Programming I

Lecture 0: Course Overview

August 25, 2024

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Course Information

▶ **Course Name:**

　▶ Introduction to Programming

▶ **Pre-Requirements for the participation**

　▶ *Fundamentals of Computers*

▶ **Type of Course:**

　▶ Lecture with supporting weekly exercises to repeat and adapt the lecture contents and Projects

▶ **Slides and Extra Notes:**

　▶ Soft Version

Lecture Issues

- Lecture Times per Week
  - Sunday 05:30 – 07:00 AM (Lecture)
  - Sunday 07:00 – 08:30 AM (Lab and Exercises)
- Office hours
  - Monday 06:00 – 08:00 AM
  - Wednesday 04:30 – 07:00 PM
- Private appointment
  - Contact me through email.

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Assignments

▸ Weekly basis

▸ Rules
- The Assignments should be handover Before the deadline...
- You will work on the homework in Small groups
- There should be no copy and paste
- The copy and paste homework has zero points
- Don't Cheat Yourself, Please!!!...

Examination and Grading

- ▶ Exams
  - ▶ Mid-term Exam: **20%**
  - ▶ Final-term Exam: **60%**

- ▶ Others
  - ▶ Class Activity: **10%**
  - ▶ Homework: **10%**

Class Rules

- Full attendance
- Please come on time
- Turn off your mobile.

Don't disturb your classmate !!!!

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Problems and Question

▸ Place:
  ▸ Computer Science Faculty (Lecturer room)

▸ Internet contact :
  ▸ Mujtaba.cs01@gmail.com

Course Contents

▸ Introduction to Computers & Programming

▸ Introduction to C++ Programming

▸ Variable Concepts

▸ C++ Data Types

▸ Expressions and Interactivity

▸ Making Decision

▸ Looping

▸ Functions

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Literature

- Starting out with C++ Early Objects.
  - This book has been used as the main reference for compiling this syllabus.
- C++ How to Program.
- Let Us C

Why Program?

❑ **Computer:**

➢ Programmable machine designed to follow instructions.

❑ **Program/Software:**

➢ Instructions in computer memory to make it do something.

❑ **Programmer:**

➢ Person who writes instructions (programs) to make computer perform a task.

So, without programmers, no programs; without programs, the computer cannot do anything.
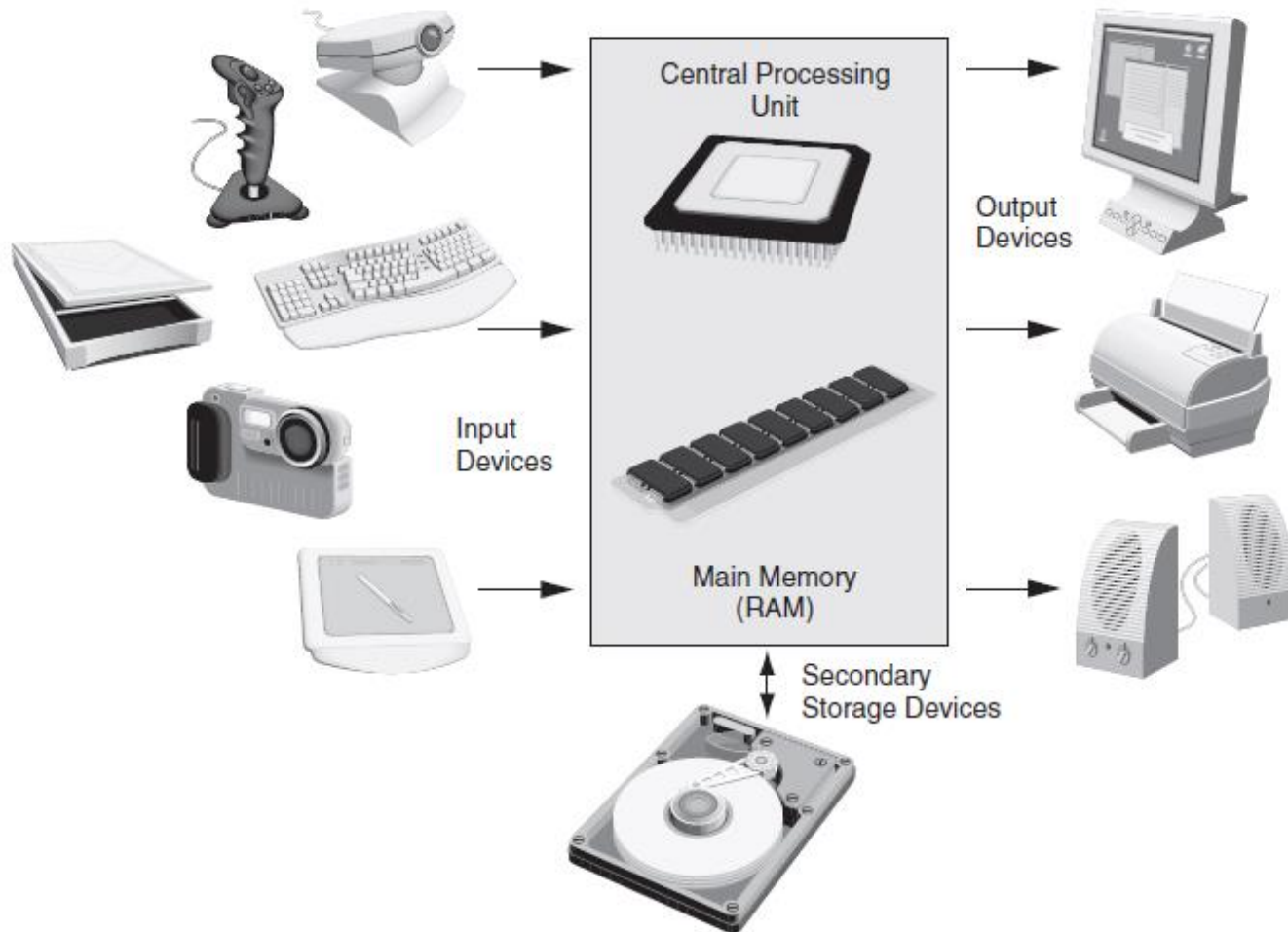
Computer Systems: Hardware & Software

