INTRODUCTION TO COMPUTER PROGRAMMING

Sevil ŞEN

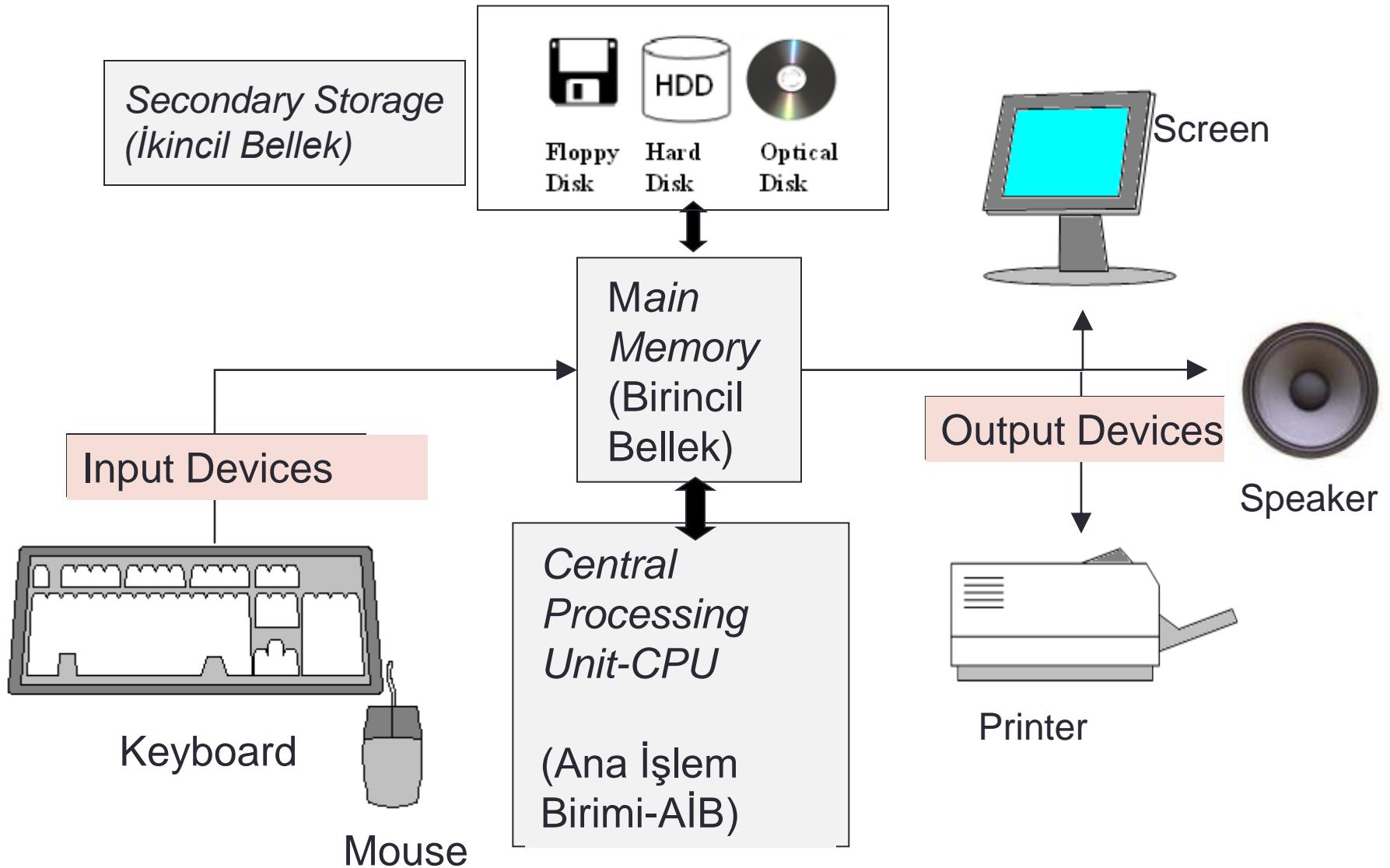Hacettepe University

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Content

- Basic concepts in computer programming

- Developing algorithms (*algoritma*)

- Creating flowcharts (*iş akış çizelgesi*)

- Computer Programming Language : C

  - Data types   (*veri türleri*), Variables (*değişkenler*)
  - Basic instructions   (*temel komutlar*)
  - Control flow instructions (*koşul ve döngü komutları*)
  - Functions   (*işlevler*)
  - Arrays   (*diziler*)
  - File Operations   (*kütük işlemleri*)
  - Pointers   (*göstergeler*)

