

Computer Systems Introduction & Overview



What is a computer?

- a computer is an electronic device for storing and processing data (typically in **binary** form) according to instructions given to it in a program

examples:

- desktop computer
 - mobile phone
 - calculator
- historically, a computer was a job title, or job description, rather than a physical device
 - a computer would perform calculations by hand and record them for others to use

Uses of Computers

- anywhere a calculation is required or may be useful
- some applications are obviously connected to math, numbers, and large quantities of data
- science & engineering
- finance
- communication
- video & music processing



Uses of Computers

- computers may also be found being applied in less obvious ways
 - air & ground traffic control
 - agriculture
 - politics & public opinion
 - education
- they are present in almost all aspects of our lives and society



Components of the Modern Computer

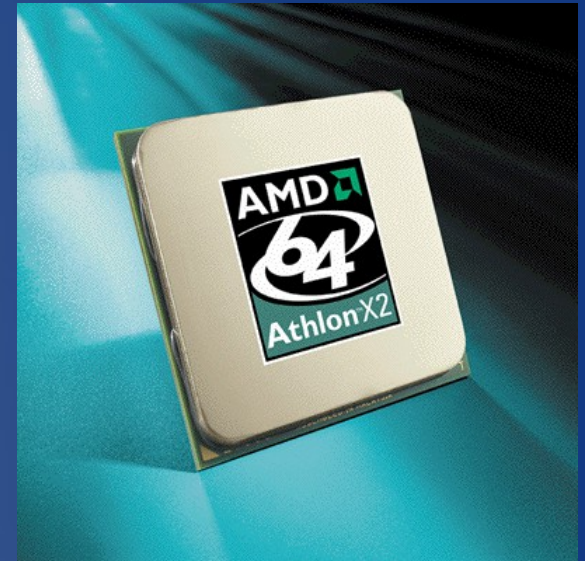


- the modern computer generally consists of six (6) primary components
 - Central Processor
 - Graphics Processor
 - Working Memory
 - Storage
 - Power Supply
 - Motherboard

Central Processing Unit (CPU)

"the brains"

- computers don't actually think, but they can **process data** so well that it seems almost intelligent
- most instructions are handled by the central processing unit, or CPU
- all instructions must be sent to the CPU using a specific and complex set of codes
- the CPU performs calculations and makes decisions for other components in the system



Motherboard

"the nervous system"

- all of the various parts of the computer can communicate because they are all plugged into the motherboard
- data and control flows back and forth between the CPU and other components
- although easy to see in personal computers, this arrangement is common in most computing devices





USB power manager
and battery charger
Linear LTC4066

Audio codec
Waltson
Microelectronics
WM8758



Voltage step-down switching regulator:
National Semiconductor LM34910SDX (40V, 1.25A)

Firmware Flash
module, 8 MB:
Silicon Storage
Technology
SST39WF800A

Random Access Memory (RAM)

"short term memory", "post it notes"

- random access memory (RAM) contains information, or data, that is currently in use by programs running on the computer
- when a program is finished with some data, it may not be lost right away, but it will be replaced if another program needs the space
- space in RAM is limited, so programs need to avoid taking up too much of it
- data in RAM is lost when the power of the computer is turned off

Hard Drive, Hard Disk, HDD

"long term memory", "volumes of books"

- provides a more permanent storage for data
- much slower, so not good for immediate use of data
- data persists even if the power is disconnected
- somewhat portable
 - can be removed and transferred to another computer



Graphics Processing Unit (GPU)

"your artistic friend"

- the CPU is very good at processing data and performing all sorts of calculations
- processing graphics (video, images) is very specific, and it is possible to build a processor optimized for this application
- although the CPU can process graphics, it is much faster to let a specialist, the GPU, handle it
- the GPU is installed on a video card, or graphics card



Power Supply

"the heart & blood"

- connects computer to external power (wall outlet)
- changes power into a form useful to various components on motherboard
- many components require different voltages and currents

