UNIT 2: COMPUTER SYSTEMS

Week02
Lesson 01

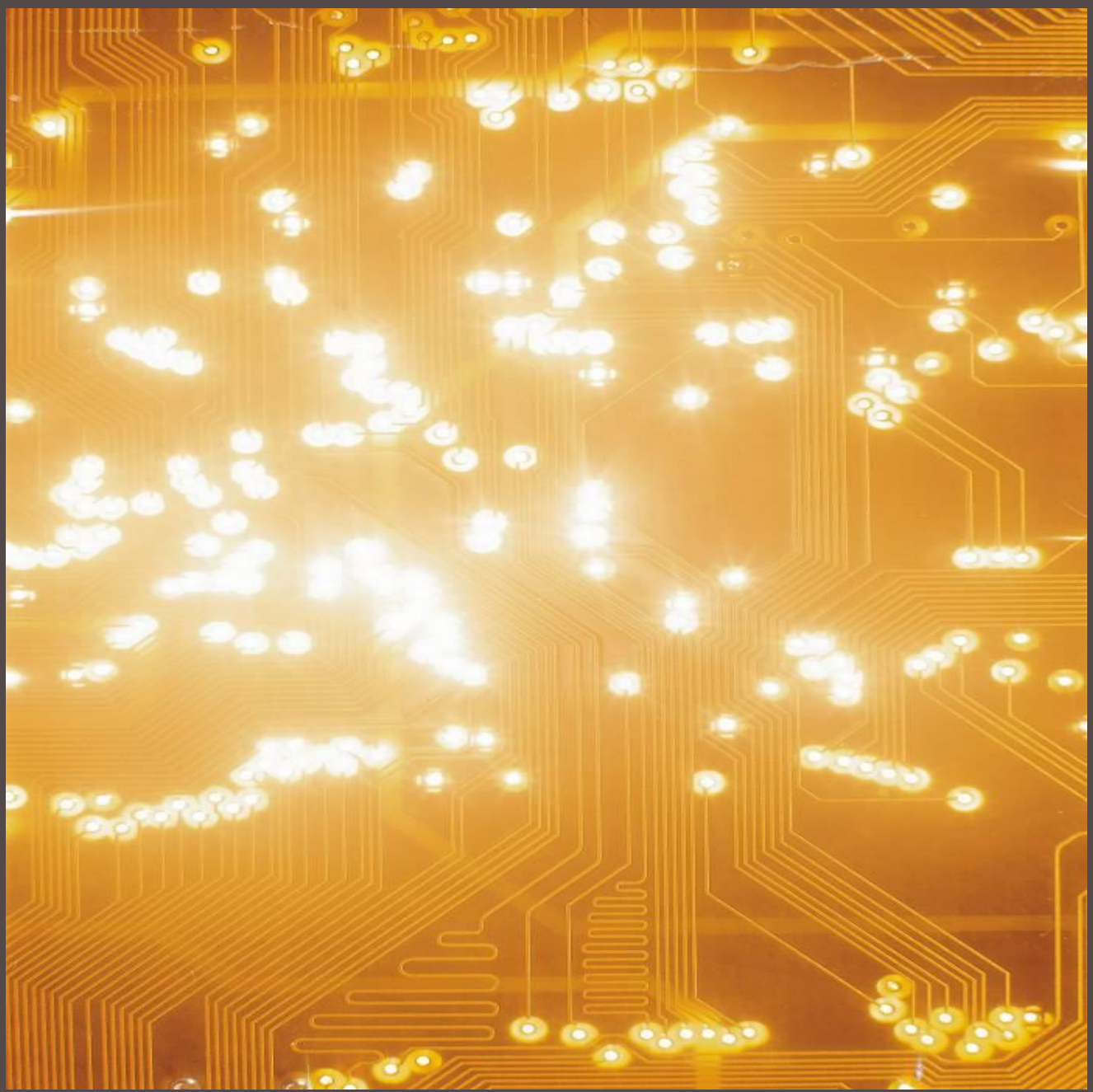
THINK ABOUT IT…

Two Antennas got married - the wedding was lousy, but the reception was outstanding

OBJECTIVES (P1)

- Define computer bridges
- Explain the function of BIOS
- Distinguish among various CMOS setup utility options
- Troubleshoot the power-on self test (POST)
- State the need and operational requirements of a PSU
- Test a PSU for it operational functionality

BIOS AND CMOS

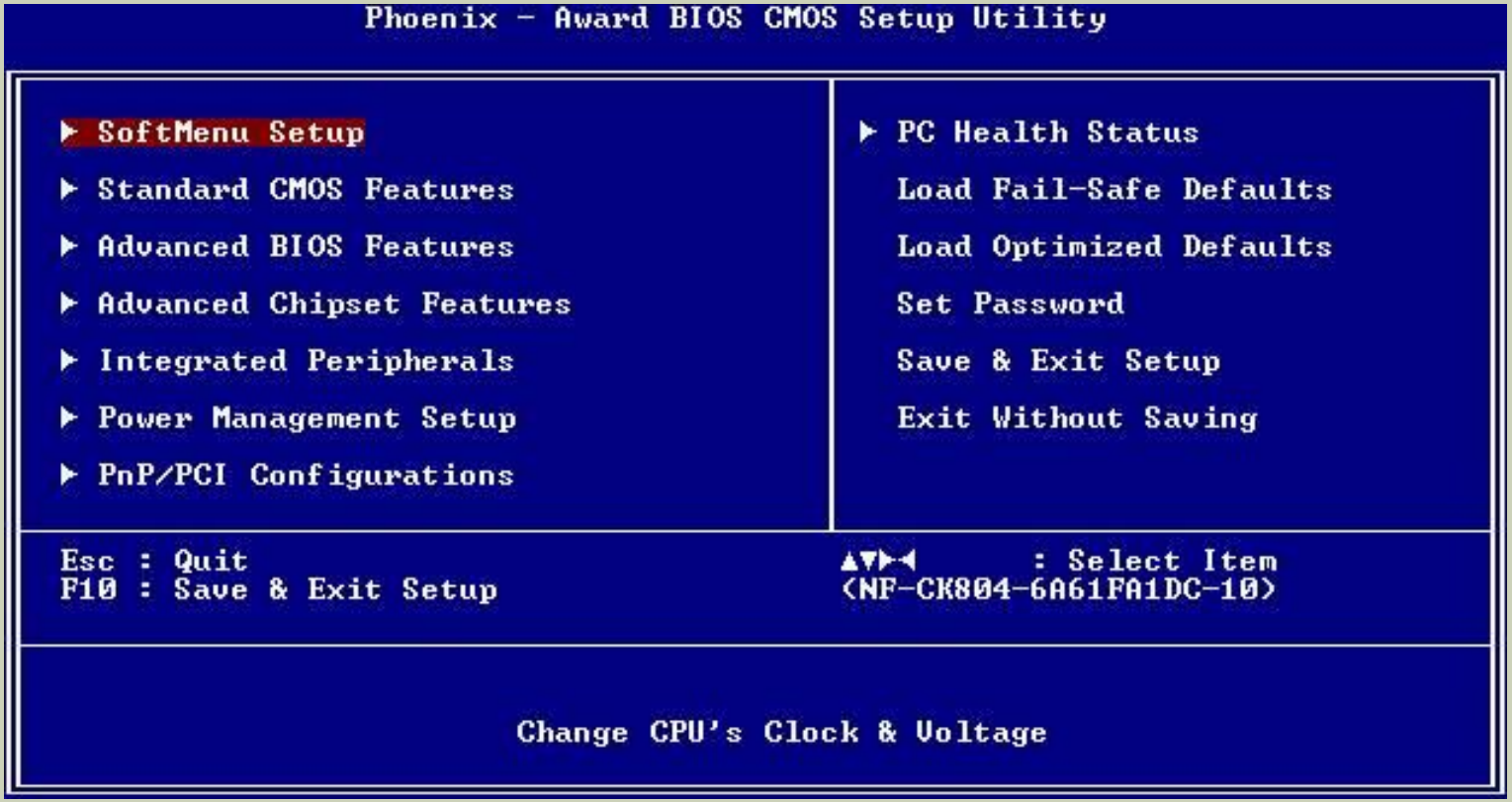


BIOS (BASIC INPUT OUTPUT SYSTEM)