Books

- Problem Solving and Program Design in C
  'Jeri R. Hanly, Elliot B. Koffman'

- The C Programming Language
  'Brian W. Kernighan, Dennis M. Ritchie'

Computer Structure

Secondary Storage
(İkincil Bellek)

Floppy Disk   Hard Disk   Optical Disk

Screen

Main Memory
(Birincil Bellek)

Output Devices

Speaker

Input Devices

Central Processing Unit-CPU

(Ana İşlem Birimi-AİB)

Keyboard

Mouse

Printer

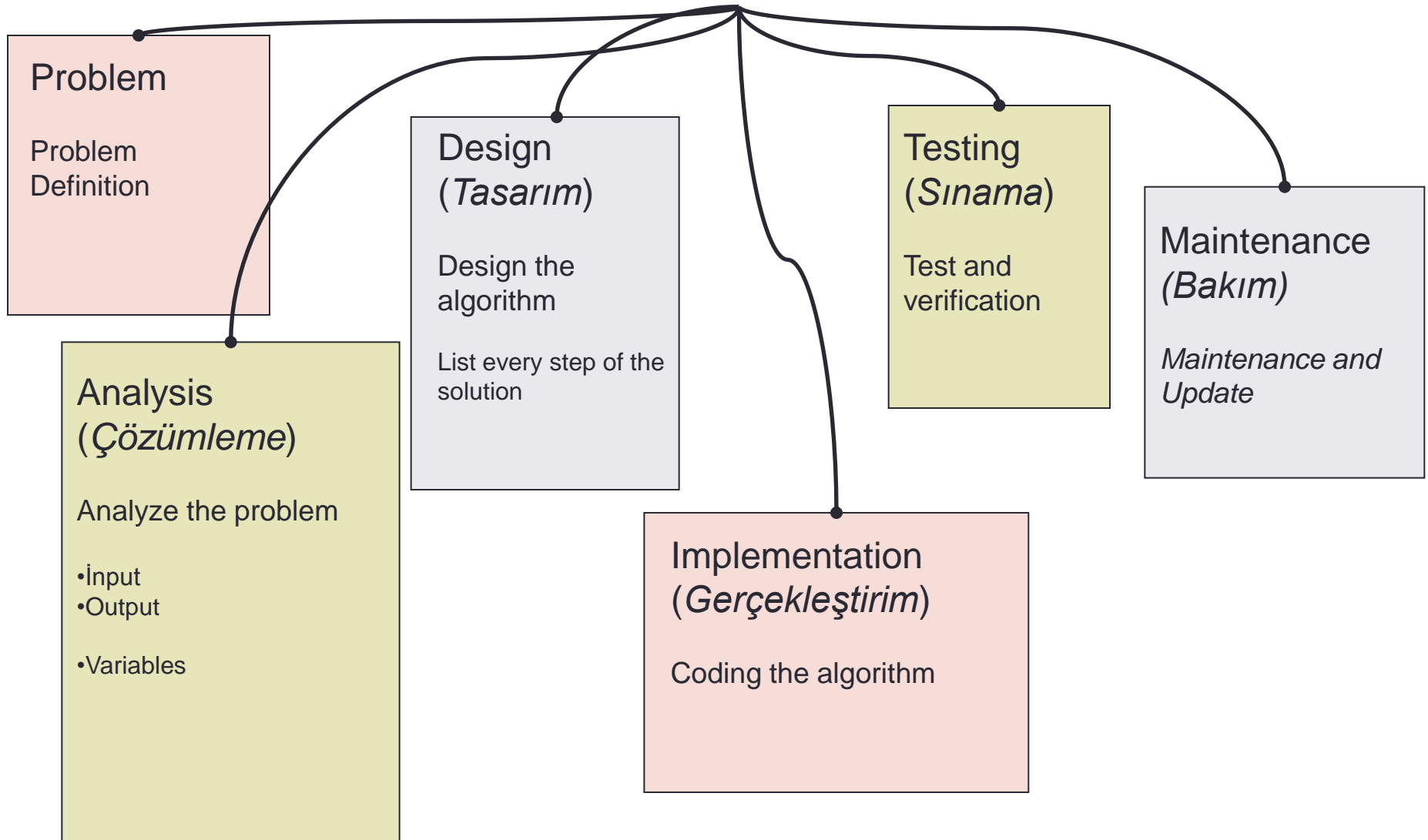# Computer Systems

- A computer **program** is…
  - A set of instructions for a computer to follow

- Computer **software** is …
  - The collection of programs used by a computer
    - Includes:
      - Editors
      - Translators
      - System Managers