❑ **Hardware:** Physical components of a computer.

❑ Main hardware categories:

▸ Central Processing Unit (CPU)

▸ Main memory (RAM)

▸ Secondary storage devices

▸ Input Devices

▸ Output Devices

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Main hardware component categories

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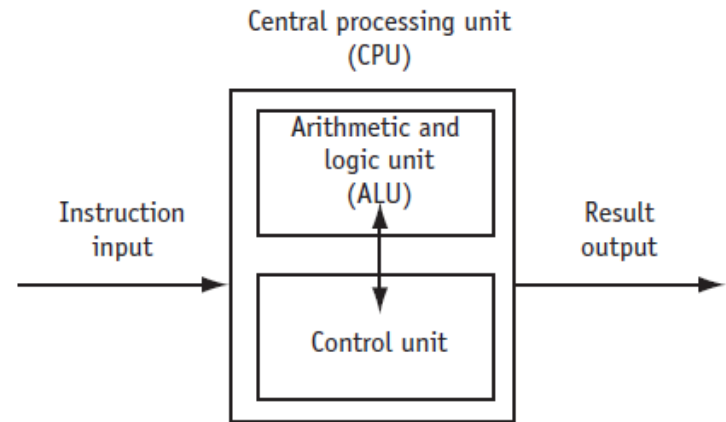
Central Processing Unit (CPU)

CPU: Hardware component that runs programs

Includes:

▸ Control Unit (CU)

    ▸ Retrieves and decodes program instructions

    ▸ Coordinates computer operations

▸ Arithmetic & Logic Unit (ALU)

    ▸ Performs mathematical operations

Main Memory

▸ Holds both program instructions and data

▸ **Volatile:** Erased when program terminates or computer is turned off.

▸ Also called Random Access Memory (RAM)