- The **BIOS** contains instructions and setup for how your system should boot and how it operates
- The BIOS has 4 main functions:
  - **POST** - Test computer hardware, ensuring hardware is properly functioning before starting process of loading operating system
  - **Bootstrap Loader** - Process of locating the operating system, once found the BIOS will pass the control to it
  - **BIOS Software and drivers** - interface between the operating system and your hardware
  - **BIOS / CMOS Setup** - Configuration program that allows you to configure hardware settings including system settings such as computer passwords, time, and date

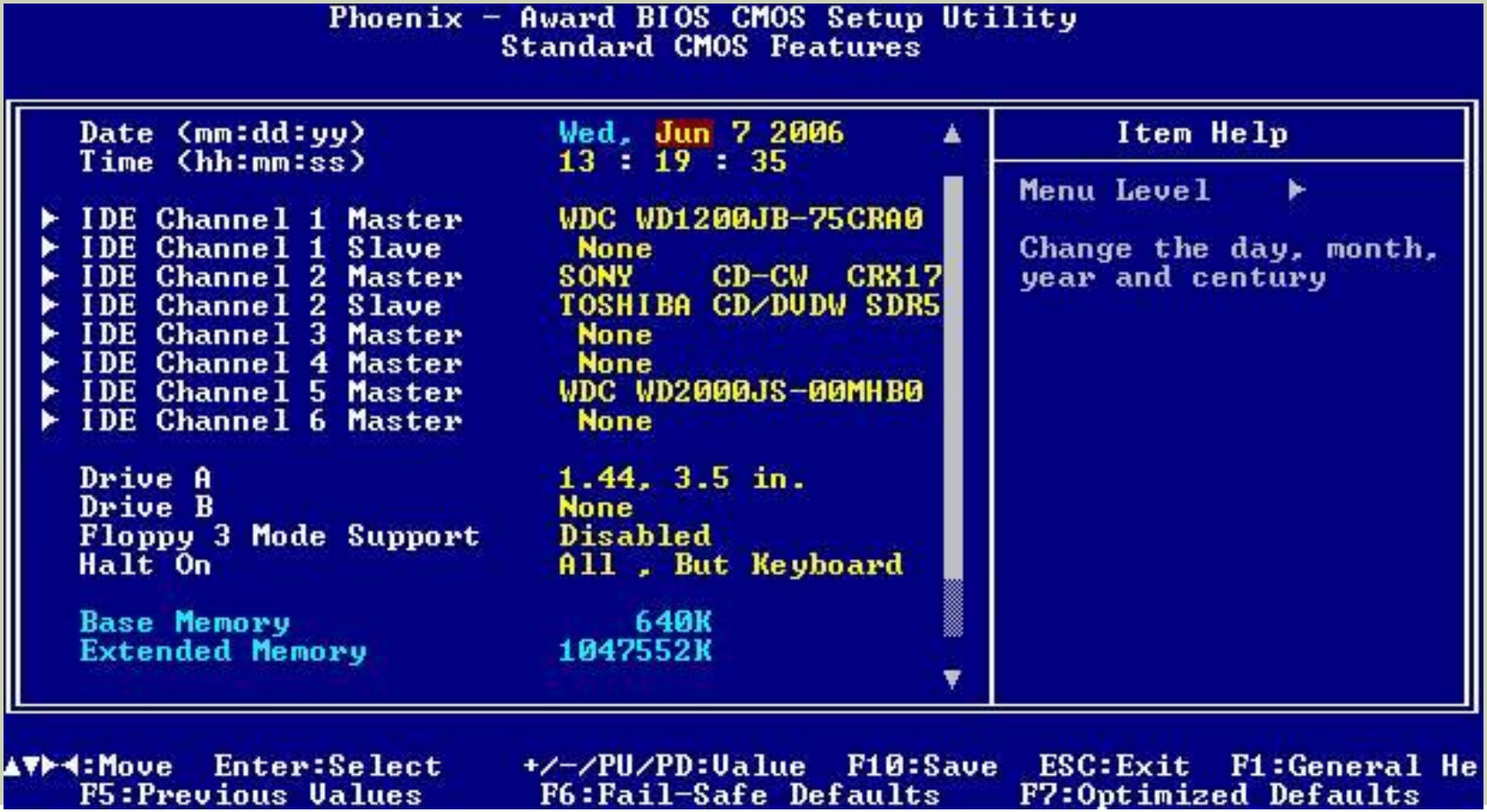
CMOS SETUP

- **Main menu**
  - Access to all submenus



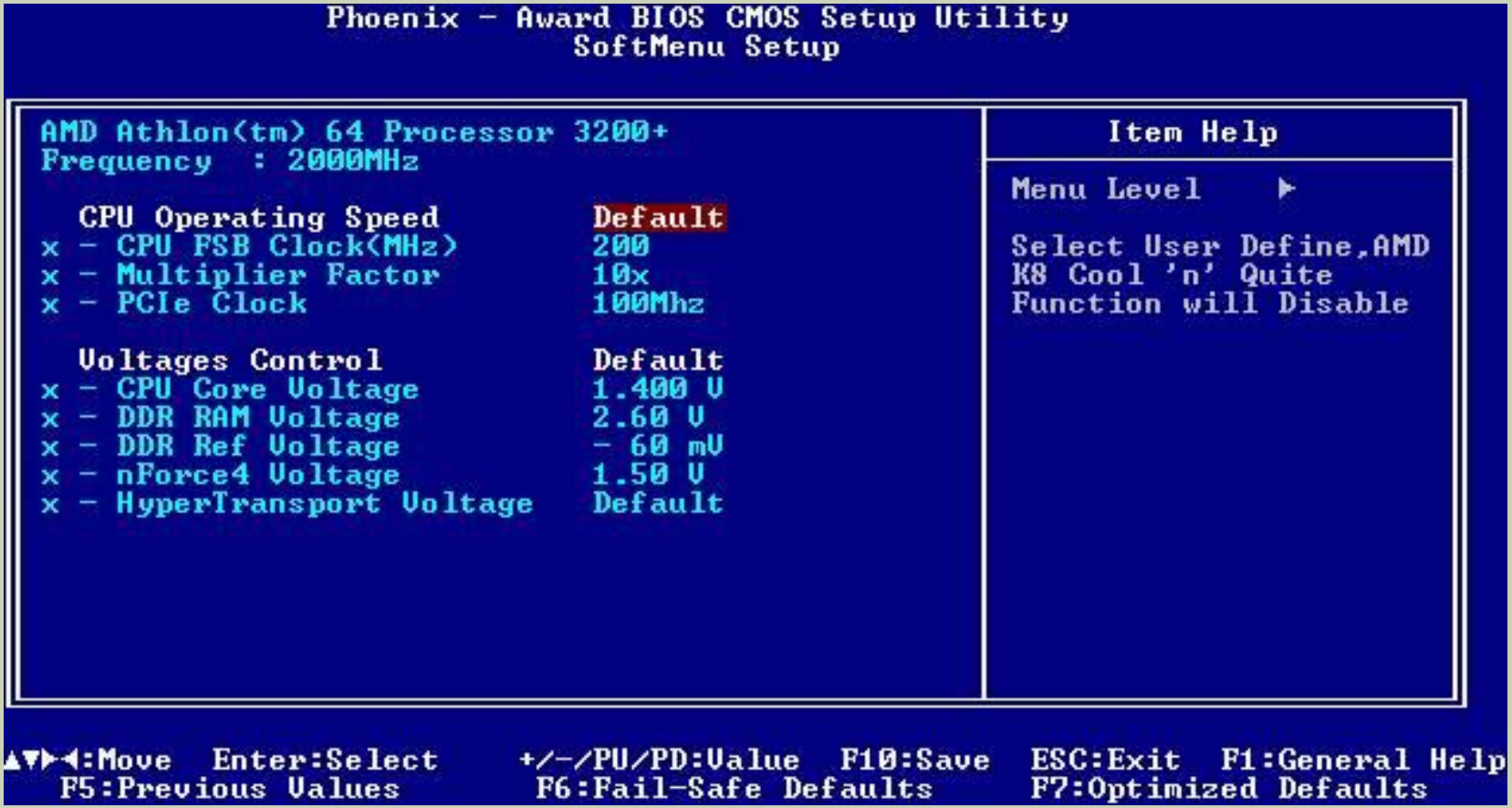
STANDARD CMOS FEATURES

- **Clock, hard drives, floppy drives**



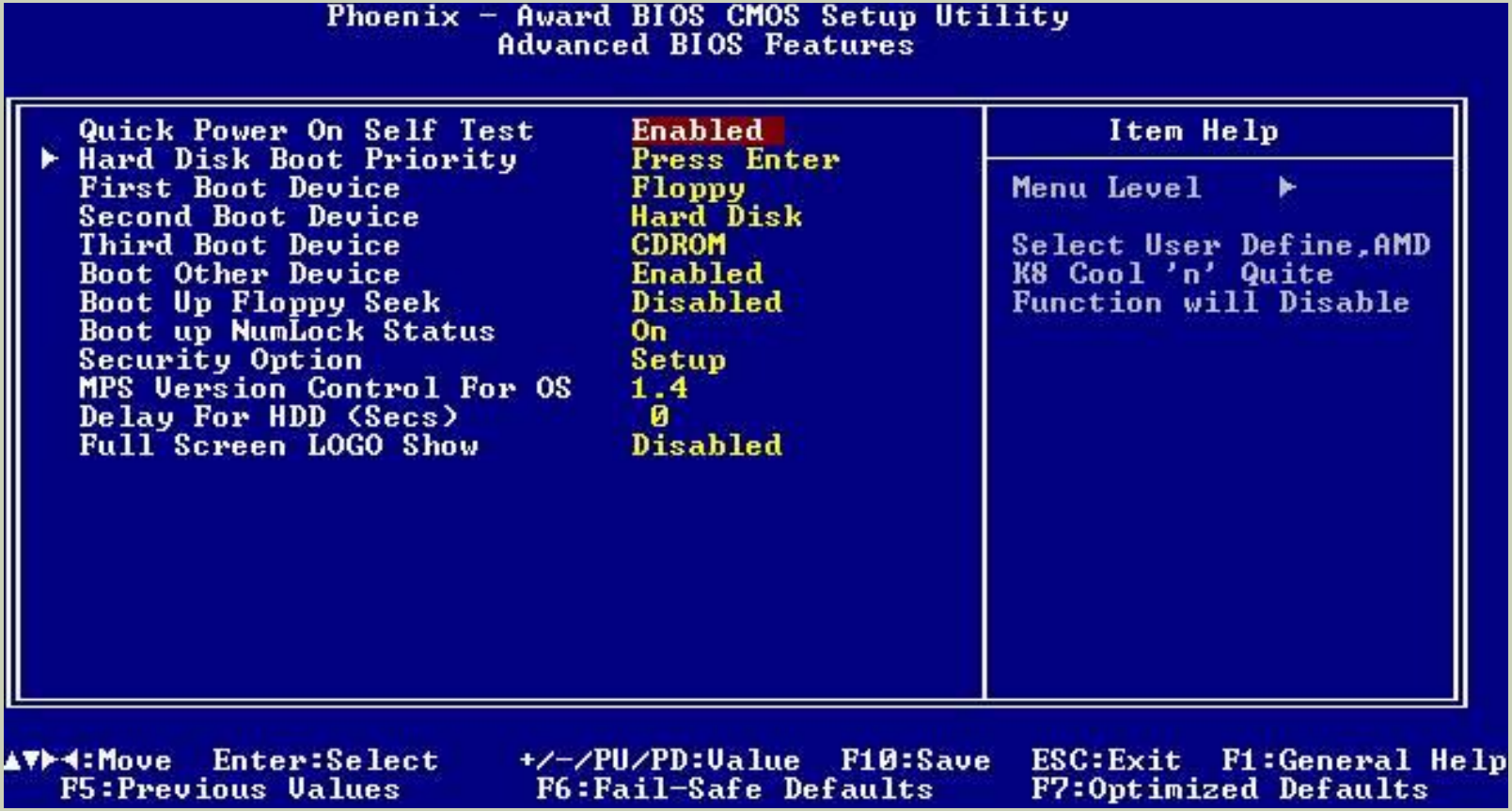
SOFTMENU SETUP

