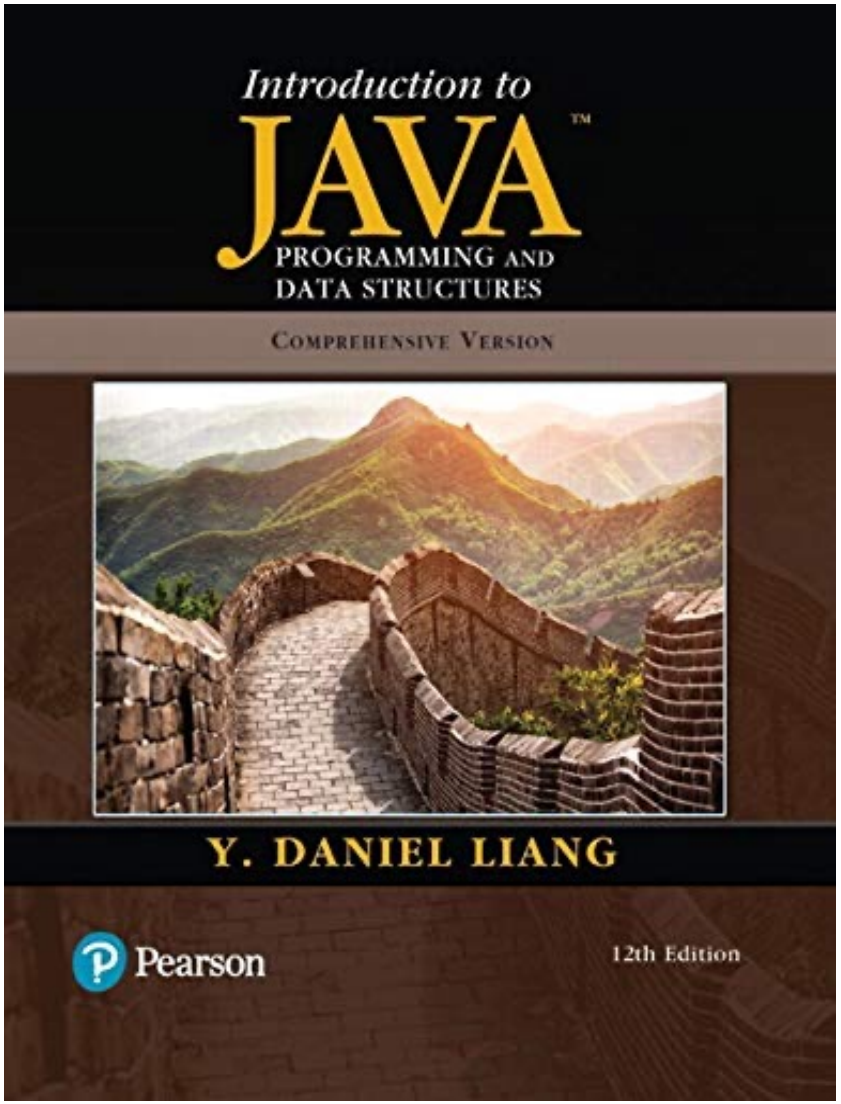
Textbook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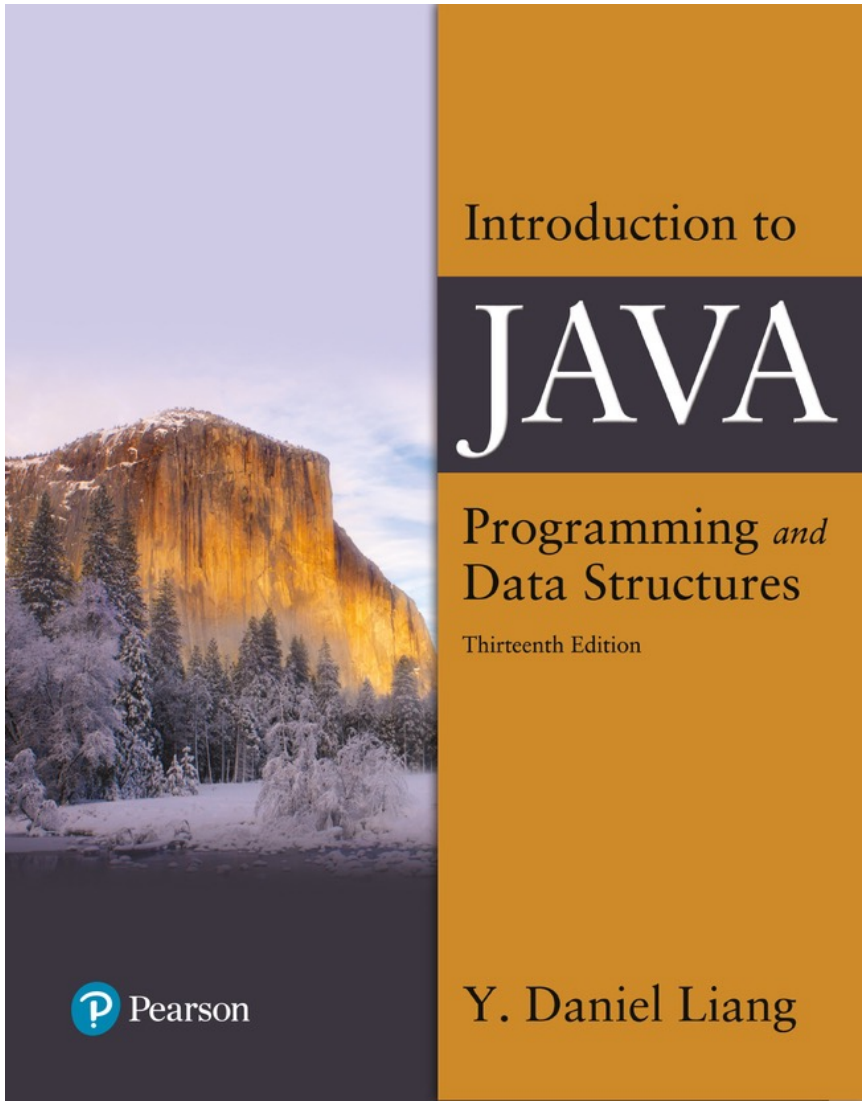
Introduction to
