

Machine Architecture



Some material in this presentation is borrowed from Adrian Ilie
From The UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Topics

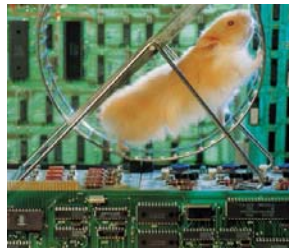
- Major Computer Components
- Central Processing Unit (CPU)
- Bus
- Main Memory (RAM)
- Secondary Storage Media
- I / O Devices

Reading

- Sections 1.1 - 1.3
- Appendix E (Sections E.1, E.4, E.5)

Major Computer Components

- Central Processing Unit (CPU)
- Bus
- Main Memory (RAM)
- Secondary Storage Media
- I / O Devices



Aug-31-2005

CMSC 104, LECT-02

3

Inside the Computer

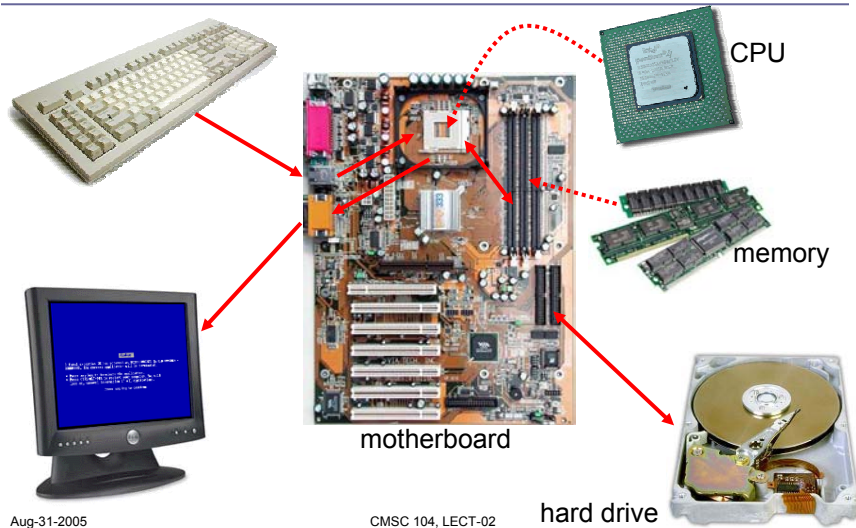


Aug-31-2005

CMSC 104, LECT-02

4

Major Computer Components



The CPU

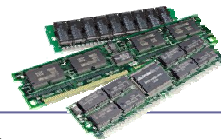


- **Central Processing Unit (CPU)**
- The “brain” of the computer. This is the component that actually executes instructions
- Controls all other computer functions
- In **PCs (personal computers)** also called the **microprocessor** or simply **processor**.

The Bus

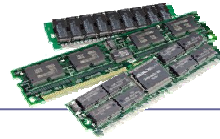
- Computer components are connected by a **bus**.
- A bus is a group of parallel wires that carry **control signals** and **data** between components.

Main Memory



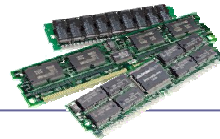
- Main memory holds information such as computer programs, numeric data, or documents created by a **word processor**.
- All programs must be brought into main memory before execution.
- When power is turned off, everything in main memory is lost
- Main memory is made up of **capacitors**.
- If a capacitor is charged, then its state is said to be **1**, or **ON**.
- We could also say the **bit is set**.
- If a capacitor does not have a charge, then its state is said to be **0**, or **OFF**.
- We could also say that **the bit is reset** or **cleared**

Main Memory (con't)



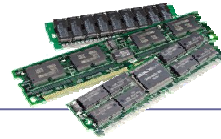
- Memory is divided into **cells**, where each cell contains 8 **bits** (a 1 or a 0). Eight bits is called a **byte**.
- Each of these cells is uniquely numbered.
- The number associated with a cell is known as its **address**.
- Main memory is **volatile** storage. That is, if power is lost, the information in main memory is lost.

Main Memory (con't)



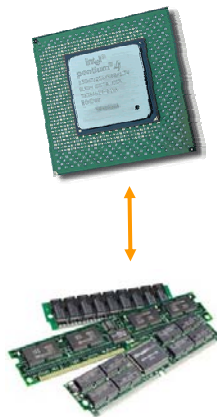
- Other computer components can
 - get the information held at a particular address in memory, known as a **READ**,
 - or store information at a particular address in memory, known as a **WRITE**.
- Writing to a memory location alters its contents.
- Reading from a memory location does not alter its contents.

Main Memory (con't)



- All addresses in memory can be accessed in the same amount of time.
- We do not have to start at address 0 and read everything until we get to the address we really want (**sequential access**).
- We can go directly to the address we want and access the data (**direct** or **random access**).
- That is why we call main memory **RAM (Random Access Memory)**.

CPU and Main Memory

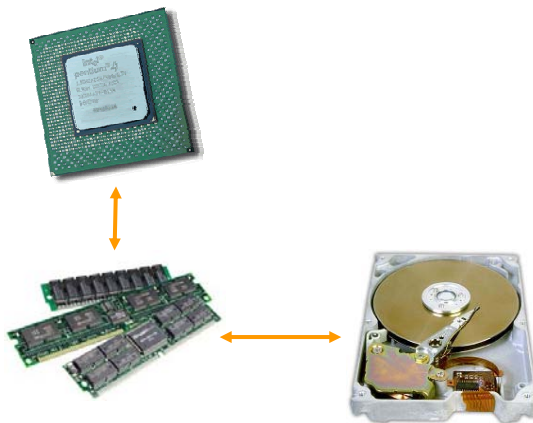


Secondary Storage Media

- Provides permanent storage for information
- Retains information even when power is off
- Examples of secondary storage:
 - Hard Disks (sequential access)
 - Floppy Disks (sequential access)
 - Tapes (sequential access)
 - CD-ROMs (random access)
 - DVDs (random access)
- **Secondary storage media** store **files** that contain
 - computer programs
 - data
 - other types of information
- This type of storage is called **persistent (permanent) storage** because it is **non-volatile**.