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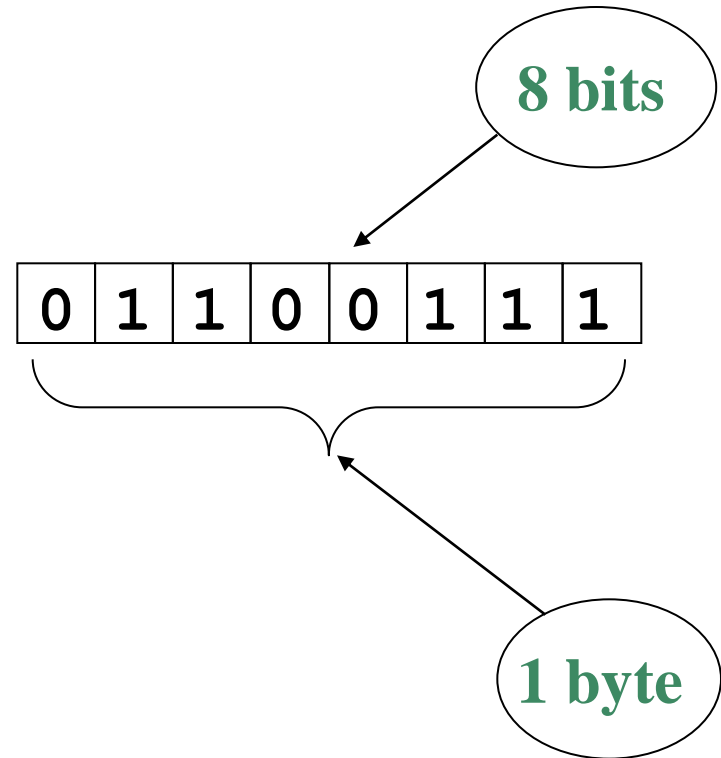
Main Memory Organization

▸ **Bit**
  ▸ Smallest piece of memory
  ▸ Stands for <u>b</u>inary dig<u>it</u>
  ▸ Has values 0 (off) or 1 (on)

▸ **Byte**
  ▸ Is 8 consecutive bits
  ▸ Has an address

▸ **Word**
  ▸ Usually 4 consecutive bytes

8 bits

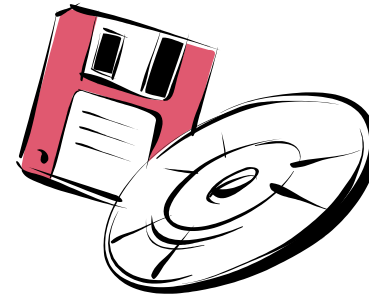| 0	1	1	0	0	1	1	1

1 byte

Secondary Storage

▸ **Non-volatile:** Data retained when program is not running or computer is turned off.

▸ Comes in a variety of media:

    i.   **Magnetic:** floppy or hard disk drive, internal or external

    ii.   **Optical:** CD or DVD drive

    iii.   **Flash:** USB flash drive

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Input Devices

▸ Used to send information to the computer from outside

▸ Many devices can provide input

  ▸ Keyboard, mouse, microphone, scanner, digital camera, disk drive, CD/DVD drive, USB flash drive

Output Devices

▸ Used to send information from the computer to the outside

▸ Many devices can be used for output

  ▸ Computer screen, printer, speakers, disk drive, CD/DVD recorder, USB flash drive

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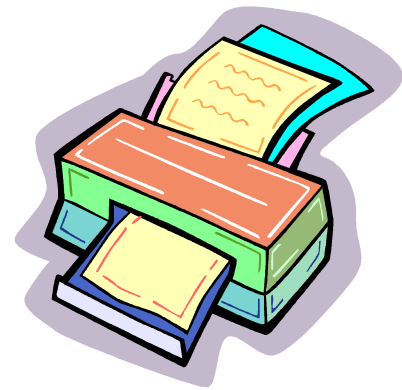
Software Programs that Run on a Computer

- ## **System software**

  - programs that manage the computer hardware and the programs that run on the computer

  - Operating Systems

    - Controls operation of computer
    - Manages connected devices
    - Runs programs

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Software Programs that Run on a Computer

▶ **System software**

- ▶ Utility Programs
  - ▶ Support programs that enhance computer operations
  - ▶ Examples: anti-virus software, data backup, data compression.

- ▶ Software development tools
  - ▶ Used by programmers to create software
  - ▶ Examples: compilers, integrated development environments (IDEs)

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Programs & Programming Languages

▶ Program
A set of instructions directing a computer to perform a task.

▶ Programming Language
A language used to write programs.

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Algorithm

‣ Algorithm:

A set of steps to perform a task or to solve a problem

‣ Order is important. Steps must be performed sequentially.

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From a High-level Program to an Executable file

i. Create file containing the program with a text editor.

ii. Run preprocessor to convert source file directives to source code program statements.

iii. Run compiler to convert source program statements into machine instructions.

iv. Run linker to connect hardware-specific library code to machine instructions, producing an executable file.

