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Abstract

In this book we present the fundamental data structures, which are widely used in a variety of applications. Emphasis is placed both on the theoretical development of basic techniques for designing and analyzing data structures and on the implementation of efficient programs. The purpose of the book is to provide readers with an understanding of the operation of important data structures and their applications, and to familiarize them with basic techniques for designing and analyzing data structures and algorithms. In addition, the book provides implementations in the Java programming language. Java was chosen for two reasons. First, a significant amount of software produced for modern systems is developed in Java. Second, we take advantage of the use of object-oriented design to represent data structures through abstract data types. The material in the book is divided into three parts. In the first part (Chapters 1-4), basic concepts and techniques for designing and analyzing data structures and algorithms are introduced. Elementary data structures are also introduced, which form the basis of the more advanced methods discussed in the next two parts. In the second and main part of the book (Chapters 5-12), we analyze the most important data structures used today (stacks and queues, priority queues, search trees, hash tables, etc.). In the third part (Chapters 13-15), we discuss more advanced issues of designing and analyzing efficient data structures. The book is mainly addressed to computer science students in the first two years of the first cycle of studies (undergraduate students), who have acquired basic knowledge on computer programming and computer operation, but also to interested professionals. In addition, the third part of the book can be covered in courses of older semesters or even in the context of a corresponding postgraduate course.