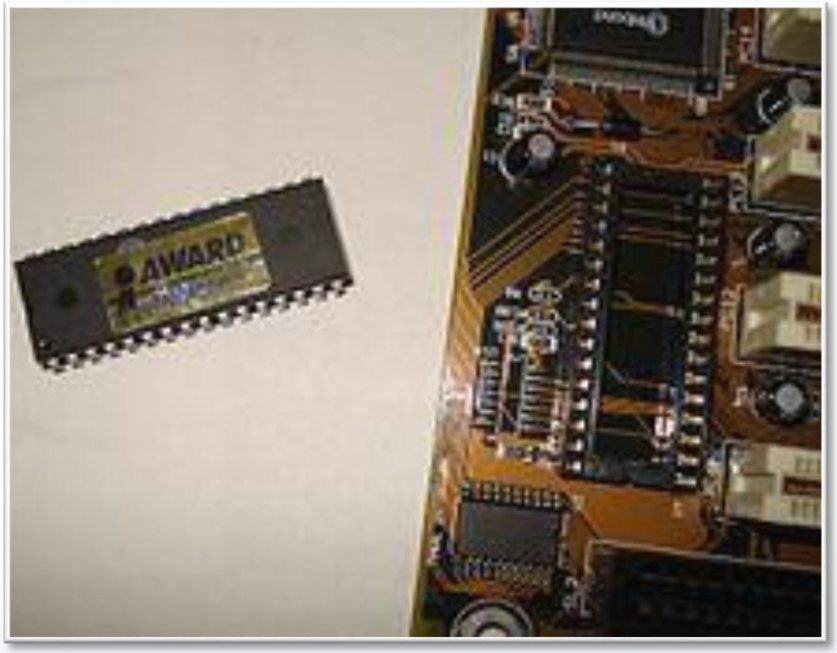
- Small Outline - Dual In-Line Memory Module
- 72, 100, 144, 200, 204 pin
- Laptops and mobile devices



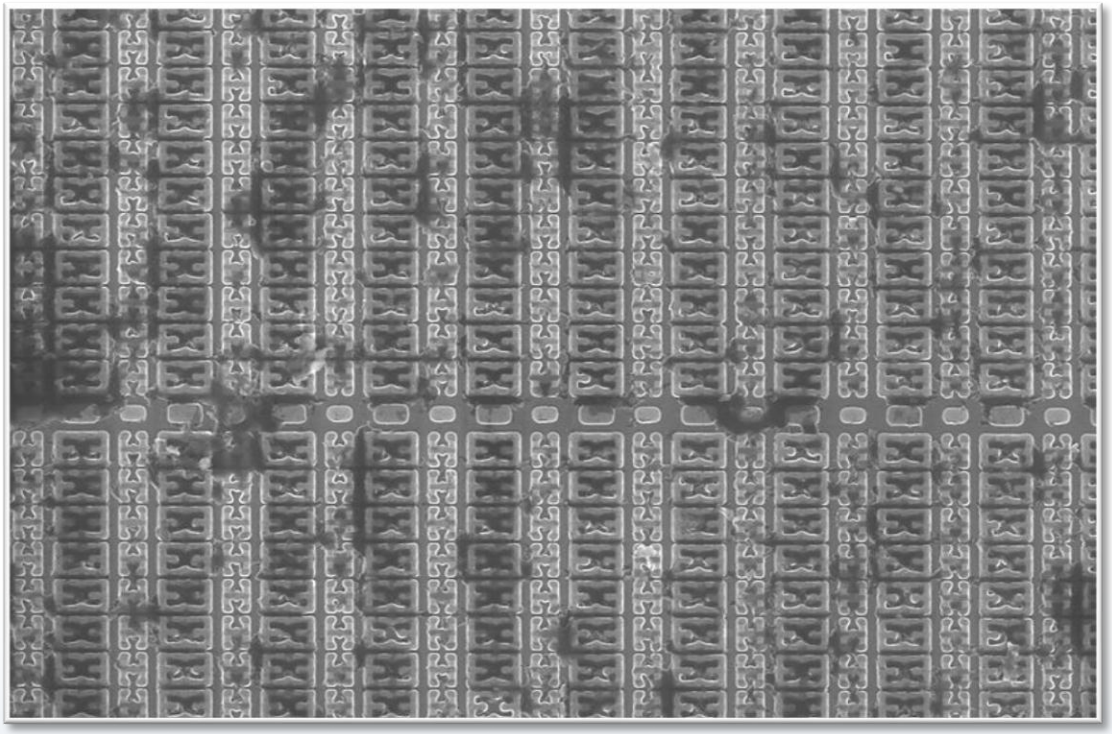
- AKA RIMM
- 16bit - 184 pins, 32bit – 232 pins
- PC600 to RIMM 6400
- 1066 MB/s to 6400 MB/s
- Costly license fees
- Every memory slot must be filled and 32bit requires a CT-RIMM