- Normally set to Default or Auto for all



ADVANCED FEATURES

- POST, boot order

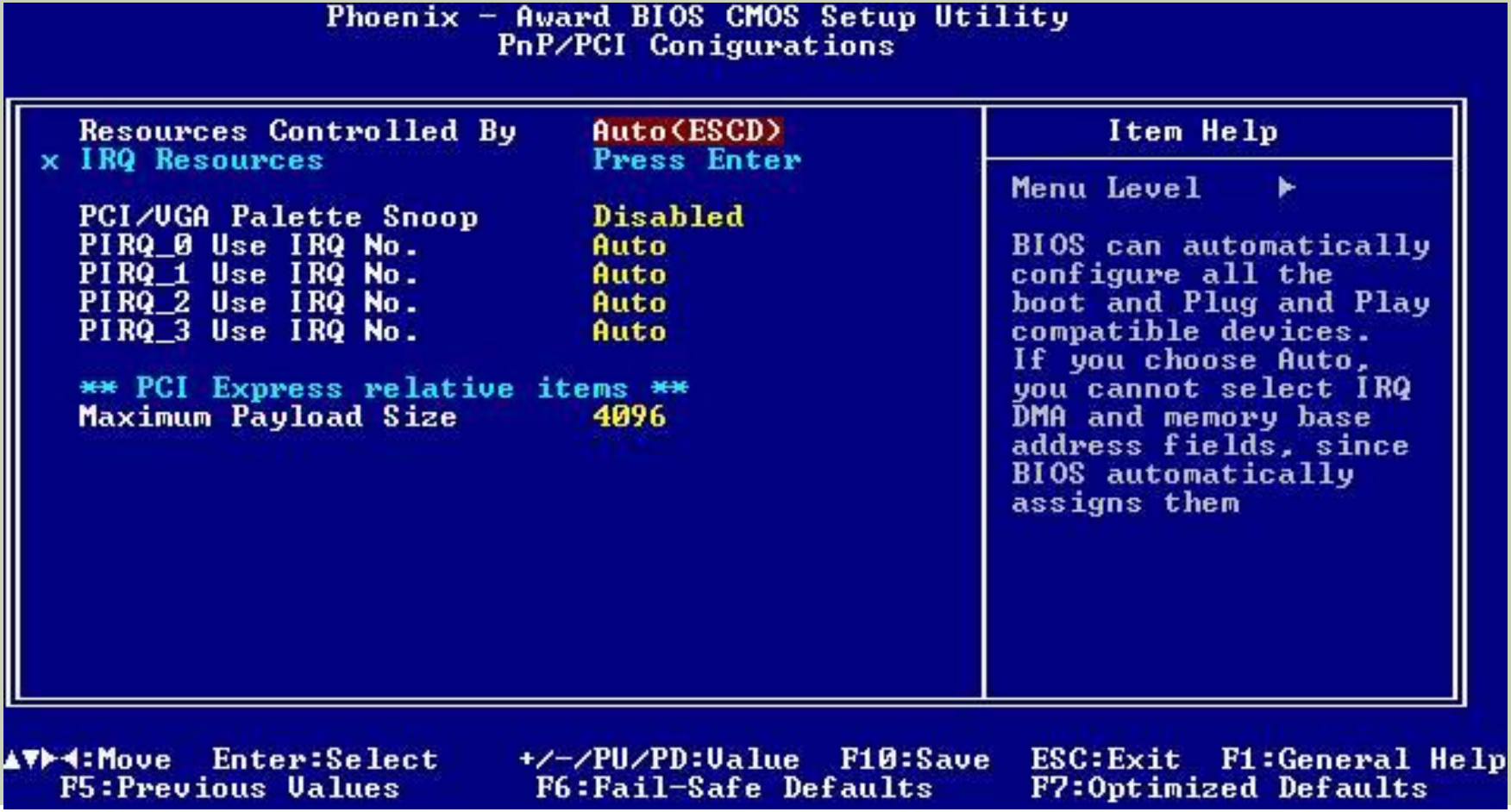


POWER MANAGEMENT

- Use to enable/disable power-saving features

PNP/PCI

- Rarely need to manipulate on today's PCs



POWER-ON SELF TEST (POST)

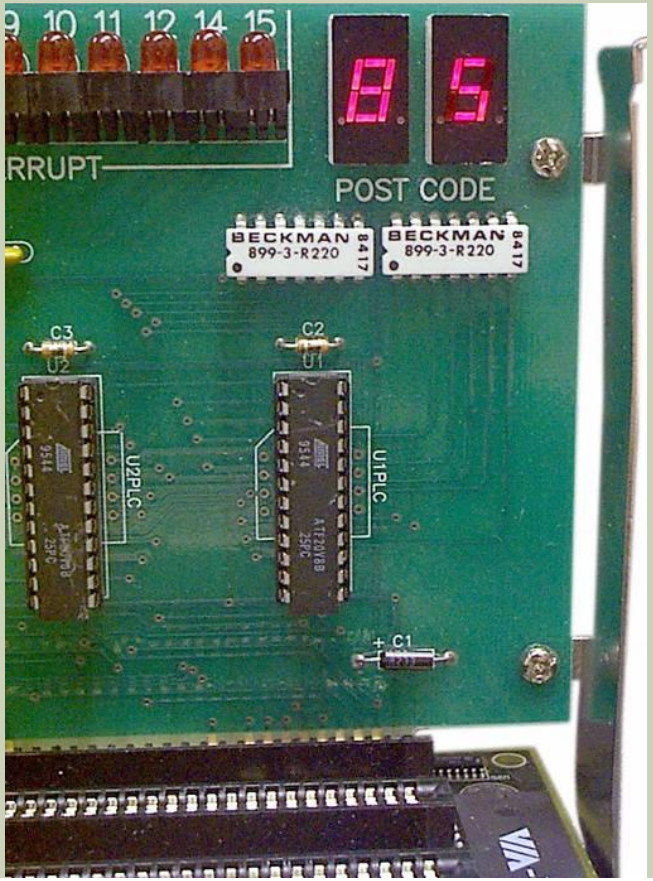
- The power-on self test (POST) is a special program stored on the ROM chip
  - Initiated when the computer is turned on or is reset
  - Checks out the system every time the computer boots
- Communicates errors
  - Beep codes
  - Text errors

BEEP CODES

- If video is determined to be missing or faulty
  - One long beep followed by three short beeps
- If everything checks out
  - One or two short beeps
- If RAM is missing or faulty
  - Buzzing noise that repeats until power turned off
- More complicated beep codes may be found in legacy computers
  - Check motherboard manual for meaning

POST CARDS

