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Introduction To
Data Structures
And Algorithms

**An
Introduction
To Data
Structures
And
Algorithms**

*Revised edition
of: Introduction
to Java
programming /*

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Introduction To
Data Structures
And Algorithms

***Y. Daniel Liang,
Armstrong***

***Atlantic State
University.***

Tenth edition.

***Comprehensive
version. 2015.***

***This is a central
topic in any***

***computer
science***

***curriculum. To
distinguish this***

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And Algorithms

***textbook from
others, the
author
considers
probabilistic
methods as
being
fundamental for
the
construction of
simple and
efficient
algorithms, and***

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***in each chapter
at least one
problem is
solved using a
randomized
algorithm. Data
structures are
discussed to the
extent needed
for the
implementation
of the
algorithms. The***

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**specific
algorithms**

**examined were
chosen because
of their wide
field of
application.**

**This book
originates from
lectures for
undergraduate
and graduate
students. The**

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***text assumes
experience in
programming
algorithms,
especially with
elementary data
structures such
as chained lists,
queues, and
stacks. It also
assumes
familiarity with
mathematical***

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***methods,
although the
author
summarizes
some basic
notations and
results from
probability
theory and
related
mathematical
terminology in
the appendices.***

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He includes many examples to explain the individual steps of the algorithms, and he concludes each chapter with numerous exercises.

Introduction to Data Structures in C is an

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***introductory
book on the
subject. The
contents of the
book are
designed as per
the
requirement of
the syllabus and
the students
and will be
useful for
students of B.E.***

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**(Computer/Elec
tronics), MCA,**

BCA, M.S.

" Algorithms

and data

structures are

much more

than abstract

concepts.

Mastering them

enables you to

write code that

runs faster and

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***more
efficiently,
which is
particularly
important for
today's web and
mobile apps.
This book takes
a practical
approach to
data structures
and algorithms,
with techniques***

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and real-world scenarios that you can use in your daily production code. Graphics and examples make these computer science concepts understandable and relevant.

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***You can use
these
techniques with
any language;
examples in the
book are in
JavaScript,
Python, and
Ruby. Use Big O
notation, the
primary tool for
evaluating
algorithms, to***

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measure and articulate the efficiency of your code, and modify your algorithm to make it faster. Find out how your choice of arrays, linked lists, and hash tables can dramatically

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***affect the code
you write. Use
recursion to
solve tricky
problems and
create
algorithms that
run
exponentially
faster than the
alternatives.
Dig into
advanced data***

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***structures such
as binary trees
and graphs to
help scale
specialized
applications
such as social
networks and
mapping
software. You'll
even encounter
a single
keyword that***

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code a turbo
boost. Jay
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teaching
practices he
developed as a
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development
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founder and***

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and more
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Open Data Structures

Comprehensive treatment focuses on creation of efficient data structures and algorithms and selection or design of data structure best suited to specific problems. This edition uses C++ as

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the programming
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language.

Advanced data
structures is a core
course in Computer
Science which most
graduate program in
Computer Science,
Computer Science
and Engineering,
and other allied
engineering

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disciplines, offer during the first year or first semester of the curriculum. The objective of this course is to enable students to have the much-needed foundation for advanced technical skill, leading to better problem-

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solving in their
respective
disciplines.

Although the course
is running in almost
all the technical
universities for
decades, major
changes in the
syllabus have been
observed due to the
recent paradigm shift

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of computation
which is more
focused on huge data
and internet-based
technologies.

Majority of the
institute has been
redefined their
course content of
advanced data
structure to fit the
current need and

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course material
heavily relies on
research papers
because of
nonavailability of
the redefined text
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structure. To the best
of our knowledge
well-known
textbook on
advanced data

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structure provides
only partial coverage
of the syllabus. The
book offers
comprehensive
coverage of the most
essential topics,
including: Part I
details
advancements on
basic data structures,
viz., cuckoo hashing,

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skip list, tango tree
and Fibonacci heaps
and index files. Part
II details data
structures of
different evolving
data domains like
special data
structures, temporal
data structures,
external memory
data structures,

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distributed and
streaming data
structures. Part III
elucidates the
applications of these
data structures on
different areas of
computer science
viz, network, www,
DBMS,
cryptography,
graphics to name a

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few. The concepts and techniques behind each data structure and their applications have been explained.

Every chapter includes a variety of Illustrative Problems pertaining to the data structure(s) detailed, a summary of the

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technical content of
the chapter and a list
of Review

Questions, to
reinforce the
comprehension of
the concepts. The
book could be used
both as an
introductory or an
advanced-level
textbook for the

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advanced
undergraduate,
graduate and
research

programmes which
offer advanced data
structures as a core
or an elective course.

