

INTRO TO PROGRAMMING

1. Elements of Programming

2. Functions

3. OOP

4. Data Structures

COMPUTER SCIENCE

5. Theory of Computing

6. A Computing Machine

7. Building a Computer

BEYOND

8. Systems

9. Scientific Computation

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3. OBJECT-ORIENTED PROGRAMMING

Overview. In object-oriented programming, we write Java code to create new data types, specifying the values and operations to manipulate those values. The idea originates from modeling (in software) real-world entities such as electrons, people, buildings, or solar systems and extends readily to modeling abstract entities such as bits, numbers, programs or operating systems.

- [3.1 Using Data Types](#) describes how to use existing reference data types, for text processing image processing.
- [3.2 Creating Data Types](#) describes how to create user-defined data types using Java's class mechanism.
- [3.3 Designing Data Types](#) considers important techniques for designing data types, emphasizing APIs, encapsulation, immutability, and design-by-contract.
- [3.4 Case Study: N-Body Simulation](#) presents a case study that simulates the motion of n particles, subject to Newton's laws of gravity.

Java programs in this chapter. Below is a list of Java programs in this chapter. Click on the program name to access the Java code; click on the reference number for a brief description; read the textbook for a full discussion.

REF	PROGRAM	DESCRIPTION
3.1.1	PotentialGene.java	identifying a potential gene
3.1.2	AlbersSquares.java	Albers squares
3.1.3	Luminance.java	luminance library
3.1.4	Grayscale.java	converting color to grayscale
3.1.5	Scale.java	image scaling
3.1.6	Fade.java	fade effect
3.1.7	Cat.java	concatenating files
3.1.8	StockQuote.java	screen scraping for stock quotes
3.1.9	Split.java	splitting a file
3.2.1	Charge.java	charged-particle data type
3.2.2	Stopwatch.java	stopwatch data type
3.2.3	Histogram.java	histogram data type
3.2.4	Turtle.java	turtle graphics data type
3.2.5	Spiral.java	spira mirabilis
3.2.6	Complex.java	complex number data type
3.2.7	Mandelbrot.java	Mandelbrot set
3.2.8	StockAccount.java	stock account data type
3.3.1	Complex.java	complex number data type (revisited)
3.3.2	Counter.java	counter data type
3.3.3	Vector.java	spatial vector data type
3.3.4	Sketch.java	document sketch data type
3.3.5	CompareDocuments.java	similarity detection
3.4.1	Body.java	gravitational body data type
3.4.2	Universe.java	n-body simulation

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