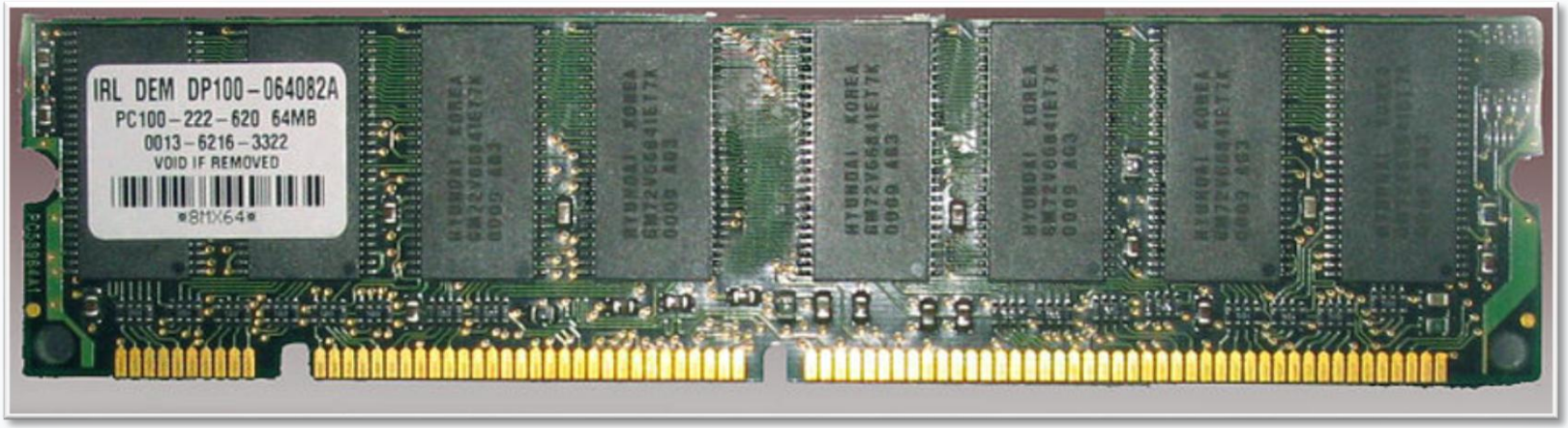
- Read Only Memory
- PROM – Programmable Read Only Memory
- EPROM – Erasable Programmable Read Only Memory



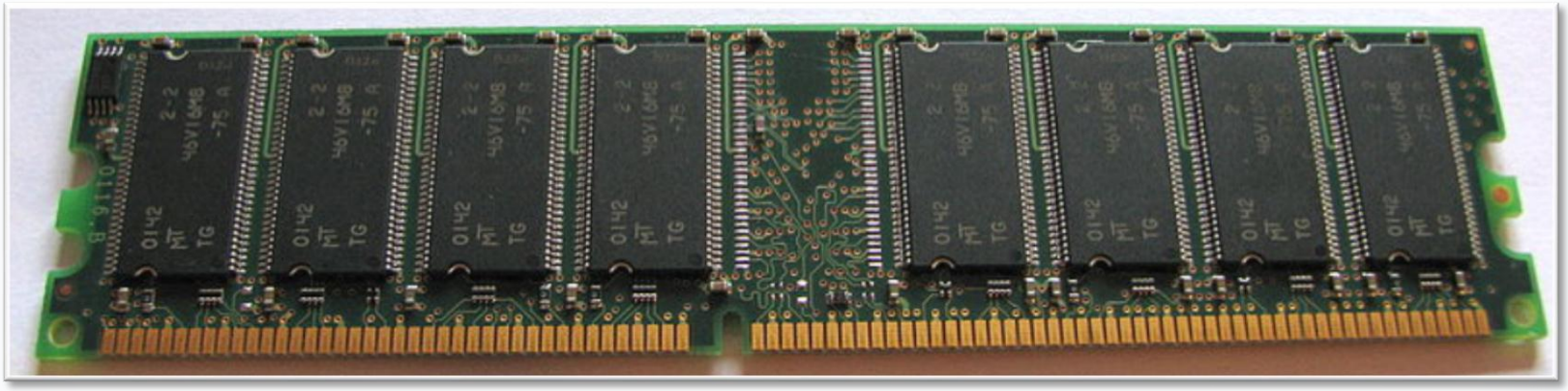
- Static Random Access Memory
- Very fast, expensive
- Used in L1, L2, L3