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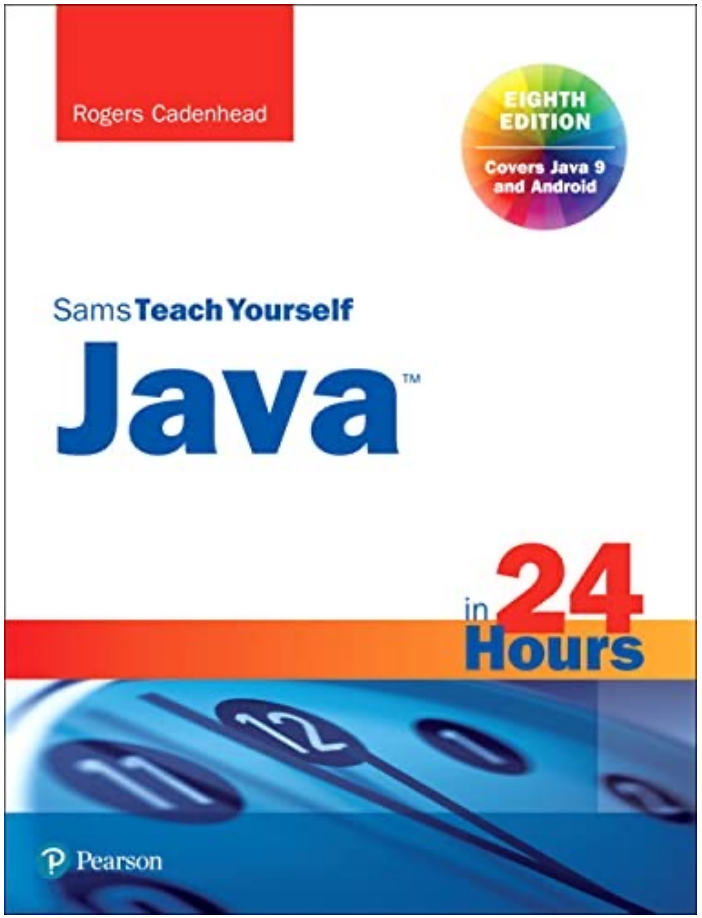
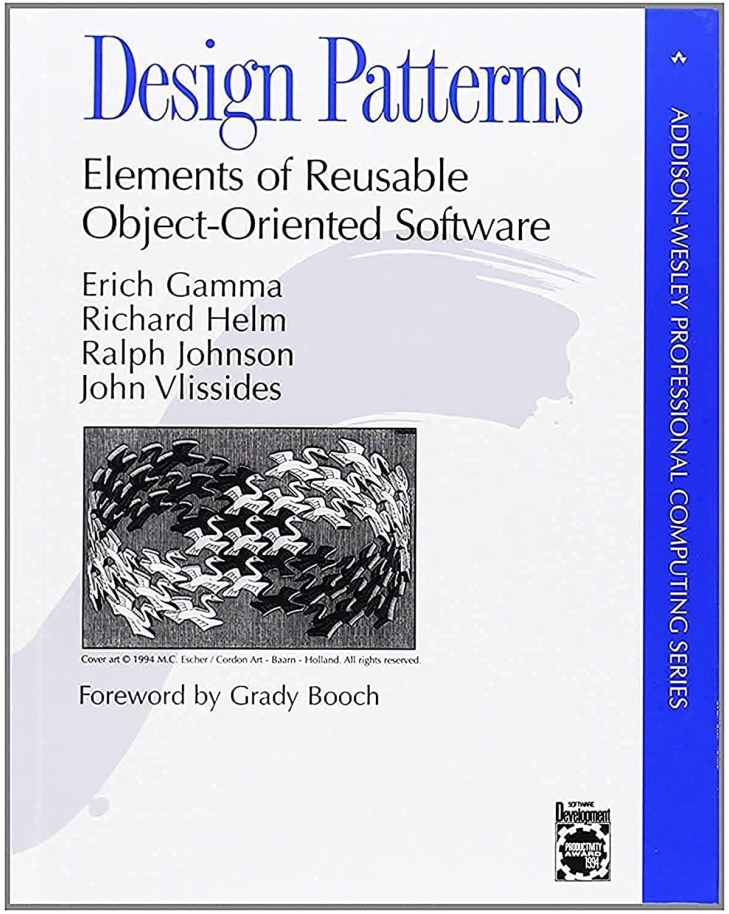
Supplementary Materials