▸ Steps ii through iv are often performed by a single command or button click.

▸ Errors occurring at any step will prevent execution of the following steps.

From a High-level Program to an Executable file

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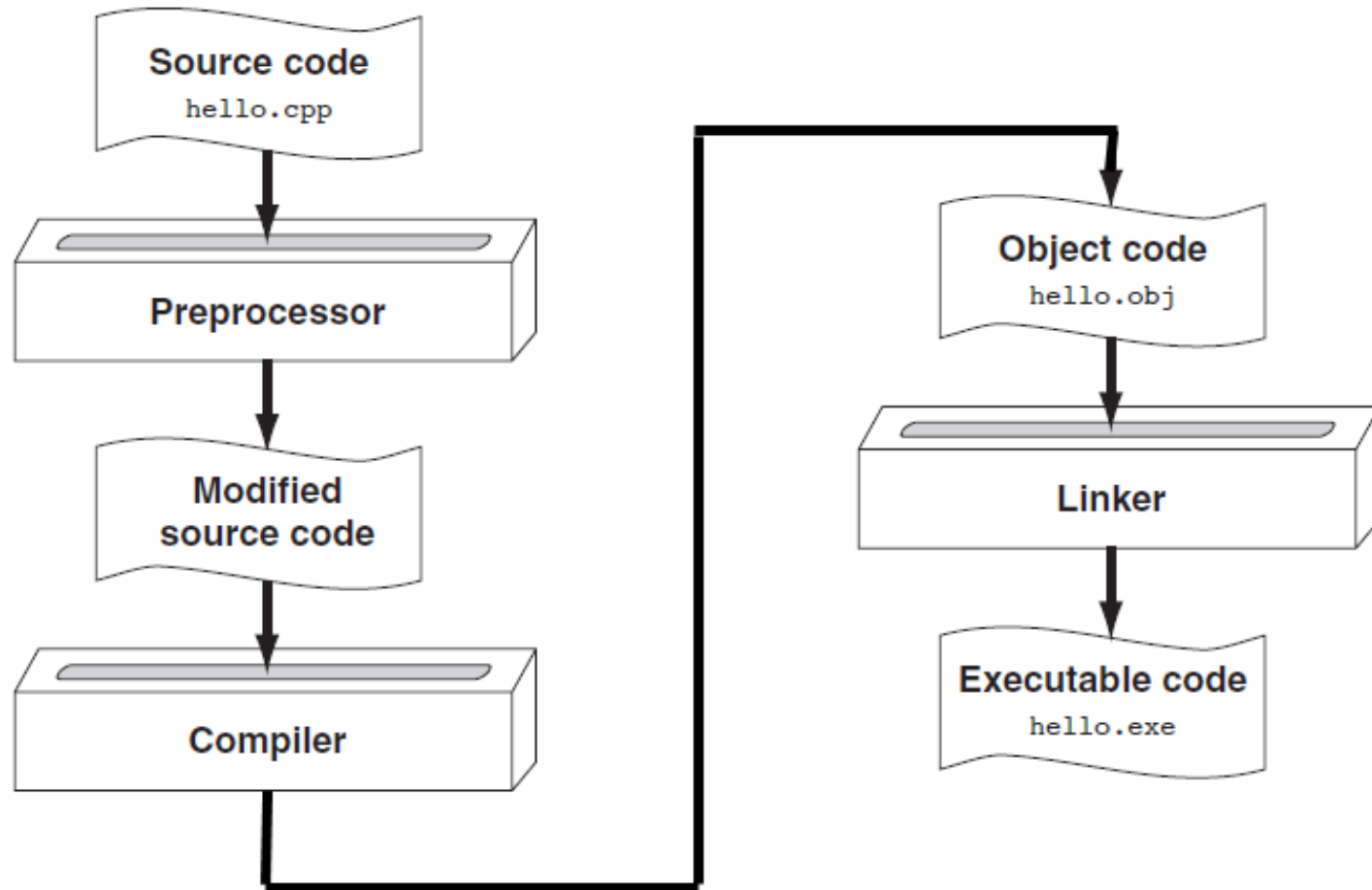
Home Work

▸ Create groups until next week. (Maximum of two students)

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References

▸ Starting out with C++ Early Objects.

Questions…?

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