

FUNDAMENTALS
+
BASIC DATA STRUCTURES

CS062

DATA STRUCTURES AND ADVANCED PROGRAMMING

Midterm I Study Guide



Alexandra Papoutsaki
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Java Basics

- ▶ Chapter 1.1 (Pages 8–35).
- ▶ Chapter 1.2 (Pages 64–77, 84–88, 96–99, 107).
- ▶ Quick overview of Java tutorials.
 - ▶ <https://docs.oracle.com/javase/tutorial/java/>
- ▶ In general, review the basics of OOP and of Java so that you are comfortable reading and writing code.

Analysis of Algorithms

- ▶ Chapter 1.4 (Pages 172-205).
- ▶ Experimental analysis including doubling hypothesis.
- ▶ Mathematical analysis including reviewing (not memorizing) useful approximations of sums.
- ▶ Order of growth classifications.
- ▶ Review of running time of operations on array lists, linked lists, stacks and queues.

ArrayLists

- ▶ Chapter 1.3 (Pages 136-137).
- ▶ Textbook API and code.
 - ▶ <https://github.com/pomonacs622021fa/LectureCode/blob/main/Lecture6/ArrayList.java>
- ▶ Java Oracle API <https://docs.oracle.com/javase/8/docs/api/java/util/ArrayList.html>
- ▶ Amortized and worst-case time analysis.

Singly Linked Lists

- ▶ Chapter 1.3 (Pages 142-146).
- ▶ Textbook API and code.
 - ▶ <https://github.com/pomonacs622021fa/LectureCode/blob/main/Lecture7/SinglyLinkedList.java>
- ▶ Worst-case time analysis for standard operations.

Doubly Linked Lists

- ▶ Chapter 1.3 (Pages 126-157).
- ▶ Textbook API and code.
 - ▶ <https://github.com/pomonacs622021fa/LectureCode/blob/main/Lecture8/DoublyLinkedList.java>
- ▶ Java Oracle API.
 - ▶ <https://docs.oracle.com/javase/7/docs/api/java/util/LinkedList.html>
- ▶ Worst-case time analysis for standard operations.

Stacks, Queues, and Iterators

- ▶ Chapter 1.3 (Pages 142-146).
- ▶ Textbook API and code for alternative implementations
 - ▶ <https://algs4.cs.princeton.edu/code/edu/princeton/cs/algs4/ResizingArrayQueue.java.html>
 - ▶ <https://algs4.cs.princeton.edu/code/edu/princeton/cs/algs4/LinkedQueue.java.html>
 - ▶ <https://algs4.cs.princeton.edu/code/edu/princeton/cs/algs4/ResizingArrayStack.java.html>
 - ▶ <https://algs4.cs.princeton.edu/code/edu/princeton/cs/algs4/LinkedStack.java.html>
- ▶ Java Oracle Iterator and Iterable.
 - ▶ <https://docs.oracle.com/javase/8/docs/api/java/util/Iterator.html>
 - ▶ <https://docs.oracle.com/javase/8/docs/api/java/lang/Iterable.html>
- ▶ Worst-case time analysis for standard operations based on the underlying implementation

Practice Exam

- ▶ <https://github.com/pomonacs622023fa/Handouts/blob/main/f16-midterm-1.pdf>
- ▶ <https://github.com/pomonacs622023fa/Handouts/blob/main/f16-midterm-1-solutions.pdf>
- ▶ Notice that there are slight differences in implementation than our class version.