Introduction

Computer Architecture & Assembly Language Programming

CA269

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Welcome

Lectures	**Mon @ 12:00am in T101**
	Friday @ 2:00pm (double) in C104
Laboratory Work	Friday 11:00am to 13:00pm L101

End of Semester Exam (Written Paper) - 60% of Course

Continuous Assessment (Lab Exams 1-2-3) - other 40%

Syllabus

- **Introduction to Computer Architecture**
  - Hard Disk, Memory, CPU, Busses
  - Input/Output, Peripherals
- **Data Representation**
  - Integers, Characters
- **Introduction to Low Level Instructions**
- **Register Manipulation**
  - Shifts and Rotates
- **Program Flow control in Assembly**
- **Interrupts and Procedures in 8086 Assembly**
- **DOS and BIOS interrupt programming**

Introduction to Computer Architecture

- What is a computer ?

A Computer is a made up of a number of functional parts which

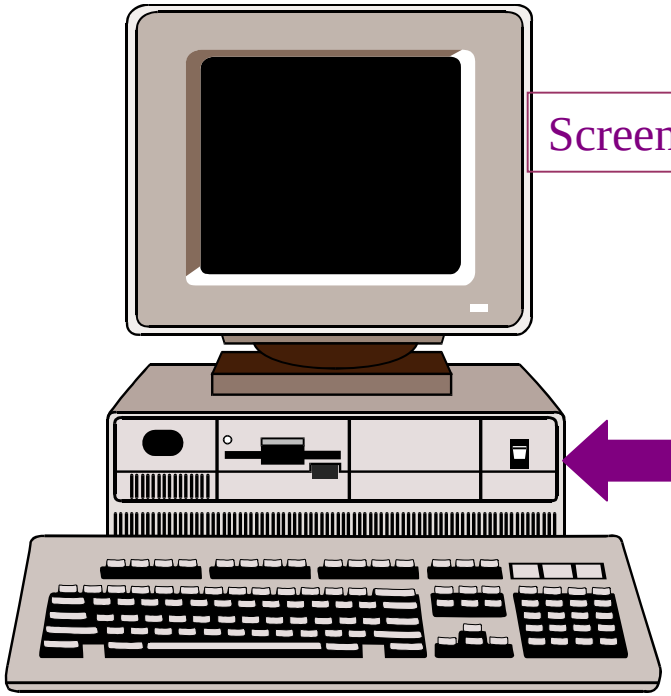
- allow the storing of computer programs
- decode instructions within a computer program
- allow the execution of computer programs
- handle information from the user and/or other external devices/machines.
- control all the above.

- What is computer architecture ?

Computer Architecture is the structure of these functional parts, how they interact and how this interaction facilitates the task of the computer to run programs.

Introduction to Computer Architecture

- **A basic computer consists of the following**



Screen for Output

Base containing:

- On/Off Switch
- Power Supply
- Long Term Storage (Hard Disk)
- Short Term Storage (Memory)
- Engine (Central Processing Unit)