While the book is
primarily meant to
serve as a course
material for use in

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the classroom, it could be used as a starting point for the beginner researcher of a specific domain.

Advanced Data Structures presents a comprehensive look at the ideas, analysis, and implementation details of data structures as a

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specialized topic in applied algorithms.

Data structures are how data is stored within a computer, and how one can go about searching for data within. This text examines efficient ways to search and update sets of numbers, intervals,

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or strings by various data structures, such as search trees, structures for sets of intervals or piece-wise constant functions, orthogonal range search structures, heaps, union-find structures, dynamization and

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persistence of
structures, structures
for strings, and hash
tables. This is the
first volume to show
data structures as a
crucial algorithmic
topic, rather than
relegating them as
trivial material used
to illustrate object-
oriented

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methodology, filling
a void in the ever-
increasing computer
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Numerous code
examples in C and
more than 500
references make

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Structures an
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Advanced
Algorithms and Data
Structures introduces
a collection of
algorithms for

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complex

programming

challenges in data
analysis, machine
learning, and graph
computing.

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software engineer,
you'll encounter
countless
programming
challenges that

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initially seem
confusing, difficult,
or even impossible.

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that you can adapt

and apply to your

own applications.

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blend of classic,

advanced, and new

algorithms, this

practical guide

upgrades your

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toolbox with new
perspectives and
hands-on techniques.
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you improve the
speed and efficiency
of your applications
without investing in
new hardware?

Well, yes, you can:
Innovations in
algorithms and data
structures have led
to huge advances in
application
performance. Pick

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up this book to
discover a collection
of advanced
algorithms that will
make you a more
effective developer.

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Advanced

Algorithms and Data
Structures introduces
a collection of
algorithms for

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complex

programming

challenges in data analysis, machine learning, and graph computing. You'll discover cutting-edge approaches to a variety of tricky scenarios. You'll even learn to design your own data

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structures for
projects that require
a custom solution.

What's inside Build
on basic data
structures you
already know Profile
your algorithms to
speed up application
Store and query
strings efficiently
Distribute clustering

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algorithms with
MapReduce Solve
logistics problems
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programmers. About
the author Marcello
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research scientist

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and a full-stack
engineer. His focus
is on optimization
algorithms, genetic
algorithms, machine
learning, and
quantum computing.

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encryption,
searching, sorting,
and pattern
matching. It is
crucial for
JavaScript
developers to
understand how
data structures
work and how to
design algorithms.
This book and the

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accompanying code
provide that

essential

foundation for

doing so. With

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Structures and

Algorithms you can

start developing

your knowledge

and applying it to

your JavaScript

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projects today.

What You'll Learn

Review core data
structure

fundamentals:

arrays, linked-lists,
trees, heaps,

graphs, and hash-
table

Review core
algorithm

fundamentals:

search, sort,

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recursion,
breadth/depth first
search, dynamic
programming,
bitwise operators
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core data structure
and algorithms
knowledge fits into
context of
JavaScript
explained using

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developers and

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software engineers
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or revisit their
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structures
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beginners and
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A student-friendly text, A Concise Introduction to Data Structures Using Java takes a developmental approach, starting with simpler concepts first and then building toward greater complexity.

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Important topics, such as linked lists, are introduced gradually and revisited with increasing depth. More code and guidance are provided at the beginning, allowing students time to adapt to Java while

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also beginning to learn data structures. As students develop fluency in Java, less code is provided and more algorithms are outlined in pseudocode. The text is designed to support a second

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course in computer science with an emphasis on elementary data structures. The clear, concise explanations encourage students to read and engage with the material, while partial implementations of

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most data structures give instructors the flexibility to develop some methods as examples and assign others as exercises. The book also supplies an introductory chapter on Java

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basics that allows students who are unfamiliar with Java to quickly get up to speed. The book helps students become familiar with how to use, design, implement, and analyze data structures, an important step on

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the path to
becoming skilled
software
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engineering based approach taken by this book extremely refreshing. With an emphasis more on software design and less on theory, Java Collections explores in detail Java 2 collection classes, helping programmers

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choose the best collection classes for each application they work on. Watt and Brown explore abstract data types (ADTs) that turn up again and again in software design, using them to provide context for the data structures

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required for their implementation and the algorithms associated with the data structures.

Numerous worked examples, several large case studies, and end-of-chapter exercises are also provided.

The design and

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analysis of efficient data structures has long been recognized as a key component of the Computer Science curriculum.

