Overview of Computers and Programming
Chapter 1

Problem Solving & Program Design in C

Eighth Edition

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Memory

- memory cell
  - an individual storage location in memory
- address of a memory cell
  - the relative position of a memory cell in the computer's main memory
- contents of a memory cell
  - the information stored in a memory cell, either a program instruction or data
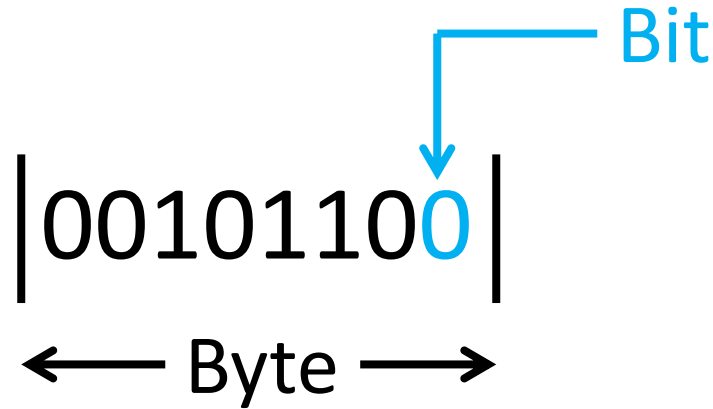
Figure 1.4

1000 Memory Cells in Main Memory

Memory

Address	Contents
0	−27.2
1	354
2	0.005
3	−26
4	H
⋮	⋮
998	X
999	75.62

Memory

- stored program concept
  - a computer's ability to store program instructions in main memory for execution

- byte
  - the amount of storage required to store a single character

- bit
  - a binary digit, a 0 or a 1

Figure 1.5
Relationship Between a Byte and a Bit

Computer Software

- Operating System

- Application Software

- Computer Languages

- Executing a Program

Operating System

- operating system (OS)
  - software that controls interaction of user and computer hardware and that manages allocation of computer resources

- booting a computer
  - loading the operating system from disk into memory

Computer Languages

- machine language
  - binary number codes understood by a specific CPU
- assembly language
  - mnemonic codes that correspond to machine language instructions
- high-level language
  - machine-independent programming language that combines algebraic expressions and English symbols
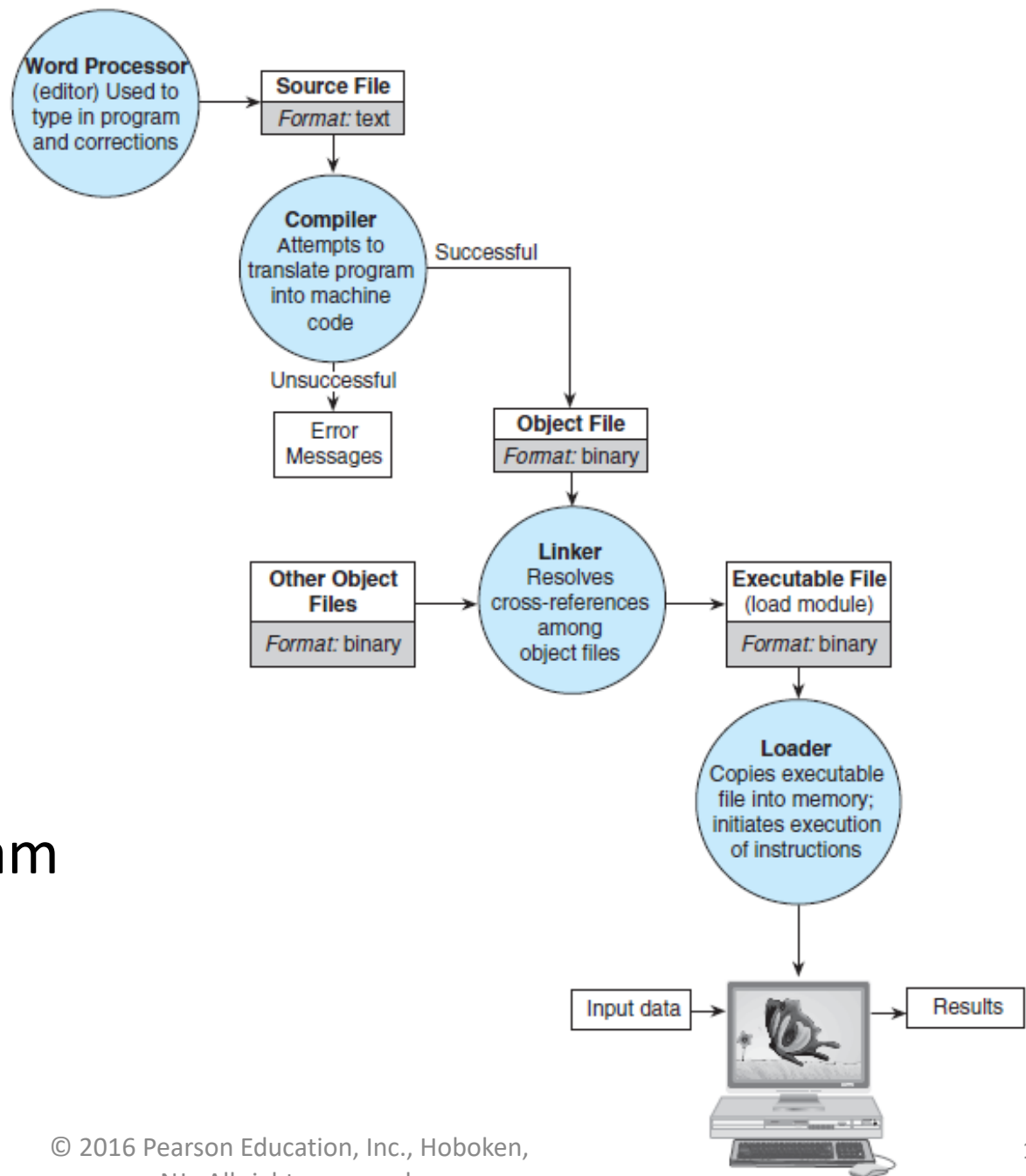
Computer Languages

- compiler
  - software that translates a high-level language program into machine language
- source file
  - file containing a program written in a high-level language; the input for a compiler
- syntax
  - grammar rules of a programming language
- object file
  - file of machine language instructions that is the output of a compiler

Computer Languages

- linker
  - software that combines object files and resolves cross-references to create an executable machine language program

- integrated development environment (IDE)
  - software package combining a word processor, compiler, linker, loader, and tools for finding errors

Figure 1.11

Entering, Translating, and Running a High-Level Language Program

Word Processor (editor) Used to type in program and corrections

Source File — *Format:* text

Compiler Attempts to translate program into machine code

Successful

Unsuccessful

Error Messages

Object File — *Format:* binary

Other Object Files — *Format:* binary

Linker Resolves cross-references among object files

Executable File (load module) — *Format:* binary

Loader Copies executable file into memory; initiates execution of instructions

Input data

Results

Executing a Program

- input data
  - the data values that are scanned by a program

- program output
  - the lines displayed by a program