Keyboard/Mouse for Input

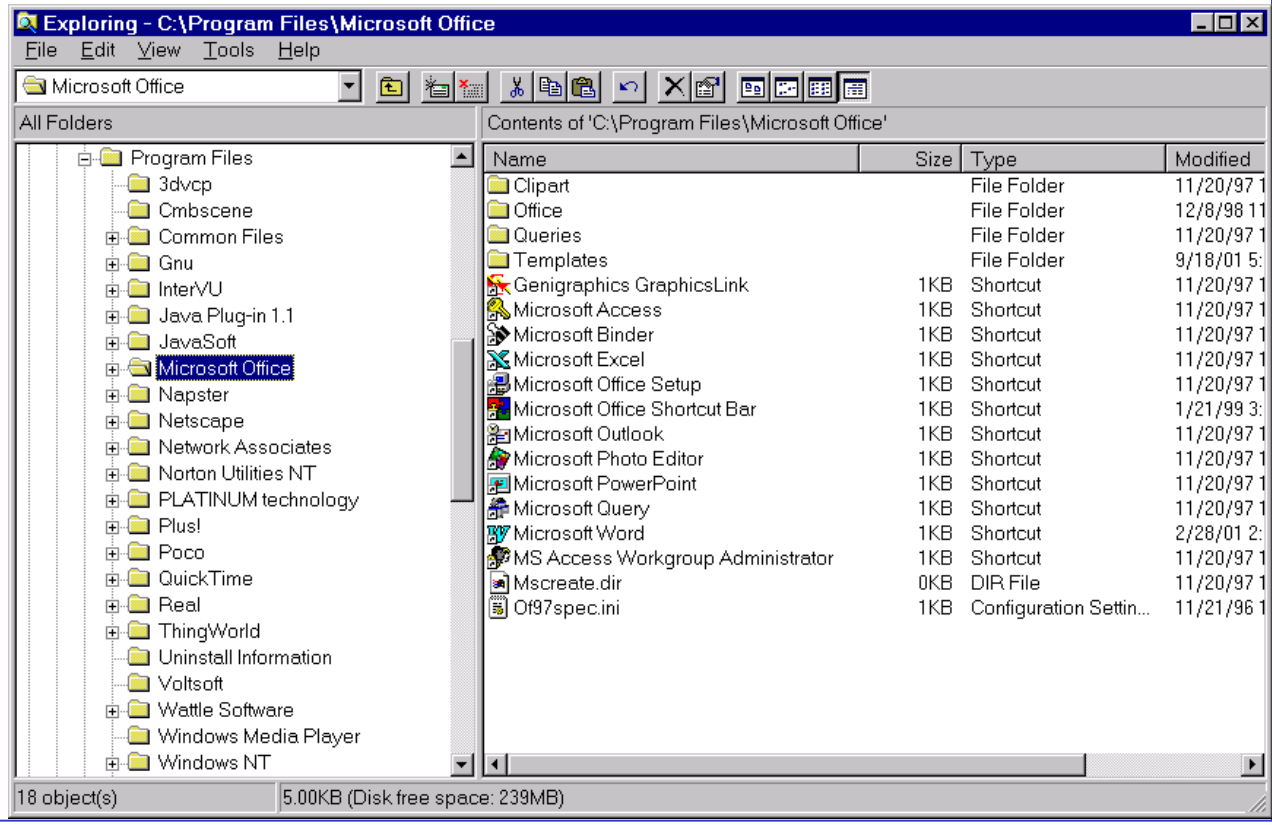
Input

Basic Computer Structure

- **Long Term Storage**
  - All the programs and files are stored on a permanent persistent device called the hard disk. We can use Windows Explorer (WinXP WinNT) to see them

