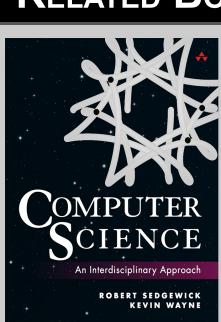
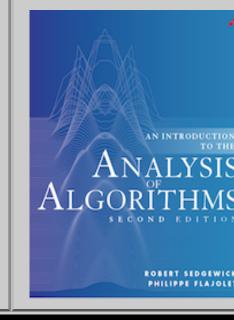


ALGORITHMS, 4TH EDITION

- 1. Fundamentals
- 2. Sorting
- 3. Searching
- 4. Graphs
- 5. Strings
- 6. Context

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Programming Assignments

1. FUNDAMENTALS

Overview. The objective of this book is to study a broad variety of important and useful *algorithms*—methods for solving problems that are suited for computer implementations. Algorithms go hand in hand with *data structures*—schemes for organizing data. This chapter introduces the basic tools that we need to study algorithms and data structures.

- 1.1 Programming Model introduces our basic programming model. All of our programs are implemented using a small subset of the Java programming language plus a few of our own libraries for input and output.
- 1.2 Data Abstraction emphasizes data abstraction, where we define abstract data types (ADTs). We specify an applications programming interface (API) and then use the Java class mechanism to develop an implementation for use in client code.
- 1.3 Bags, Queues, and Stacks considers three fundamental ADTs: the bag, the queue, and the stack. We describe APIs and implementations using resizing arrays and linked lists.
- 1.4 Analysis of Algorithms describes our approach to analyzing algorithm performance. The basis of our approach is the scientific method: we develop hypotheses about performance, create mathematical models, and run experiments to test them.
- 1.5 Case Study: Union-Find is a case study where we consider solutions to a connectivity problem that uses algorithms and data structures that implement the classic union-find ADT.

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.

HandomSequiave ∰ proform numbers in a given renge Average jave ∰ average of a sectuence of numbers Cat siva ∰ concatenate ites Knuth dave ∰ Knuth shufflo Countrieve ∰ set of images Allow stusva ∰ a lowinst client Vectoriave ∰ set of images Allow stusva ∰ a lowinst client Date isva ∰ a lowinst client Foin 2D, ava ∰ averaging or records Froin 2D, ava ∰ averaging or records Imanual D java ∰ averaging or records Imanual D java ∰ averaging or records In Residing ArraySteck java ∰ IPO stack (residing array) LinkodSteck java ∰ IPO stack (residing array) LinkodSteck java ∰ IPO stack (index list) Countries average and stocker Featring ArraySteck java ∰ IPO stack (index list) LinkodSteck java ∰ IPO stack (index list) Countries average in multiplication in multiplicat	REF	PROGRAM	DESCRIPTION / JAVADOC
avarago of a sequence of humbers Cat liava	-	BinarySearch.java 👙	binary search
Connectenate files Knuth, ava ∰ Knuth shuffle Countergava ∰ StaticSETofints, java ∰ Set of integers Allowist blava ∰ Allowist blava ∰ Fucilides nivector Decolava ∰ Tochides nivector Decolava ∰ Tochides nivector Decolava ∰ Items clion Folint Diava ∰ Items clion Folint Diava ∰ Items clion Folint Diava ∰ Items clion Accumulator java ∰ Accumulator java ∰ Lincod Stack java ∰ Lincod Stack java ∰ Lincod Stack java ∰ Lincod Stack java ∰ Tipo queue (in exit tat) Gualarjava ∰ Tipo queue (in exit tat) Gualarjava ∰ Tipo queue (in exit tat) Gualarjava ∰ Tipo queue (in exit tat) Fipo queue Resizing Array Dagjava ∰ Tipo queue (in exit tat) Gualarjava ∰ Tipo queue (in exit tat) Fipo queue Fipo queue Resizing Array Dagjava ∰ Tipo queue (in exit tat) Tipo queue	_	RandomSeq.java 👙	random numbers in a given range
Knuth, ava # Knuth shufto Countor ava # countor	_	Average.java 👙	average of a sequence of numbers
- Counter, ava ∰ set of integers - StaticsErointa, ava ∰ set of integers - Allow ist java ∰ allowist of on: - Vectoriava ∰ Ducidean vector - Datoljava ∰ care - Itransaction java ∰ transaction - Point2Dijava ∰ point - RootH-Vjava ∰ avia alignoc restangle - Interval1Dijava ∰ 1d interva - Interval2Dijava ∰ 2d interva - Accumulatorijava ∰ 1umang avarage and stiddev - 1,1 ResizingArrayStackijava ∰ ILFO stack fresizing array) - Slackijava ∰ ILFO stack fresizing array) - Slackijava ∰ ILFO stack fresizing array) - ResizingArrayQueule, ava ∰ IFFO queule (resizing array) - ResizingArrayQueule, ava ∰ IFFO queule (resizing array) - ResizingArrayBagijava ∰ ITFO dueule - ResizingArrayBagijava ∰ multiset (resizing array) - Queulejava ∰ multiset (resizing array) - StopvacinfoPU, ava ∰ multiset (resizing array) - Bagijava ∰ multiset - StopvacinfoPU, ava ∰ multiset - StopvacinfoPU, ava ∰ multiset - Disconsignatio java ∰ simple inseriregression - ThreeSumFast, ava ∰ simple inseriregression - ThreeSumFast, ava ∰ simple inseriregression - ThreeSumFast, ava ∰ size infree sum - DouolingTest java ∰ doubting ratio - QuekUnionUFjava ∰ doubting ratio	-	Cat.java 👙	concatenate files
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Euclidean vector Date_ava ∰ Date_ava ☐ Date_ava ∰ Date_ava ☐ Date_ava ∰ Date_ava ☐ Date_ava ∰ Date_ava M Dat	-	StaticSETofInts.java 👙	set of integers
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