

Introduction

Computer Architecture & Assembly Language Programming

CA269

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Welcome

Lectures

Mon @ 12:00am in T101 @3:00pm in XG22

Tuesday @ 1:00pm in XG20

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

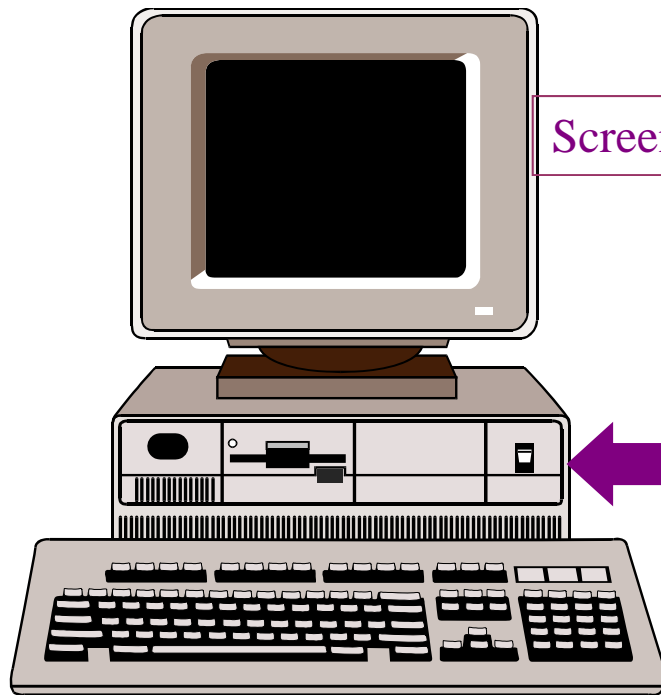
- allow the **storing** of computer programs
- decode** instructions within a computer program
- allow the **execution** of computer programs
- handle information from the **user** and/or other external devices/machines.
- control** all the above.