HARD DISK

Permanent Storage

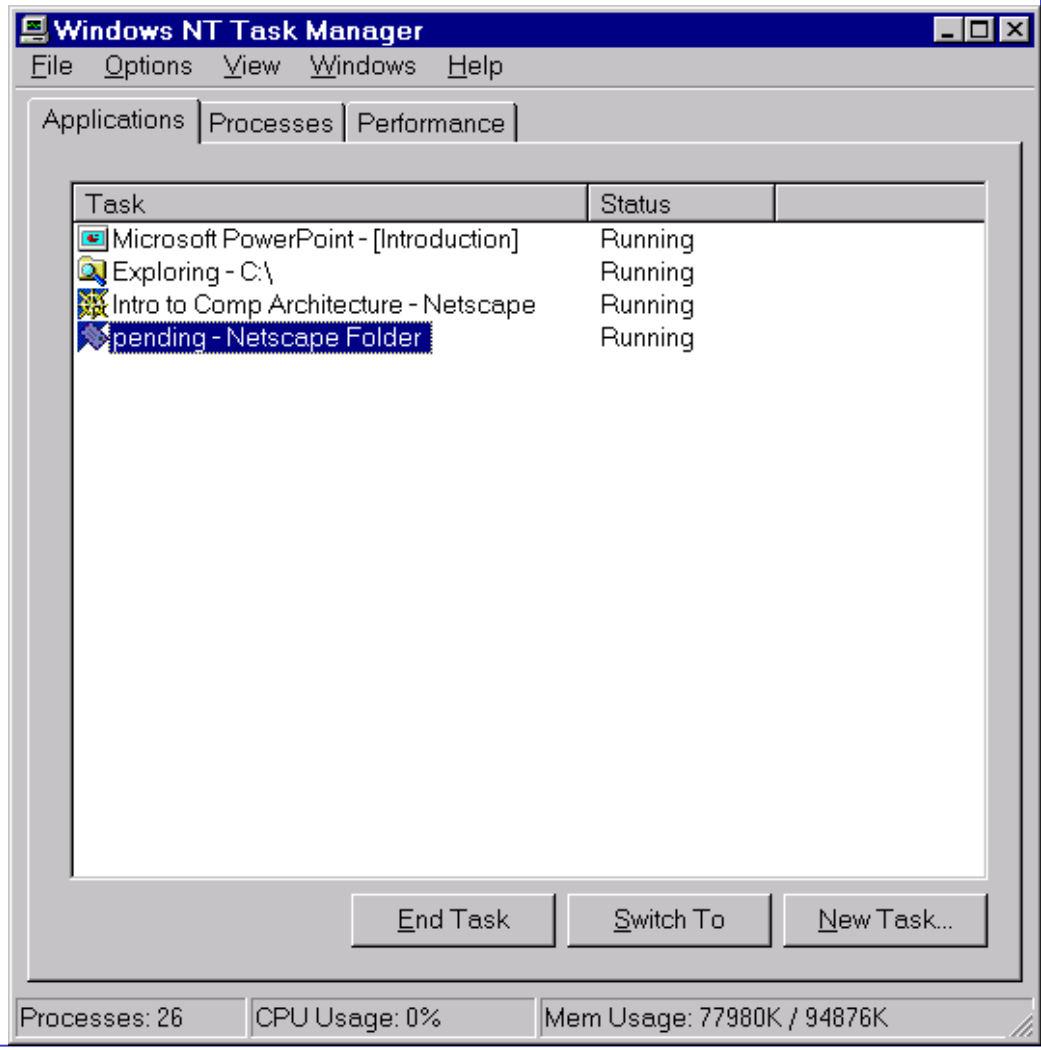


Dead Storage

- **Hard Disk Properties**
  - Magnetic Disk for long term storing of information
  - Files are “dead” (not running) on the hard disk
  - Does not need power supply to keep the files (similar to the floppy disk)
  - Capacity is huge (Gigabytes)
  - Speed is slow (Takes a long time to copy a dead program into the “live” memory)

Basic Computer Structure

- **Memory (Short Term Storage)**
  - The files and programs on the hard disk are there for storage. If we want to RUN a program we must move it to Memory. We can see what's in memory (running) using NT's Task Manager.