For Beginners



For Advanced Users

Northeastern University

Lecture 1: Fundamentals of Programming - 1

Prof. Chen-Hsiang (Jones) Yu, Ph.D.

College of Engineering

Materials are edited by Prof. Jones Yu from Prof. Charlie Wiseman's materials.

Outline

- Introduction to Computation and Programming
- Variables, I/O, Types and Strings
- Control Flow and Conditions
- Methods
- Arrays
- File I/O

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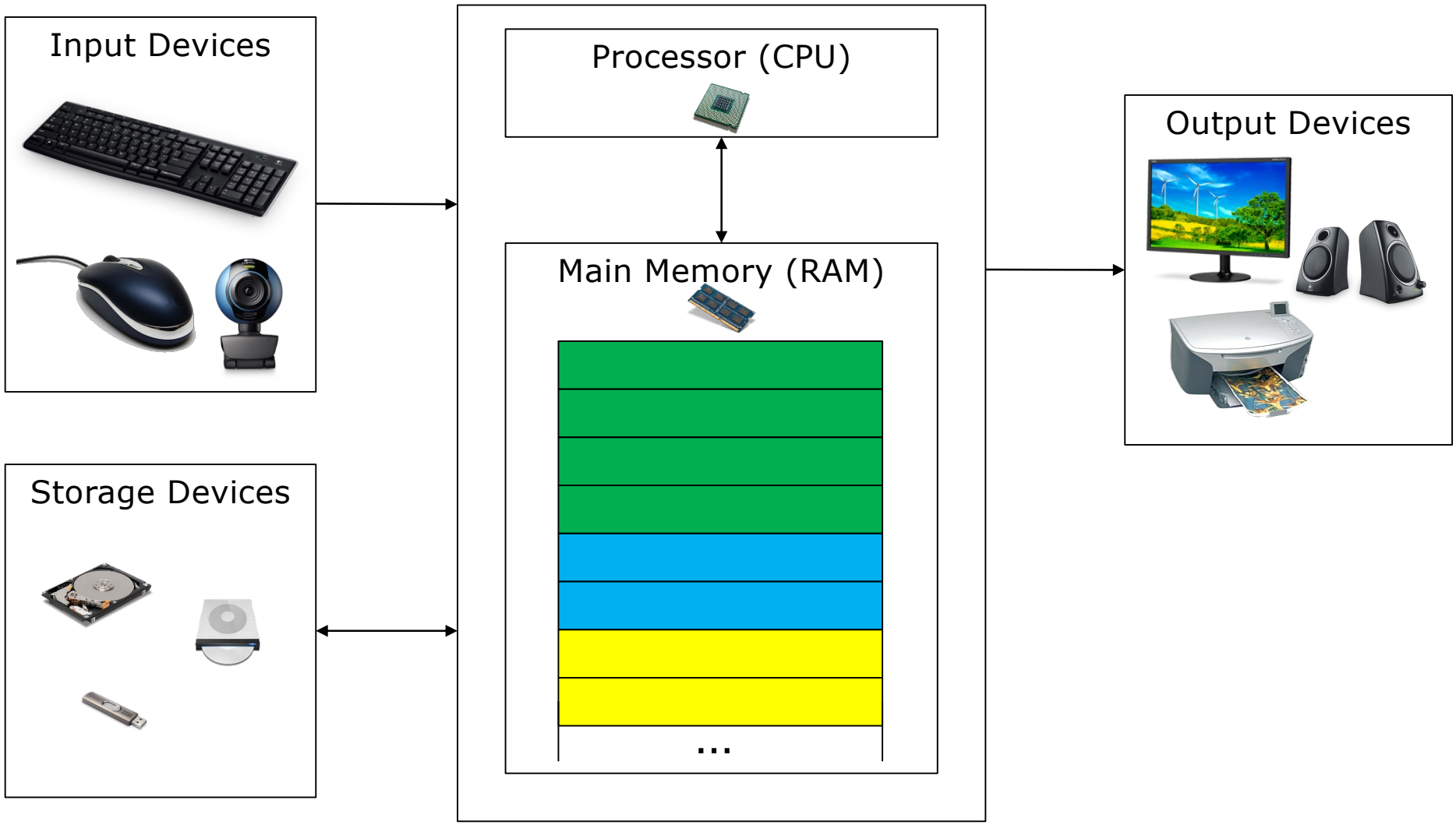
Introduction to Computation and Programming

