HARDWARE FUNDAMENTALS AND INSTALLATION 1
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• 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
• 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
Power Supply – Installation

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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
• 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.
- 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
- Set top box
- PVRs
- Media center
Motherboards – Pico - ITX

- Smaller than Nano-ITX
- Uses less energy
- Embedded
- Mobile devices
• Short length conductor that allows configuration of computer hardware
• 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
Central Processing Unit Features

- **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
Central Processing Unit Features

- 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
ARM – System on a Chip
• Single Edge Contact Cartridge
• Intel Pentium II
CPU Sockets – PGA

- Pin Grid Array
- Many Intel, AMD, and VIA chips
- Use ZIF (Zero Insertion Force)
CPU Sockets – LGA

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

• Intel: LGA, 775, 1155, 1156, 1366
• **List of 80x86 sockets and slots**
• 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
• Socket H
• 1156 pins
• Intel Core i3/i5/i7, Xeon, Pentium, Celeron
• Consumer desktops
• Replaces LGA 1155
• [List of 80x86 sockets and slots](#)
• Socket B
• 1366 pins
• Intel X58/Xeon/Core i7
• High performance desktop
• List of 80x86 sockets and slots
• Socket R
• 2011 pins
• Intel Sandy-E, Ivy Bridge-E
• High performance desktop and servers
• [List of 80x86 sockets and slots](#)
AMD CPU Sockets

- 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](#)
• 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
• [link]List of 80x86 sockets and slots
• Socket AM3
• PGA 941 pins
• AMD Athlon II, Sempron
• Replaced AM2, AM2+
• List of 80x86 sockets and slots
• 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
• 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
• 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