- An **algorithm** is
  - A sequence of precise instructions which leads to a solution
  - Program is an algorithm expressed in a language that the computer can understand

Pseudocode

- Pseudocode

  - Artificial, informal language that helps us develop algorithms
  - Similar to everyday English
  - Not actually executed on computers
  - Helps us "think out" a program before writing it
    - Easy to convert into a corresponding C++ program
    - Consists only of executable statements

Software Development

Problem

Problem Definition

Analysis (*Çözümleme*)

Analyze the problem

•İnput
•Output

•Variables

Design (*Tasarım*)

Design the algorithm

List every step of the solution

Implementation (*Gerçekleştirim*)

Coding the algorithm

Testing (*Sınama*)

Test and verification

Maintenance (*Bakım*)

Maintenance and Update

Program Design

- Programming is a creative process
  - No complete set of rules for creating a program

- Program Design Process
  - Problem Solving Phase
    - Result is an algorithm that solves the problem
  - Implementation Phase
    - Result is the algorithm translated into a programming language

Problem Solving State

- Be certain the task is completely specified
  - What is the input?
  - What information is in the output?
  - How is the output organized?

- Develop the algorithm before implementation
  - Experience shows this saves time in getting your program to run.
  - Test the algorithm for correctness

Implementation State

- Translate the algorithm into a programming language
  - Easier as you gain experience with the language

- Compile the source code
  - Locates errors in using the programming language

- Run the program on sample data
  - Verify correctness of results

- Results may require modification of the algorithm and program

Flowchart – İş Akış Çizgesi

- A **flowchart** is a type of diagram, that represents an algorithm or process.

  - The steps of algorithms and data → boxes of various kinds

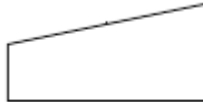 - The order of steps → connecting these with arrows.
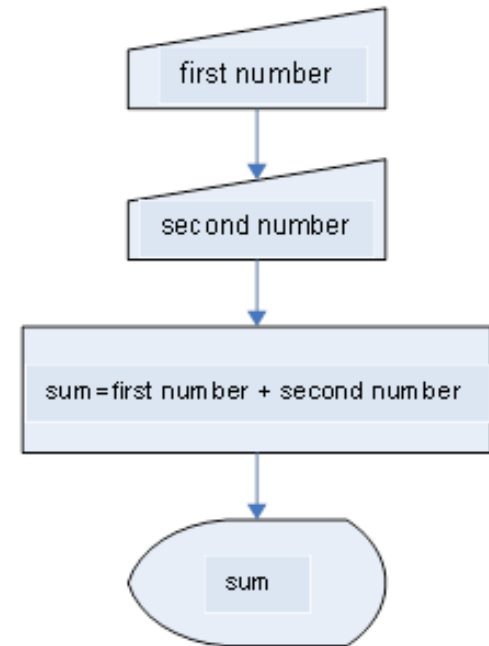
Basic Symbols Used in Flowcharts 1/2
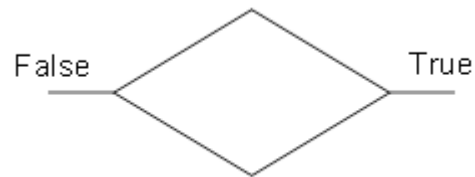
Start / Stop

Input

Sequence

Output

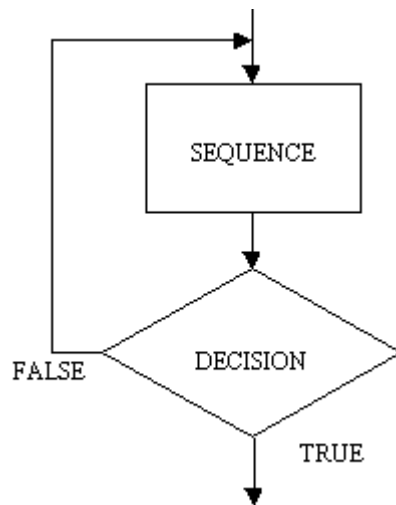# Basic Symbols Used in Flowcharts 1/2

Decision

False — ◇ — True

Repeat

⬡

Repeat Loop

SEQUENCE
FALSE — DECISION — TRUE

While Loop

DECISION — FALSE
TRUE
SEQUENCE