What Makes Up a Computer?

- Hardware
  - » Physical components
  - » Wide variety of types and manufacturers
  - » Abstracted to a simple set of ideas for Computer Science
- Software
  - » Programs (i.e., instructions)
  - » Wide variety of purposes
  - » The focus of this course

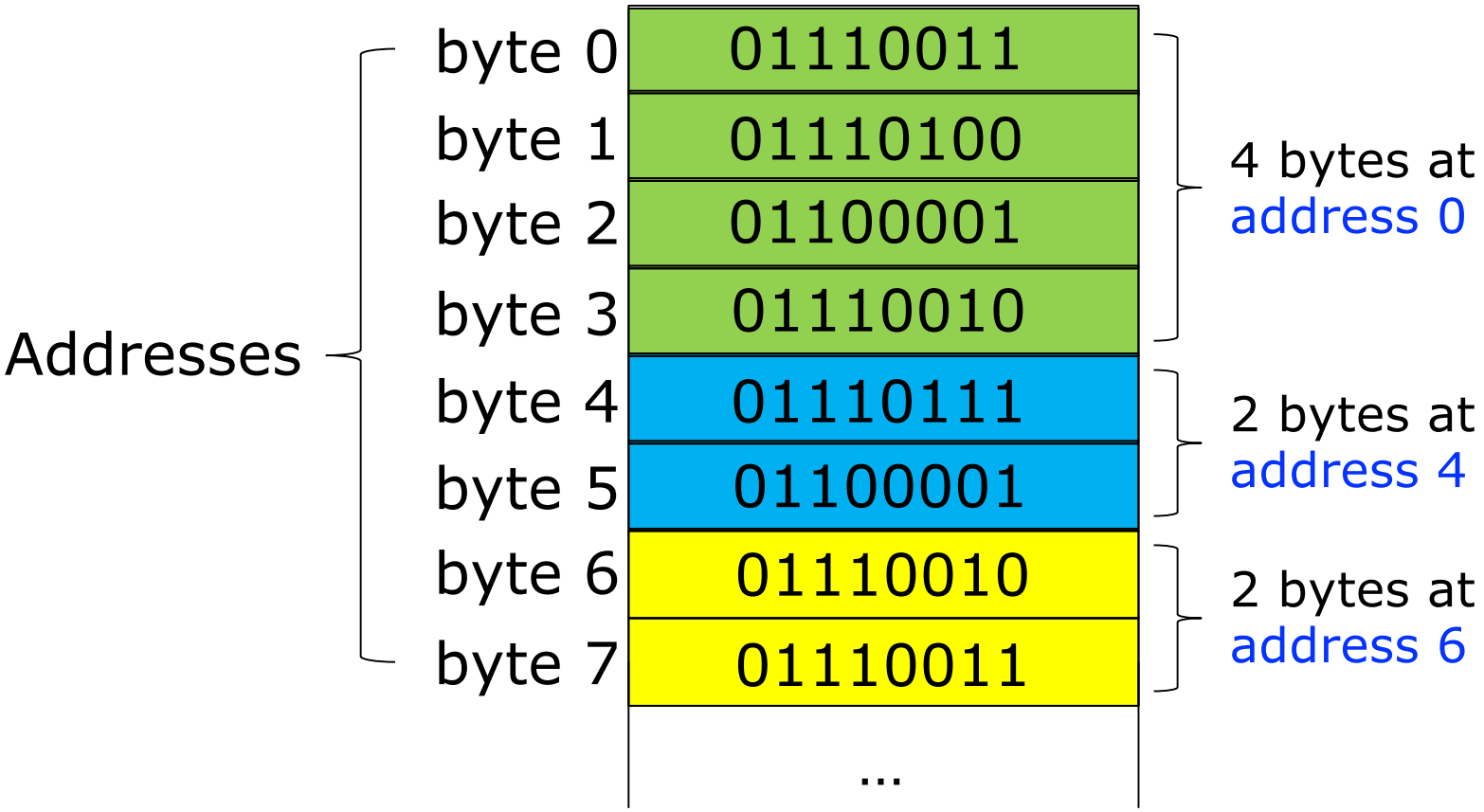
High Level View



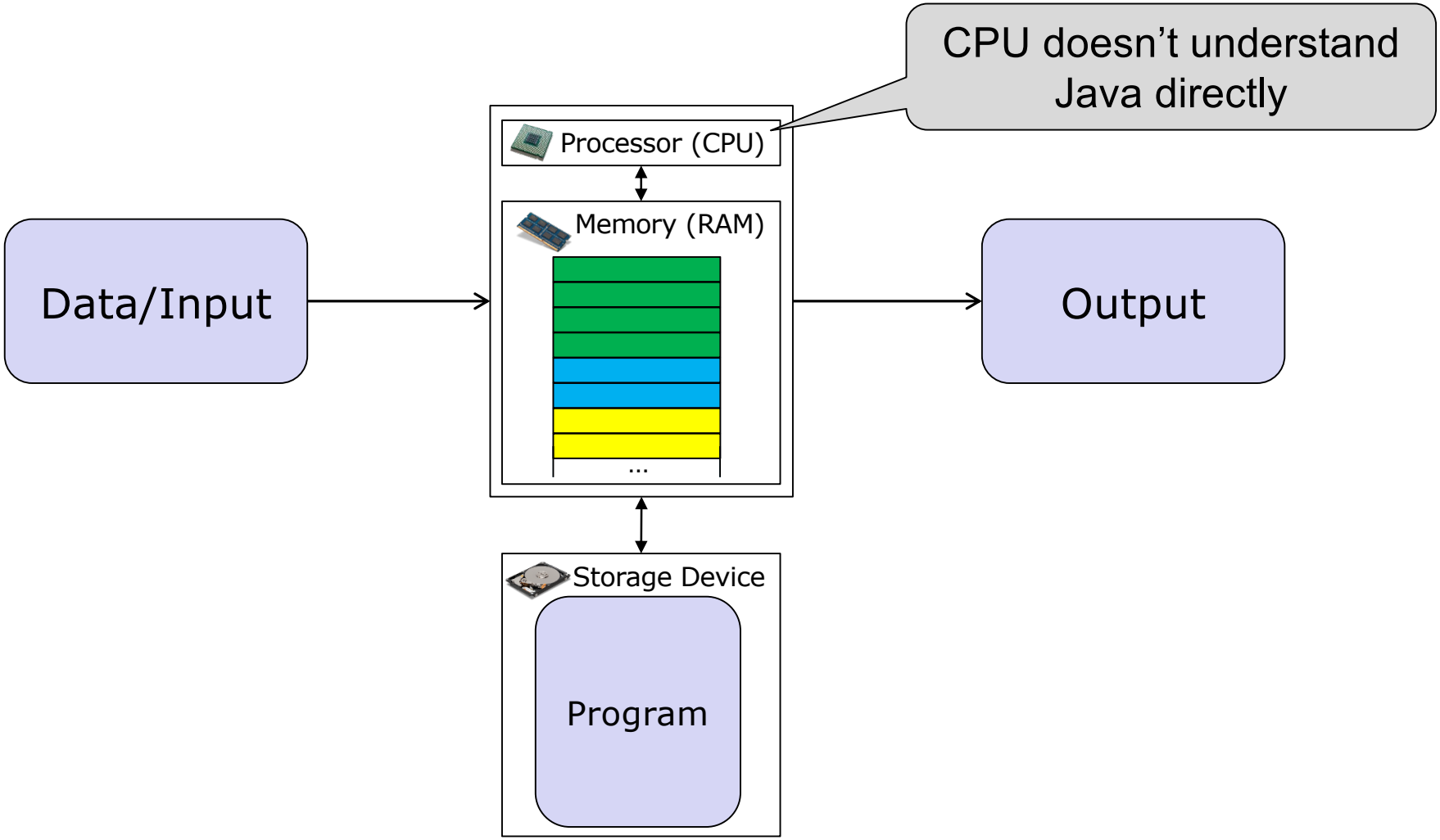
What Makes Up a Computer? (cont.)