Goodrich,
Tomassia and
Goldwasser's
approach to this
classic topic is

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based on the object-oriented paradigm as the framework of choice for the design of data structures. For each ADT presented in the text, the authors provide an associated Java interface. Concrete

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data structures
realizing the ADTs
are provided as
Java classes
implementing the
interfaces. The
Java code
implementing
fundamental data
structures in this
book is organized
in a single Java

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package,
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This package forms
a coherent library
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and algorithms in
Java specifically
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purposes in a way
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Dr Weiss's clear
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stages of an
algorithm make
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update of the
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algorithms text,
with new
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matchings in
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algorithms,
machine**

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**learning, and
other topics.**

**Some books on
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incomplete;
others cover
masses of
material but
lack rigor.
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uniquely**

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potential**

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in the field •
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**supplementary
material**

**Assuming only
fundamental
programming
skills in Java,
this book
begins by
introducing the
concept of
object-oriented
programming in
Java.**

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Windowing Toolkit (the AWT), is also introduced at an early stage, and it is used to develop object oriented programs with graphical user interfaces (GIUs). After introducing the

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**standard data
structures and
algorithms
commonly
studied in
second year
computing
courses, the
book concludes
with a
substantial
case study that
provides a**

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**hands-on
experience with
key concepts.
This textbook
provides an
introduction to
data structures
and the
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which has been
recently**

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carefully
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together with
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implementation
and use in the**

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features of
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whilst using the
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can be exploited to
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implement
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structures. You'll
also see how, by
abandoning
traditional data**

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manipulate**

**structures by
building new
versions rather than
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**You'll discover how
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structures are
different from the
traditional data
structures you might**

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the data itself. These
techniques are
especially applicable
for algorithmic
development
important in big
data, finance, and
other data science
applications. What
You'll Learn Carry
out algorithmic
programming in R**

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with R. Some
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recommended.**

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introduction to the
critical topic of data
structures, written
from the object-**

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**oriented perspective
most students and
practitioners are
adopting. The book
introduces data
structures using
C++, a language
whose classes and
object-oriented
constructs are
specifically designed
to efficiently
implement data**

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structures. The opening chapters introduce the ideas behind object-oriented programming and C++; once these ideas are explained, the book introduces data structures and algorithms from an O-O point of view. All standard data

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data structures can
enhance their
effectiveness.**

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is about computer
science. It is also
about Python.**

**However, there is
much more. The
study of algorithms
and data structures
is central to**

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understanding what computer science is all about. Learning computer science is not unlike learning any other type of difficult subject matter. The only way to be successful is through deliberate and incremental exposure to the fundamental ideas.

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A beginning computer scientist needs practice so that there is a thorough understanding before continuing on to the more complex parts of the curriculum. In addition, a beginner needs to be given the opportunity to be

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successful and gain confidence. This textbook is designed to serve as a text for a first course on data structures and algorithms, typically taught as the second course in the computer science curriculum. Even though the second course is considered

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more advanced than the first course, this book assumes you are beginners at this level. You may still be struggling with some of the basic ideas and skills from a first computer science course and yet be ready to further explore the discipline and

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structures, writing
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solving problems.**

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to-use text on data
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undergraduates in
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and information science. The thirteen chapters, written by an international group of experienced teachers, cover the fundamental concepts of algorithms and most of the important data structures as well as the concept of interface design. The

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book contains many examples and diagrams. Whenever appropriate, program codes are included to facilitate learning. This book is supported by an international group of authors who are experts on data structures and algorithms, through

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its website at www.cs.pitt.edu/~jung/GrowingBook/, so that both teachers and students can benefit from their expertise.

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the exposition*

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course are starred.

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*that starts at
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long course may be
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book. * Sorting,
often perceived as
rather technical, is
not treated as a
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but is used in many*

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examples (including bubble sort, merge sort, tree sort, heap sort, quick sort, and several parallel algorithms). Also, lower bounds on sorting by comparisons are included with the presentation of heaps in the context

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*of lower bounds for
comparison-based
structures. **

*Chapter 13 on
parallel models of
computation is
something of a mini-
book itself, and a
good way to end a
course. Although it
is not clear what
parallel*

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maps, and

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application that

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contents, and
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resulting data tree
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will run and how
much memory it will
require Write classes
that implement the
Map interface, using
a hash table and*

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that stores web page
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which the authors
and their colleagues
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for self-study. Many exercises are provided, a substantial proportion of them with detailed solutions. Numerous figures aid understanding. To benefit from the book, the reader should have had prior exposure to

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programming in a structured language such as Java or C++, at a level similar to a typical two semester first-year university computer science sequence. However, no knowledge of any particular such language is necessary.

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Mathematical prerequisites are modest. Several appendices can be used to fill minor gaps in background knowledge. After finishing this book, students should be well prepared for more advanced study of the three topics, either for

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Balancing AVL Trees, putAVL, removeAVL, AVL Tree Performance.

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About the Author Aditya
Bhargava is a Software
Engineer with a dual
background in
Computer Science and
Fine Arts. He blogs on
programming at adit.io.

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