- POST cards are devices that monitor POSTs and report on the hardware that may be causing problems
  - Turn the PC off, plug in the card, and reboot
  - POST error codes do not fix the computer – they just tell you where to look
  - If all else fails, replace the motherboard

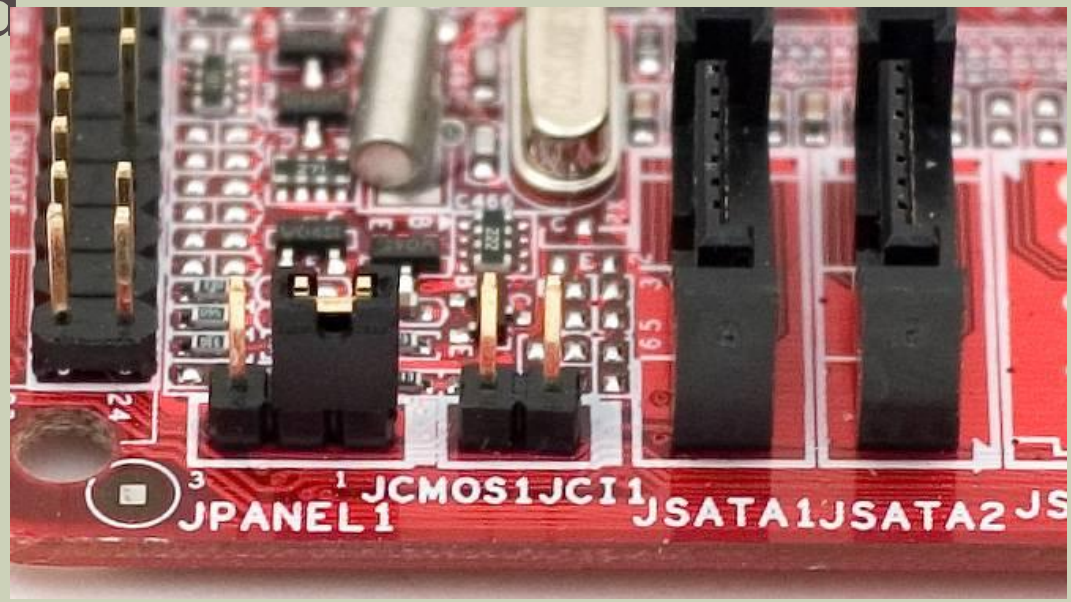


UPDATING/FLASHING THE BIOS

- Flashing your BIOS to the latest release is crucial because it enhances your system's capabilities
  - It helps it to detect newer devices and components
  - Bigger hard drivers
  - Newer processors
  - Support for updated USB/Firewire
  - PCE-E / PCI-X ports
- Improves stability (very often in the latest BIOS flashes manufacturers apply a series of bug fixes)
- There is always a "change-log" included with every newer BIOS release that should help you decide whether or not it's worth it to flash that specific version
- Dangers of ‘flashing’
- How to protect against failed flashes…?!?!?