MEMORY

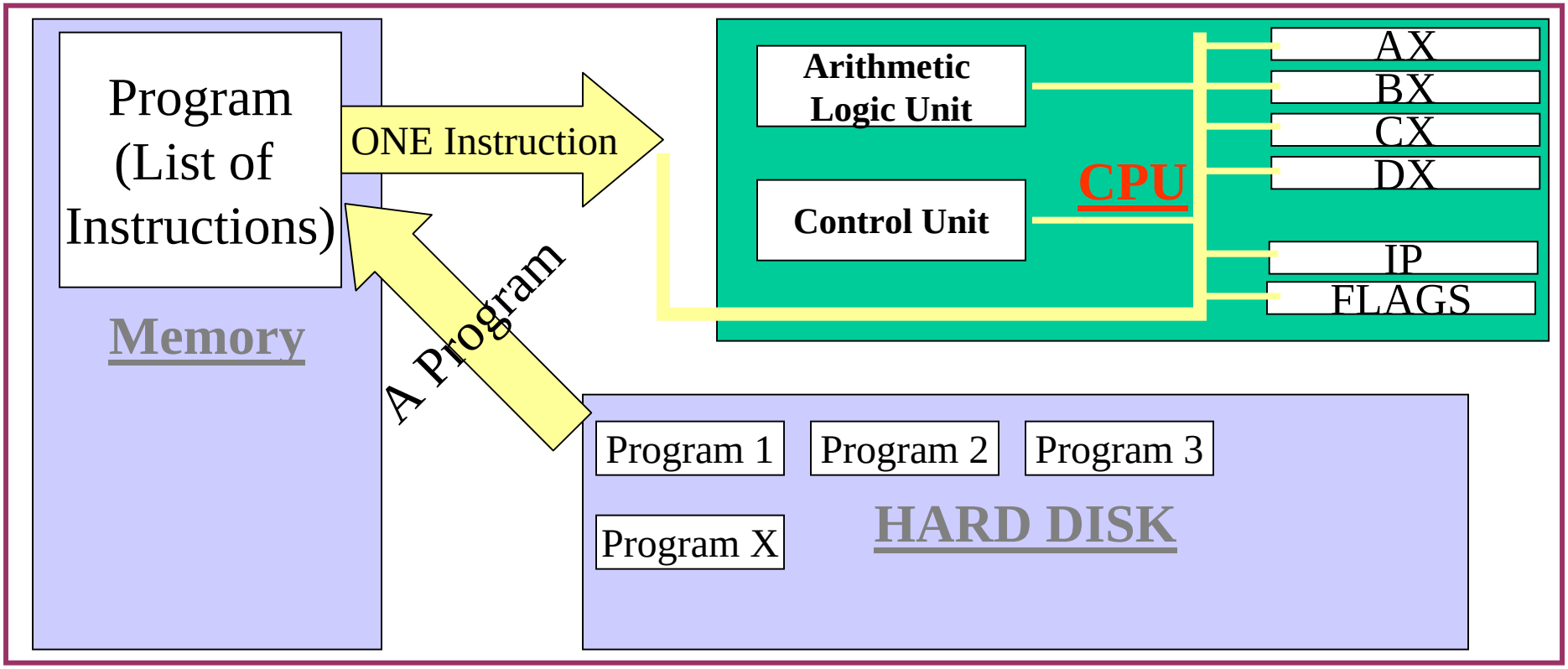
Temporary Storage

Live Storage

- **Memory Properties**
  - Computer Chips for short term storage of information
  - Programs (files) are “live” in memory
  - Needs a power supply to keep the programs alive. (Switching off the computer, kills all programs and information in memory)
  - Capacity is small (Megabytes)
  - Speed is fast (Once a program has been copied from the hard disk to memory, it executes a lot faster)

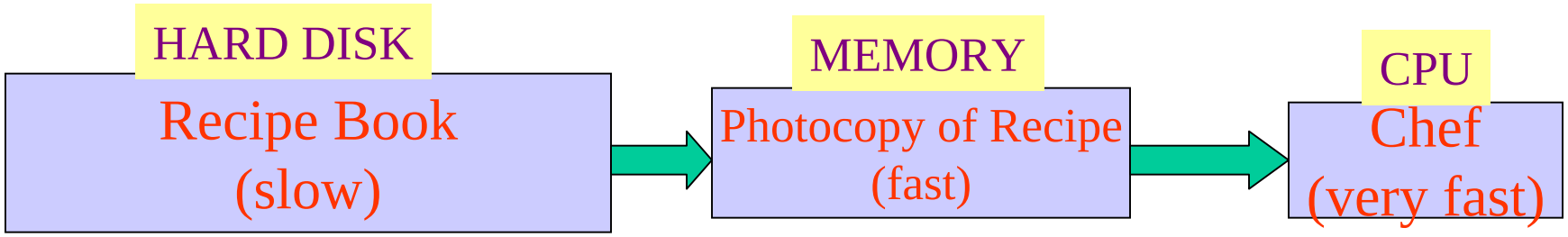
Basic Computer Structure

- **CPU - Central Processing Unit**
  - This is the ENGINE of the computer
  - The program (instructions) are taken one at a time from memory and executed at high speed in the CPU.