- This architecture is called von Neumann architecture, also known as the von Neumann model or Princeton architecture.
- It is a computer architecture proposed in 1945 by John von Neumann and others in the First Draft of a Report on the EDVAC.
- The main idea of the architecture has not changed since then.

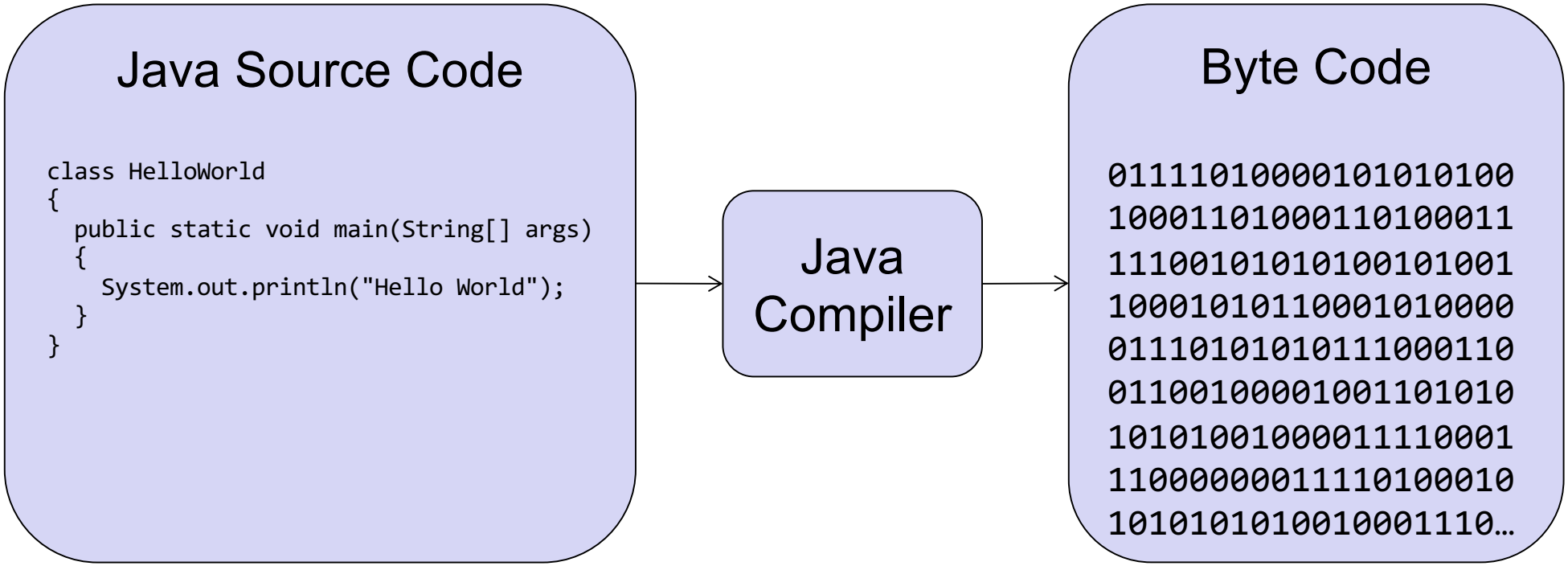
Main Memory (RAM)



