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## CHAPTER 9



# Algorithm Optimization

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At the heart of some applications lie specialized algorithms designed for a specific domain and based on assumptions that do not hold universally. Other applications rely on well-tested algorithms that fit many domains and have been relevant for decades in the entire field of computer software. We believe that every software developer can benefit and obtain insight from some of the crown jewels of algorithms research, as well as the algorithm categories on which software frameworks are based. Although some parts of this chapter might be somewhat difficult if you do not have a strong mathematical background, they are well worth the effort.

This chapter gently brushes against some of the pillars of computer science and reviews several examples of immortal algorithms and their complexity analysis. Supplied with these examples, you should feel more comfortable using existing algorithms, adapting them to your needs, and inventing your own.

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**Note** This is not a textbook on algorithms research, nor an introductory text into the most important algorithms in modern computer science. This chapter is deliberately short to make it explicitly clear that you cannot learn from it all you need to know. We have not delved into formal definitions in any detail. For example, our treatment of Turing machines and languages is not at all rigorous. For a textbook introduction to algorithms, consider Cormen, Leiserson, Rivest, and Stein's "Introduction to Algorithms" (MIT Press, 2001) and Dasgupta, Papadimitriou, and Vazirani's "Algorithms" (soon to appear, currently available online as a draft).

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