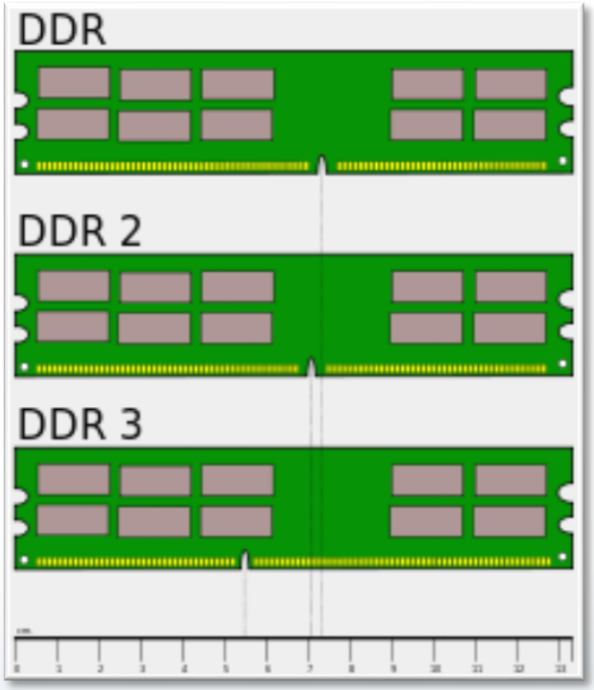
- Synchronous Dynamic Random Access Memory
- Syncs with the clock system
- PC133 = 133 Mhz clock



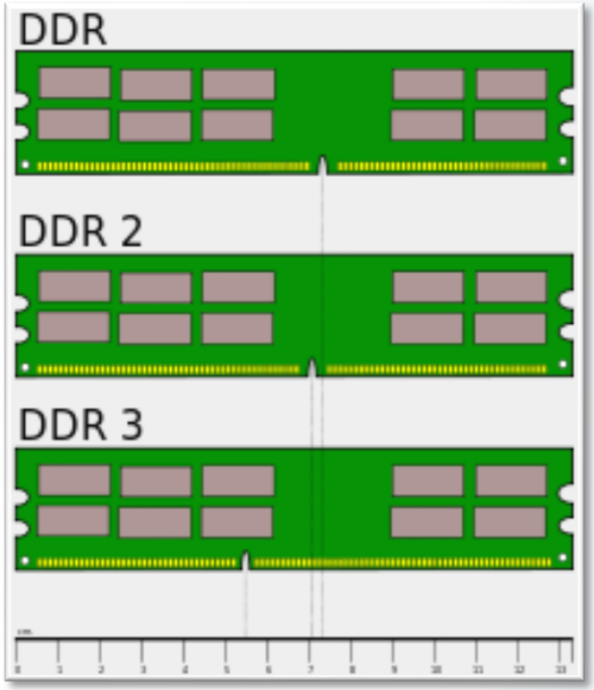
- Dual Data Rate Synchronous Dynamic Random Access Memory
- Double the clock system
- Speed: PC1600 = 1600 MB/s to PC3200 = 3200 MB/s



- Dual Data Rate Synchronous Dynamic Random Access Memory
- 4x the clock system
- Speed: PC2-3200 = 3200 MB/s to PC2-8500 8500 MB/s



- Dual Data Rate Synchronous Dynamic Random Access Memory
- 8x the clock system



Parity Memory

- Adds extra bit to a byte (9 vs 8 bits for every byte)
- Allows detection of memory errors
- More expensive, slower than non-parity memory

- Error Correcting Code Memory
- Automatically corrects errors
- Avoids memory corruption
- Used in database servers
- More expensive and slower than non-ECC memory

THANK YOU