CLEARING THE CMOS

- To clear the CMOS settings, place the shunt on the CMOS jumper
  - Resets to factory settings
  - Resets password



BRIDGE INTRODUCTION

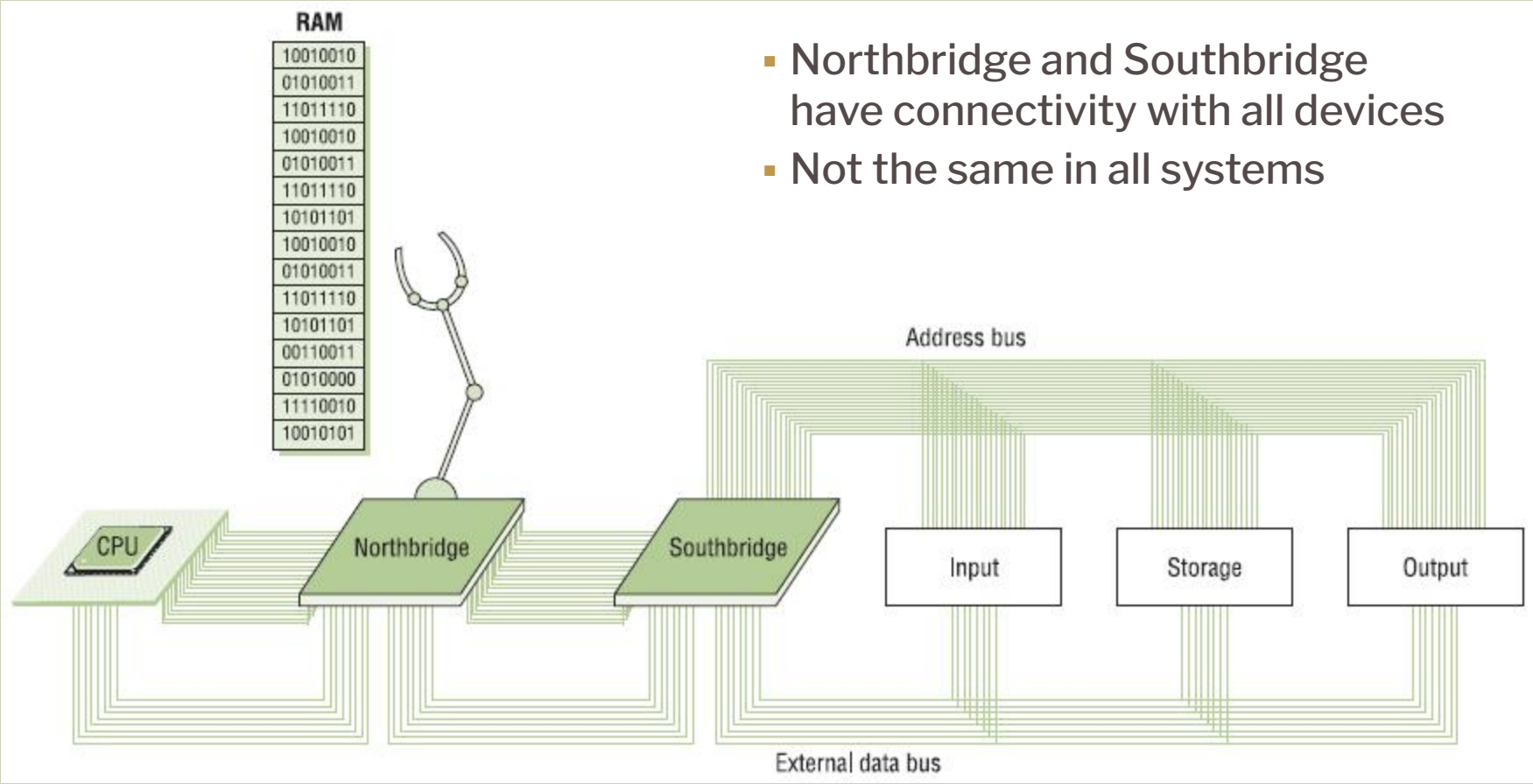
- Data flows through the computer
  - Between CPU and RAM
  - Between CPU and video
  - Between CPU and other devices
- Bridges are used to connect the pieces
  - Northbridge
    - Bridge closest to the CPU
  - Southbridge
    - The farther bridge

NORTHBRIDGE & SOUTHBRIDGE

- **A chipset is a set of Northbridge and Southbridge chips that work together**

- Northbridge
  - Chip or chips that connect the CPU to video and/or memory
- Southbridge
  - Handles all of the inputs and outputs to the many devices in the PC