Secondary Storage





Aug-31-2005

CMSC 104, LECT-02

15

I/O (Input/Output) Devices

- Information input and output is handled by **I/O (input/output) devices**.
- More generally, these devices are known as **peripheral devices**.
- Examples:
 - Monitor
 - Keyboard
 - Mouse
 - Disk Drive (Floppy, Hard, Removable)
 - CD or DVD Drive
 - Printer
 - Scanner

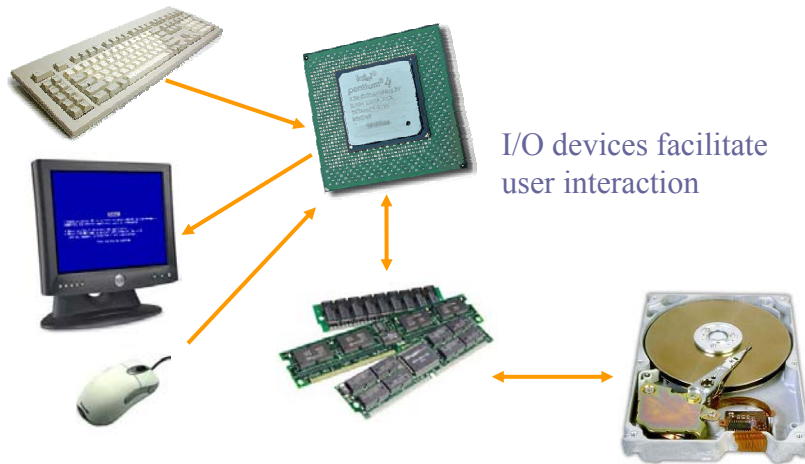


Aug-31-2005

CMSC 104, LECT-02

16

Input/Output Devices



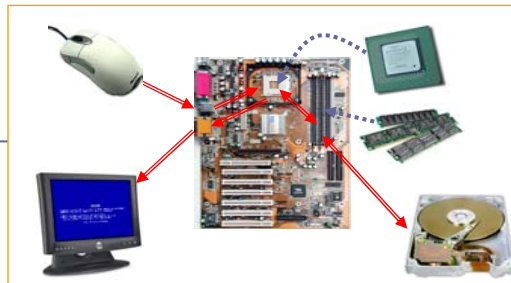
I/O devices facilitate user interaction

Aug-31-2005

CMSC 104, LECT-02

17

Opening MS Word



- Use the mouse to select MS Word
- The CPU requests the MS Word application
- MS Word is loaded from the hard drive to main memory
- The CPU reads instructions from main memory and executes them one at a time
- MS Word is displayed on your monitor

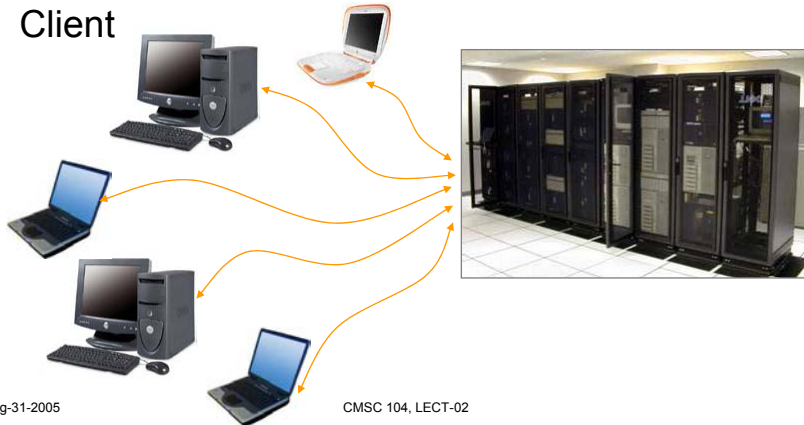
Aug-31-2005

CMSC 104, LECT-02

18

Client & Server

- Server software accepts requests for data from Client software and returns the results to the Client



Aug-31-2005

CMSC 104, LECT-02

19

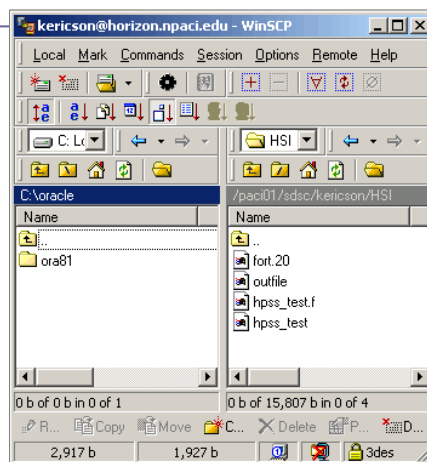
Client & Server

- FTP, SFTP – file transfer protocol

- WinSCP

- <http://www.umbc.edu/oit/sans/desktopsupport/downloads/pages/WinSCP.htm>

- <http://www.umbc.edu/oit/sans/helpdesk/WinScp/winscp.html>



Aug-31-2005

CMSC 104, LECT-02

20