•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

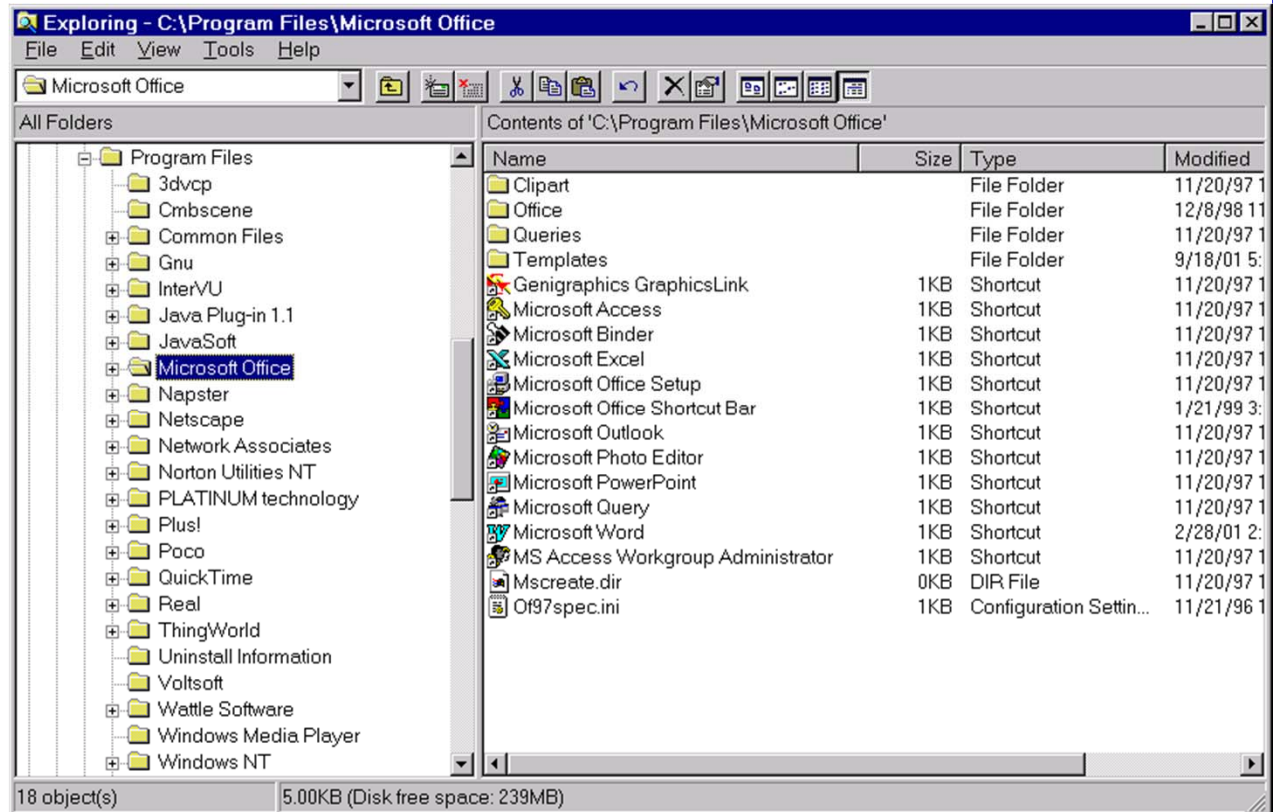
Input

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)

