

18 Recursion

Objectives

In this chapter you'll:

- Learn the concept of recursion.
- Write and use recursive methods.
- Determine the base case and recursion step in a recursive algorithm.
- Learn how recursive method calls are handled by the system.
- Learn the differences between recursion and iteration, and when to use each.
- Learn what fractals are and how to draw them using recursion and JavaFX's `Canvas` and `GraphicsContext` classes.
- Learn what recursive backtracking is and why it's an effective problem-solving technique.

Outline

1. 18.1 Introduction
2. 18.2 Recursion Concepts
3. 18.3 Example Using Recursion: Factorials
4. 18.4 Reimplementing Class `FactorialCalculator` Using `BigInteger`

5. 18.5 Example Using Recursion: Fibonacci Series
6. 18.6 Recursion and the Method-Call Stack
7. 18.7 Recursion vs. Iteration
8. 18.8 Towers of Hanoi
9. 18.9 Fractals
 1. 18.9.1 Koch Curve Fractal
 2. 18.9.2 (Optional) Case Study: Lo Feather Fractal
 3. 18.9.3 (Optional) **Fractal** App GUI
 4. 18.9.4 (Optional) FractalController Class
10. 18.10 Recursive Backtracking
11. 18.11 Wrap-Up
 1. Summary
 2. Self-Review Exercises
 3. Answers to Self-Review Exercises
 4. Exercises