Problem Solving with Data Structures Using Java: A Multimedia Approach

By Mark J. Guzdial, Barbara Ericson

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Problem Solving with Data Structures, First Edition is not a traditional data structures textbook that teaches concepts in an abstract, and often dry, context that focuses on data structures using numbers. Instead, this book takes a more creative approach that uses media and simulations (specifically, trees and linked lists of images and music), to make concepts more concrete, more relatable, and therefore much more motivating for students.

This book is appropriate for both majors and non-majors. It provides an introduction to object-oriented programming in Java, arrays, linked lists, trees, stacks, queues, lists, maps, and heaps. It also covers an existing simulation package (Greenfoot) and how to create continuous and discrete event simulations.

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Editorial Review

Review

"An innovative departure from the typical presentation of this content; it uses a multimedia context to highly engage students. This is a refreshing applied/practical presentation than the more common abstract one." — Tom Wulf, University of Cincinnati College of Applied Science

"This textbook [Guzdial/Ericson] may be a way to introduce computer science students to data structures without losing them as majors!" — Helen Hu, Westminster College

"The applications are just so darn interesting!" — Kathy Liszka, University of Akron

"Overall, I think the examples and applications are more interesting and relevant than other CS2 textbooks that I have seen before." — Timothy Huang, Middlebury College

"This text [Guzdial/Ericson] explores data structures using the context of pictures, sounds, music, animations, and simulations. It provides rich context for learning about the structuring of data using Java." — Charles Fowler, Gainesville State College

"Other data structures books are generally boring. Guzdial/Ericson uses media computation successfully in introductory programming courses in both Java and Python. Students can see the usefulness and relevancy of programming to manipulating digital media." — Kam Fui Lau, Armstrong Atlantic State University

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About the Author
<>Barbara Ericson is a research scientist and the Director of Computing Outreach for the College of Computing at Georgia Tech. She has been working on improving introductory computing education for over 5 years. She enjoys the diversity of the types of problems she has worked on over the years in computing including computer graphics, artificial intelligence, medicine, and object-oriented programming.

Mark Guzdial is a Professor in the School of Interactive Computing at Georgia Tech. An award-winning teacher and active researcher in computing education, he holds a joint Ph.D. In Education and Computer Science from the University of Michigan. Dr. Guzdial directs Project "Georgia Computes!" which is an NSF funded alliance to improve computing education from pre-teen years to undergraduates. He is a member of

the ACM Education Board and is a frequent contributor to the ACM SIGCSE (Computer Science Education) Symposium.

Barbara Ericson and Mark Guzdial, are recipients of the 2010 Karl V. Karlstom Outstanding Educator Award for their contributions to broadening participation in computing. They created the Media Computation (MediaComp) approach, which motivates students to write programs that manipulate and create digital media, such as pictures, sounds, and videos. Now in use in nearly 200 schools around the world, this contextualized approach to introductory Computer Science attracts students not motivated by classical algorithmic problems addressed in traditional computer science education. They also lead "Georgia Computes!" an NSF-funded statewide alliance to increase the number and diversity of students in computing education across all of Georgia. Barbara Ericson directs the Institute for Computing Education at Georgia Tech. Mark Guzdial is director of the Contextualized Support for Learning at Georgia Tech. Together they have written three textbooks using the MediaComp approach to engage and inspire student learning in computing. The Karlstrom Award recognizes educators who advanced new teaching methodologies; effected new curriculum development in Computer Science and Engineering; or contributed to ACM's educational mission.

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