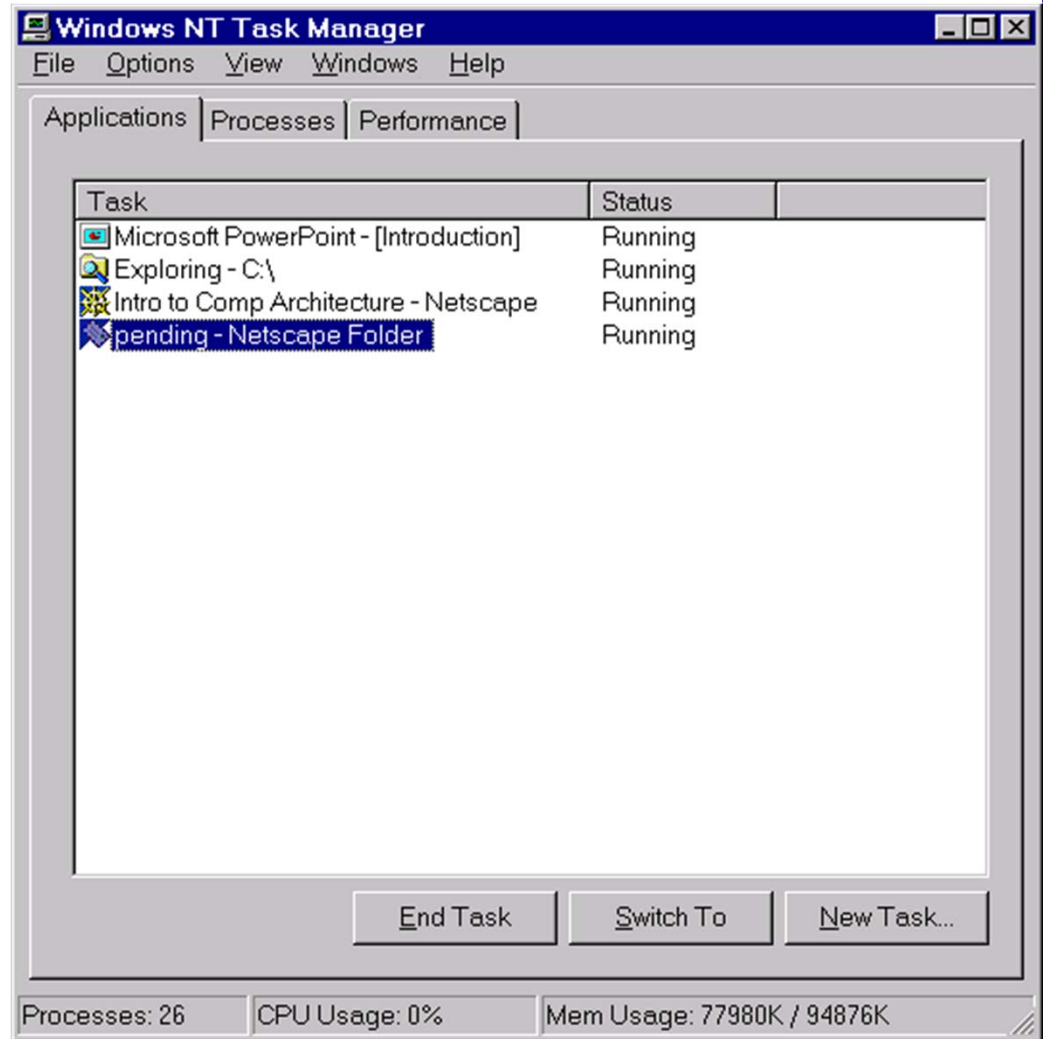
Basic Computer Structure

- **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



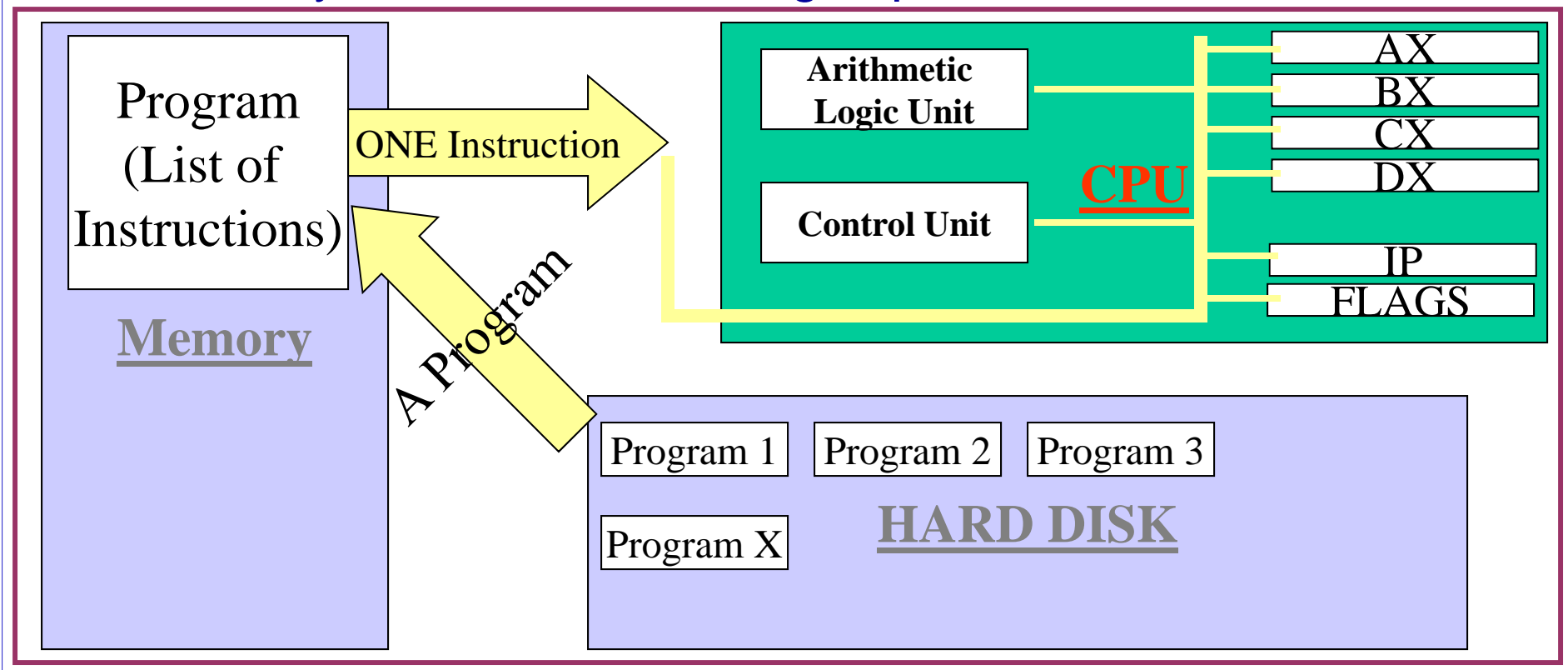
Live Storage

- **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)