Running a Program



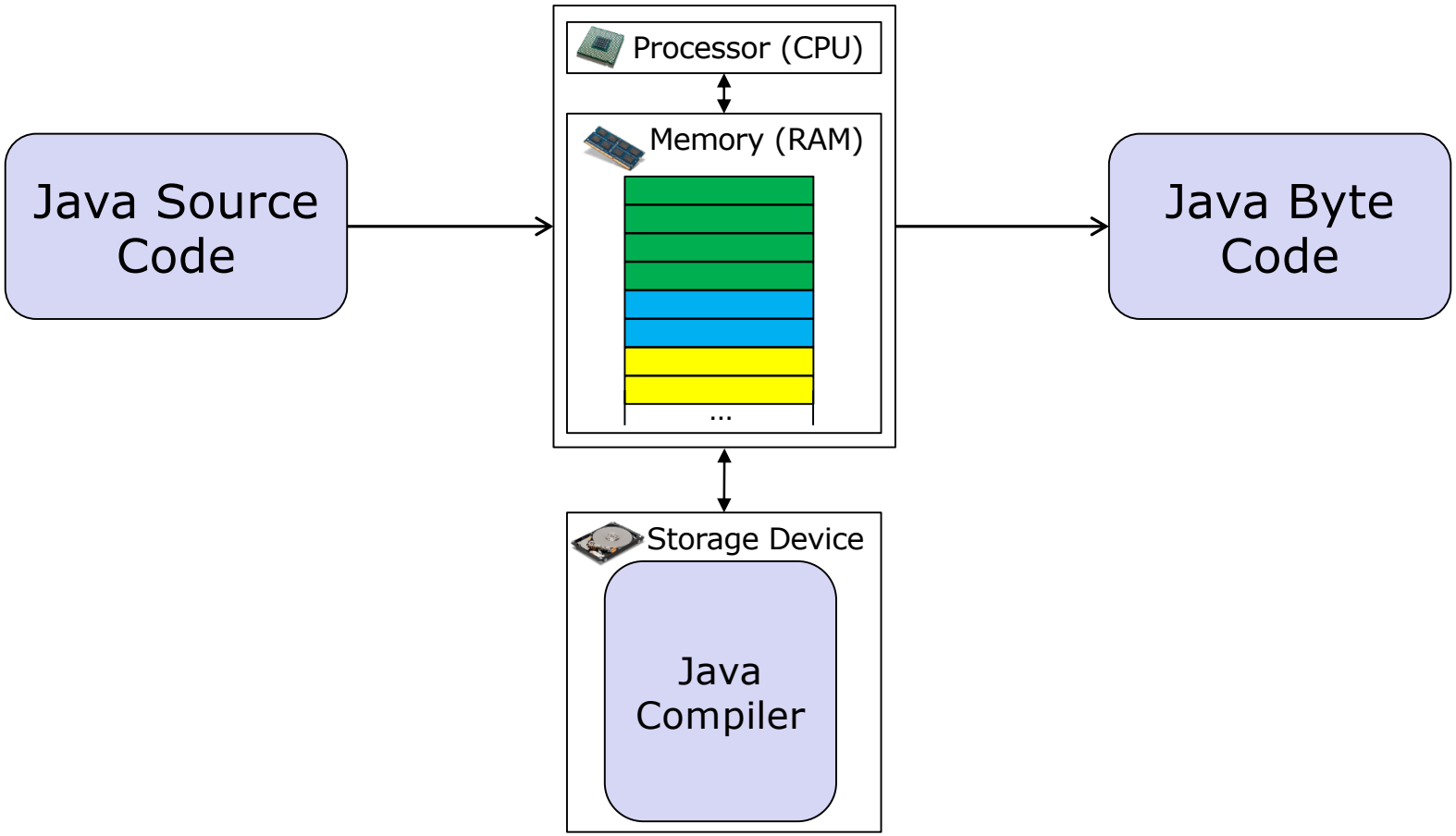
Compilers


Java Source Code
class HelloWorld
{
public static void main(String[] args)
{
System.out.println("Hello World");
}
}
Java Compiler
Byte Code
01111010000101010100
10001101000110100011
11100101010100101001
10001010110001010000
01110101010111000110
01100100001001101010
10101001000011110001
11000000011110100010
10101010100100011110…