DATA FLOW

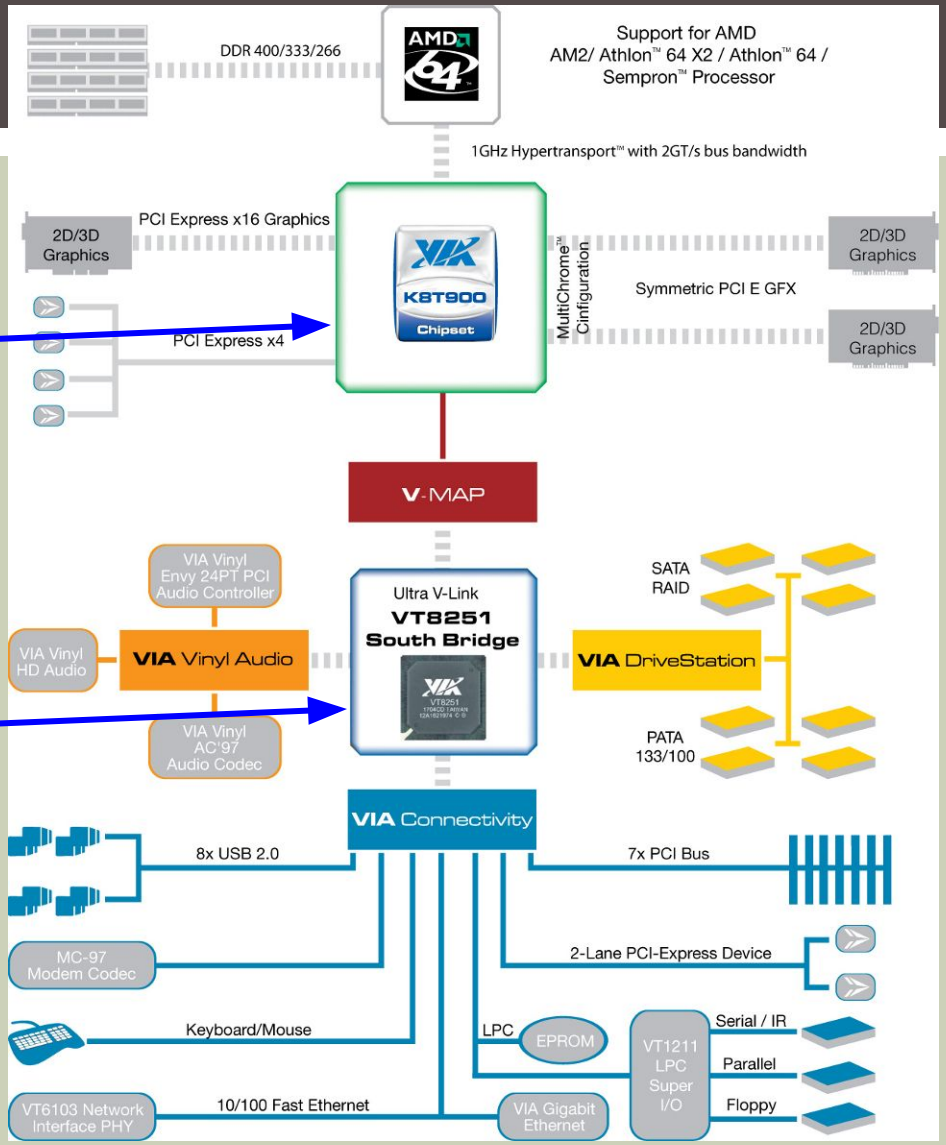


- Northbridge and Southbridge have connectivity with all devices
- Not the same in all systems

EXAMPLE AMD CHIPSET

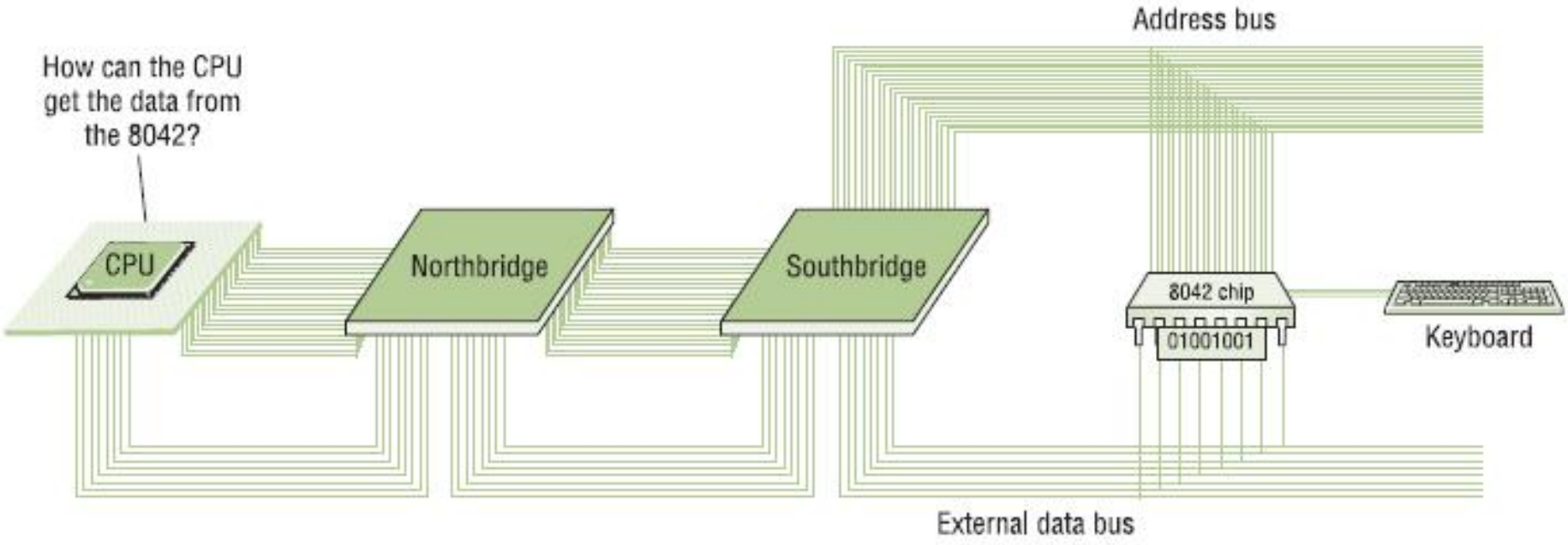
Northbridge

Southbridge



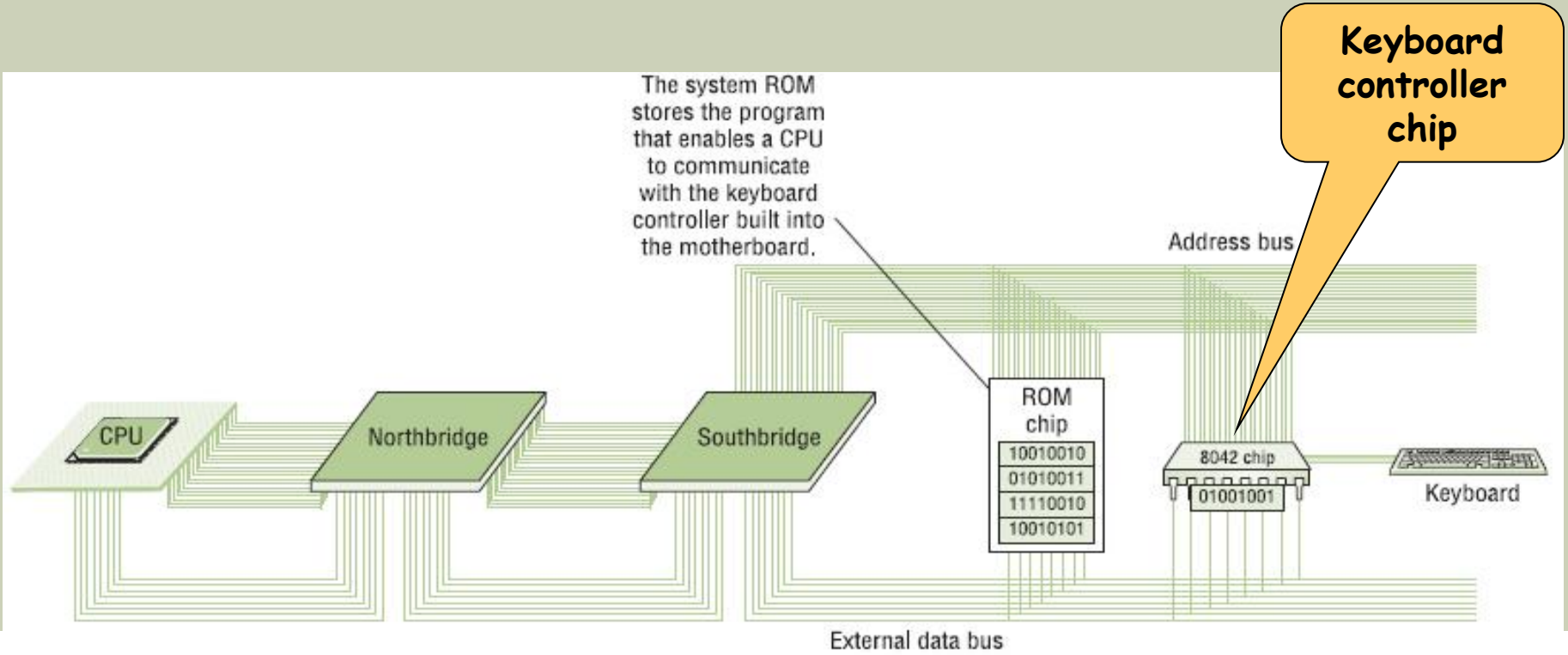
TALKING TO THE KEYBOARD

- The keyboard talks to the external data bus
  - Uses the keyboard controller chip (8042)
  - The Southbridge chip handles the keyboard interface, acting as the keyboard controller chip among its many other functions. Manufacturers today choose a specific chipset, rather than an individual keyboard controller



BIOS

- Each program is called a service
- Programs that typically reside in RAM or on other erasable media are called "software," while programs that reside in ROM are called "firmware."