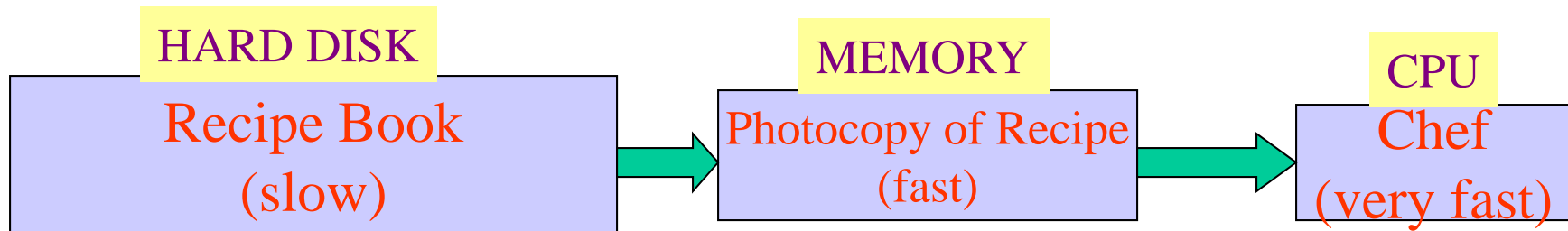
Basic Computer Structure

- **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.



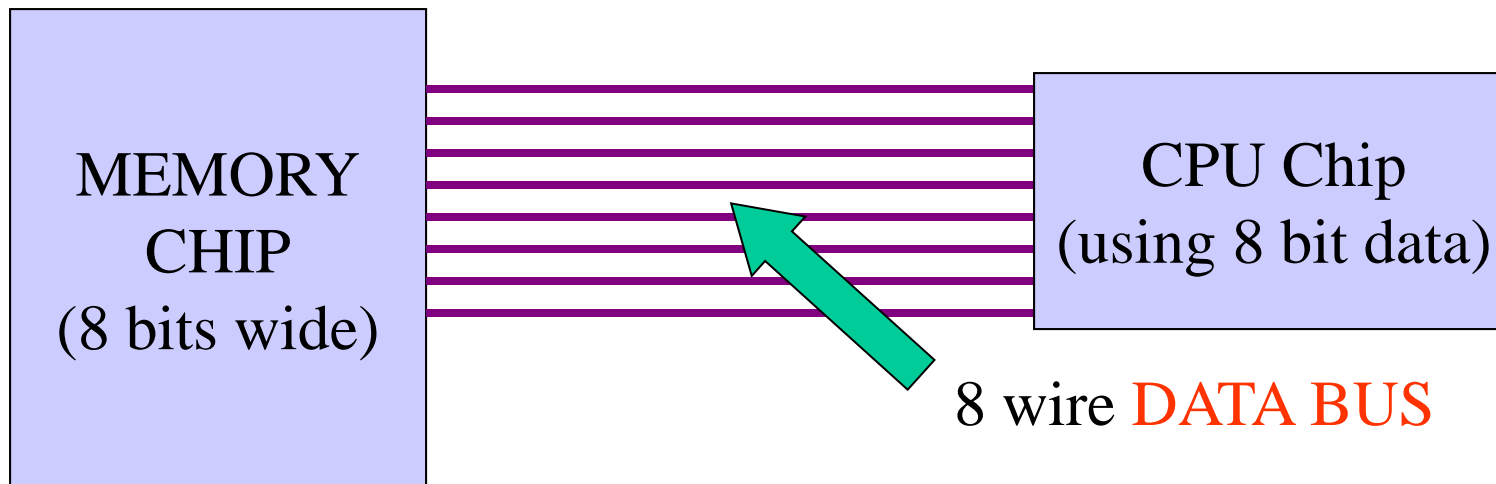
Programs

- **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**