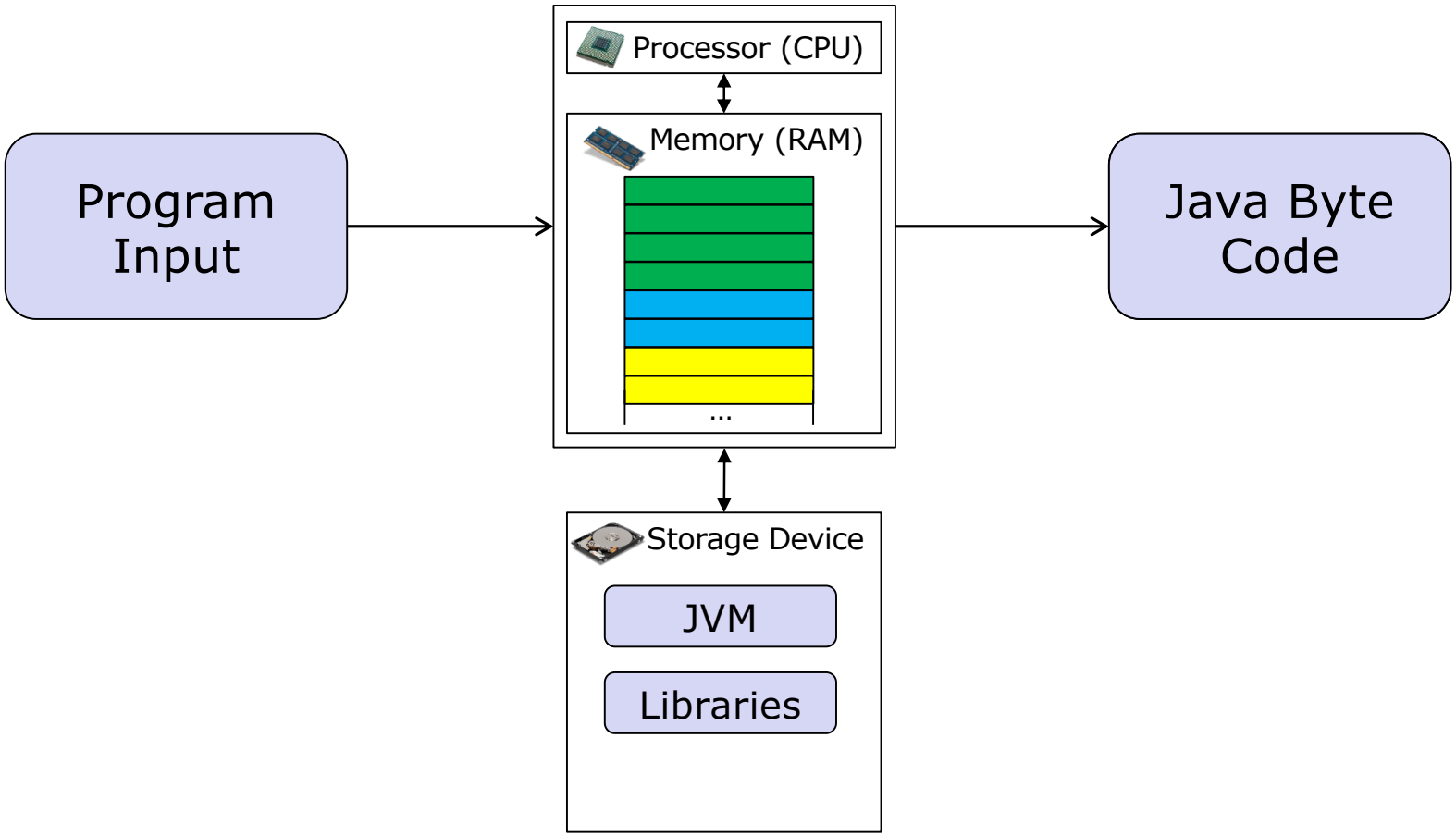
Java Virtual Machine

- Java byte code also can't be executed by a CPU directly.
- Instead, the Java Virtual Machine (JVM) is another program that interprets the byte code and translates it into the native CPU language.
  - » Allows a program to be compiled once and run on all types of computers (that have a JVM available and installed)
- Other high level languages work differently.

Building a Java Program



Running a Java Program



Take Home Points

- Computers have 5 main components: Processor, Main Memory, Input Devices, Output Devices, Storage Devices
- 1 byte = 8 bits (binary digits)
- Main Memory is a sequence of bytes, each with a memory address
- The Java compiler turns source code into byte code.
- The JVM uses byte code along with additional libraries to execute your program.