BIOS VS. CMOS

- BIOS
  - Programs
  - Non-volat
    after pow
  - Can be ch
    “flashing”
  - Typically
    (though F
    bigger)
  - Often a s

CMOS

t alive with

CMOS setup

3 K of data

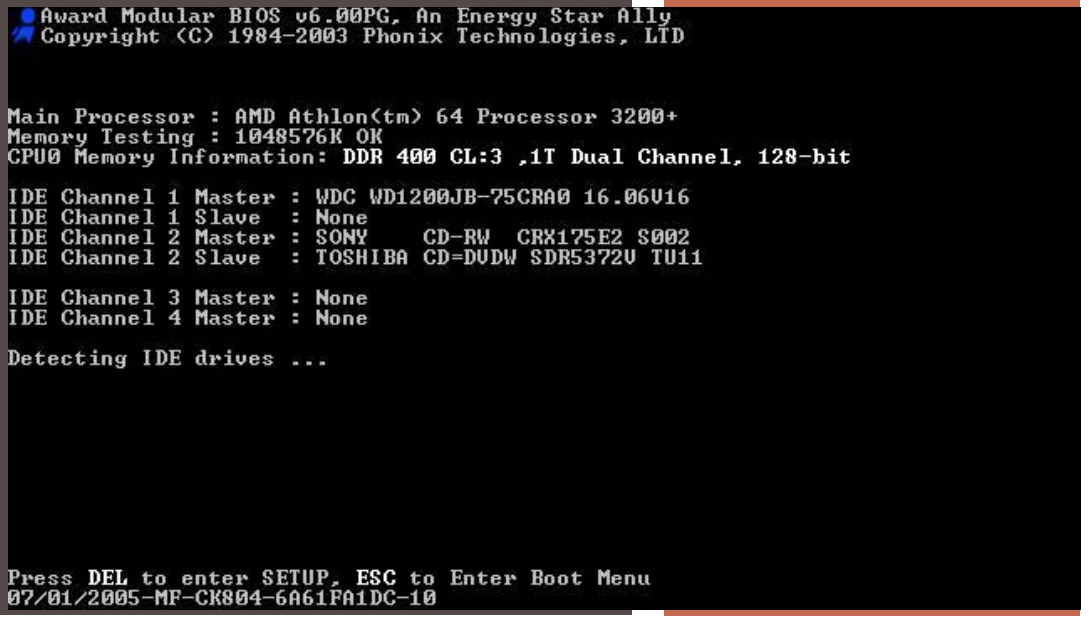
size is typically

uthbridge

Motherboard Schematic & Chipset research Activity

Updated via BIOS program

- **Three primary BIOS brands**
  - American Megatrends (AMI), Award, Phoenix
  - To enter setup, press key combination (may be Del, ESC, F1, F2, CTRL-ALT-ESC, CTRL-ALT-INS, CTRL-ALT-Enter, or CTRL-S)



Updating CMOS

CMOS (COMPLEMENTARY METAL OXIDE SEMICONDUCTOR)

- The CMOS is powered by a CMOS battery and contains your system settings and is modified and changed by entering the CMOS Setup
- CMOS is an on-board semiconductor chip powered by a CMOS battery inside computers that stores information such as the system time and date and the system hardware settings for your computer
- The standard lifetime of a CMOS battery is around 10 Years
- Volatile (kept alive by battery)
- Stores only changeable data, Not programs
- Often on Southbridge

LOSING CMOS SETTINGS

- Common errors
  - CMOS configuration mismatch
  - CMOS date/time not set
  - No boot device available
  - CMOS battery state low
- Common reasons for losing CMOS data
  - Jiggling the battery while doing other work
  - Dirt on the motherboard
  - Electrical surges
  - Faulty power supplies
  - Chip creep

POWER SUPPLY UNIT (PSU)

- A PSU converts the 115-volt alternating current (AC) supplied by an electrical outlet into direct current that the PC can use
- The PSU converts the AC into a 12-volt, 5-volt, or 3.3-volt direct curren
  - 12-volt DC is used to pow such as hard drives and C
  - The 5-volt and 3.3-volt ou various electronics on the
- Although unlikely over 25% of all PSU's

  http://www.helpwithpcs.com/courses

Power Supply Calculator: www.outervision.com

AT & ATX PSU'S

- Every PSU in use today is either an AT or an ATX
- The main difference is the number of connectors attached to the wires
- But regardless of which type there are some basic components that apply to all PSU's
- The first is the power connection, which is where the power supply connects to the electrical outlet
- Next is the motherboard power, which is delivered via a set of cables running from the power supply
- Power supplies also have a fan (which you can troubleshoot easily by just looking at it to see if it's working)

PSU CONNECTORS

- **4 Pin Berg Connector**
  Used to connect the PSU to small form factor devices, such as 3.5" floppy drives. *available in:* **AT, ATX & ATX-2**

- **4 Pin Molex Connector**
  This is used to power various components, including hard drives and optical drives.
  available in: **AT, ATX & ATX-2**

- **20 Pin Molex ATX Power Connector**
  This is used to power the motherboard in ATX systems.
  available in: **ATX**(ATX-2 have four extra pins)

