

19.1 Introduction

Searching data involves determining whether a value (referred to as the **search key**) is present in the data and, if so, finding its location. Two popular search algorithms are the simple linear search and the faster but more complex binary search. **Sorting** places data in ascending or descending order, based on one or more **sort keys**. A list of names could be sorted alphabetically, bank accounts could be sorted by account number, employee payroll records could be sorted by social security number, and so on. This chapter introduces two simple sorting algorithms, the selection sort and the insertion sort, along with the more efficient but more complex merge sort. [Figure 19.1](#) summarizes the searching and sorting algorithms discussed in the examples and exercises of this book.



Software Engineering Observation 19.1

In apps that require searching and sorting, use the predefined capabilities of the Java Collections API ([Chapter 16](#)). The techniques in this chapter are provided to introduce students to the concepts behind searching and sorting algorithms—upper-level computer-science courses typically discuss such

algorithms in detail.

Chapter	Algorithm	Location
<i>Searching Algorithms:</i>		
16	<code>binarySearch</code> method of class <code>Collections</code>	Fig. 16.12
19	Linear search	Section 19.2
	Binary search	Section 19.4
	Recursive linear search	Exercise 19.8
	Recursive binary search	Exercise 19.9
21	Linear search of a <code>List</code>	Exercise 21.21
	Binary tree search	Exercise 21.23
16	<code>sort</code> method of class <code>Collections</code>	Figs. 16.6–16.9
	<code>SortedSet</code> collection	Fig. 16.16
19	Selection sort	Section 19.6
	Insertion sort	Section 19.7
	Recursive merge sort	Section 19.8
	Bubble sort	Exercises 19.5 and 19.6
	Bucket sort	Exercise 19.7
	Recursive quicksort	Exercise 19.10
21	Binary tree sort	Section 21.7

Fig. 19.1

Searching and sorting algorithms covered in this text.

A Note About Counter-Controlled for Loops in the Examples

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Throughout this chapter, we use many counter-controlled for loops to demonstrate the mechanics of searching and sorting with various algorithms. Many of these loops now can be implemented using Java SE 8's streams capabilities ([Chapter 17](#)).