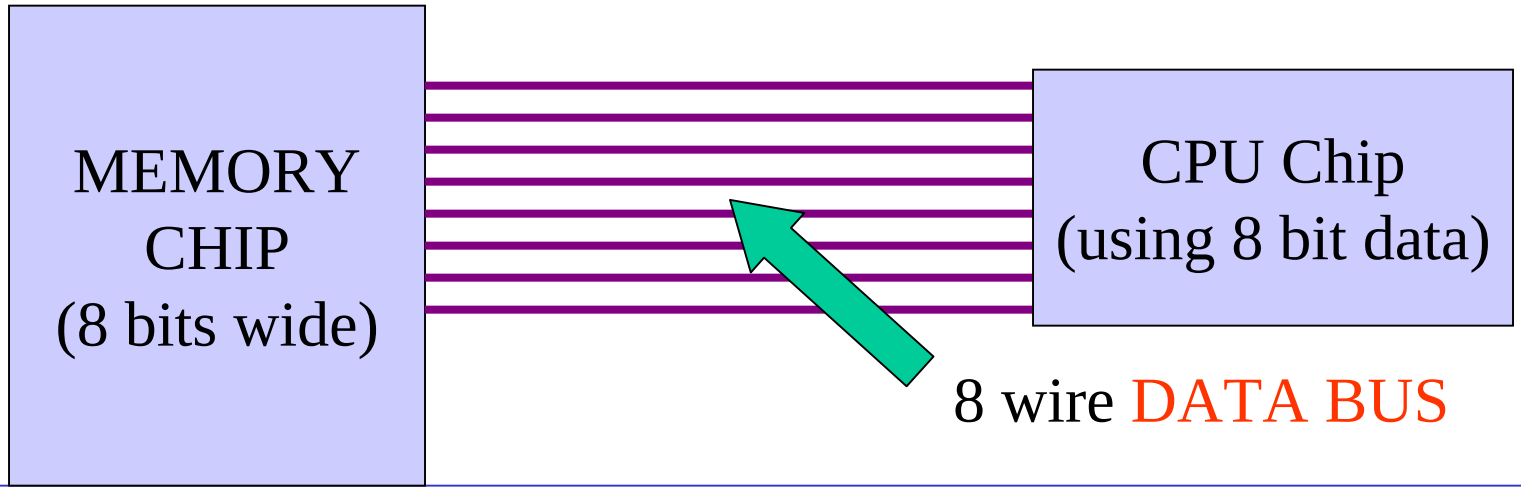
Programs

- **Programs are lists of instructions**
  - Set up values
  - Add, Subtract, Multiply, Divide
  - Input/Output text
  - Repeat a number of times
- **Analogy of Book of Recipes**
  - Recipe Book - Permanent Storage
  - Photocopy of ONE recipe - Fast Access like Memory
  - Chef performs each instruction - CPU



On the Bus

- **Information passes from disk to memory to cpu and back**
  - This information passes on a collection of wires
  - a collection of wires is known as a bus
  - a group of wires used for control is a control bus
  - a group of wires for data information is a data bus
  - a group of wires for address information is an address bus



Input and Output

- **Programs can process information from the user**
  - Input information
    - Pointing information (Mouse)
    - Words, Numbers, Letters etc. (Keyboard)
- **Programs can pass info back to the user**
  - Output information
    - Graphics, Documents, Results (Screen)
    - Graphics, Documents, Results (Printer)
- **Devices which pass information to the computer or receive information from the computer are known as peripherals**

Summary

- **A Basic Computer System**