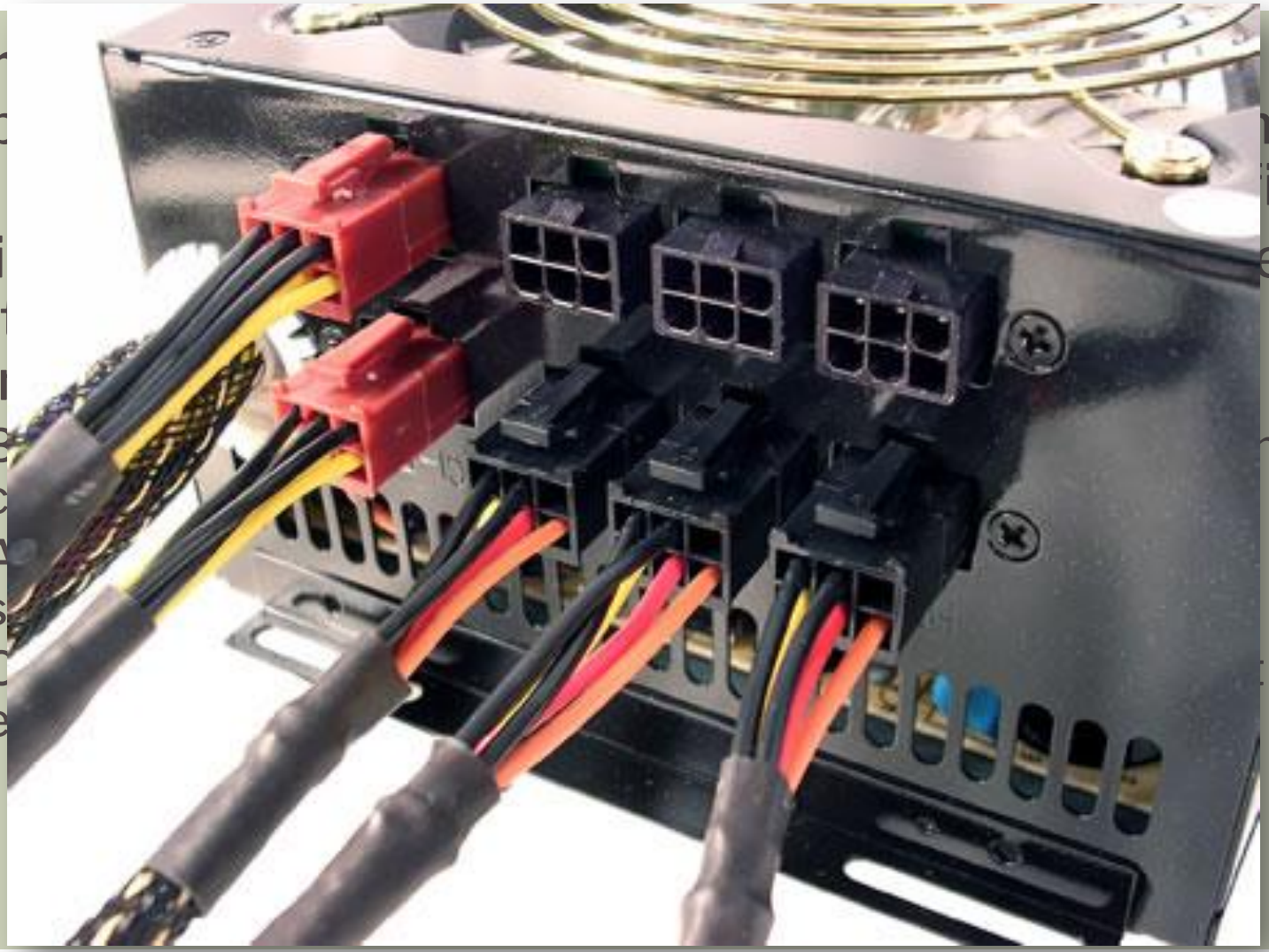
- **4 Pin Molex P4 12V Power Connector**
  Used specifically for Pentium 4 Processor Motherboards.
  available in: **ATX** (integrated into the power connector in ATX-2)

- **6 Pin AUX Connector**
  Provides +5V DC, and two connections of +3.3V.
  available in: **ATX/ATX-2**

- **A 15-pin SATA power connector**, the shape prevents accidental mis-identification and forced insertion of the wrong connector type,

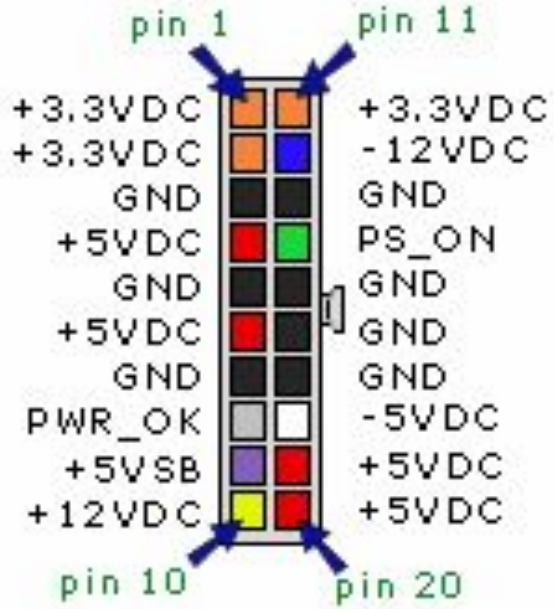
MODULAR PSU

- A r… a typ…ned by …itted
- Wi…er; but co…
  - B…nused c…
  - A… s…
  - C… fully e…



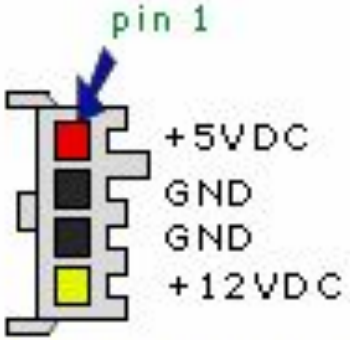
ATX POWER SUPPLY PIN OUTS

diagrams with pins facing forward



ATX 20 pin Molex
Main Power Connector

(c) helpwithpcs.com



4 pin Berg Floppy
Drive Connector

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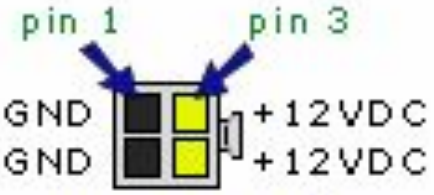

ATX 4 pin Molex
12V P4 Connector

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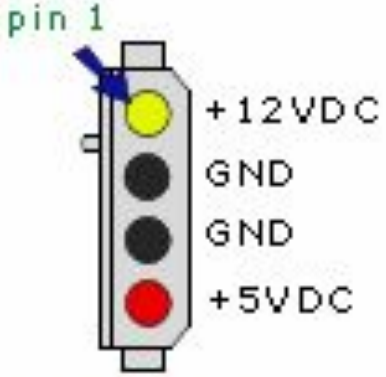
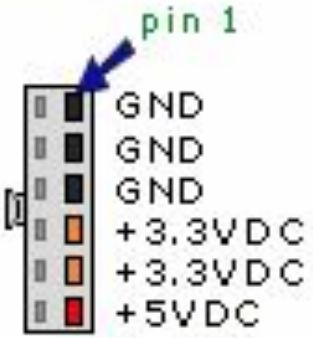


4 pin Molex
peripheral Connector



6 pin AUX
Connector

WHAT IS A MULTI-METER?

- A multimeter measures electrical properties such as AC or DC voltage, current, and resistance
- Electricians and the general public might use a multimeter on batteries, components, switches, power sources, and motors to diagnose electrical malfunctions and narrow down their cause
- The two main kinds of a multimeter are analogue and digital

MULTIMETERS CONT.

- A digital multimeter has an LCD screen that gives a straight forward decimal read out, while an analogue display moves a bar through a scale of numbers and must be interpreted.
- Any multimeter will work over a specific range for each measurement. Select one that's compatible with what you meter most, from low-voltage power sources to high-voltage car batteries.
- Multimeters are specified with a sensitivity range, so make sure you get the appropriate one.

THE PSU POWER ON TRICK

First of all, find a paperclip and bend it to something like in the picture

Find the green wire and one of the black wires

Next, put your paperclip into the pin with the green wire and the other end into one of the two black ground wires beside the green wire. With your teachers permission power on the PSU unit

PSU PIN-OUT TESTING

- In groups (chosen by your teacher)
- Collect the equipment required to complete this weeks activity
  - Power Supply Unit
  - Paperclip
  - Multimeter
  - Power cable(if not a
- Under the careful w on trick
- Measure the pin-ou correct output stan

PSU Worksheet Task: