

CS 112 : Data Structures

Fall 2016

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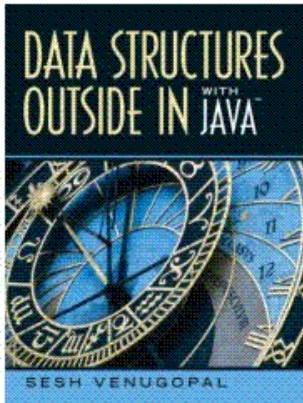
Hill Center 406

Lecture 1: Sep 6

Resources

Sakai@Rutgers

<http://sakai.rutgers.edu>
(CS112 – Fall 2016)



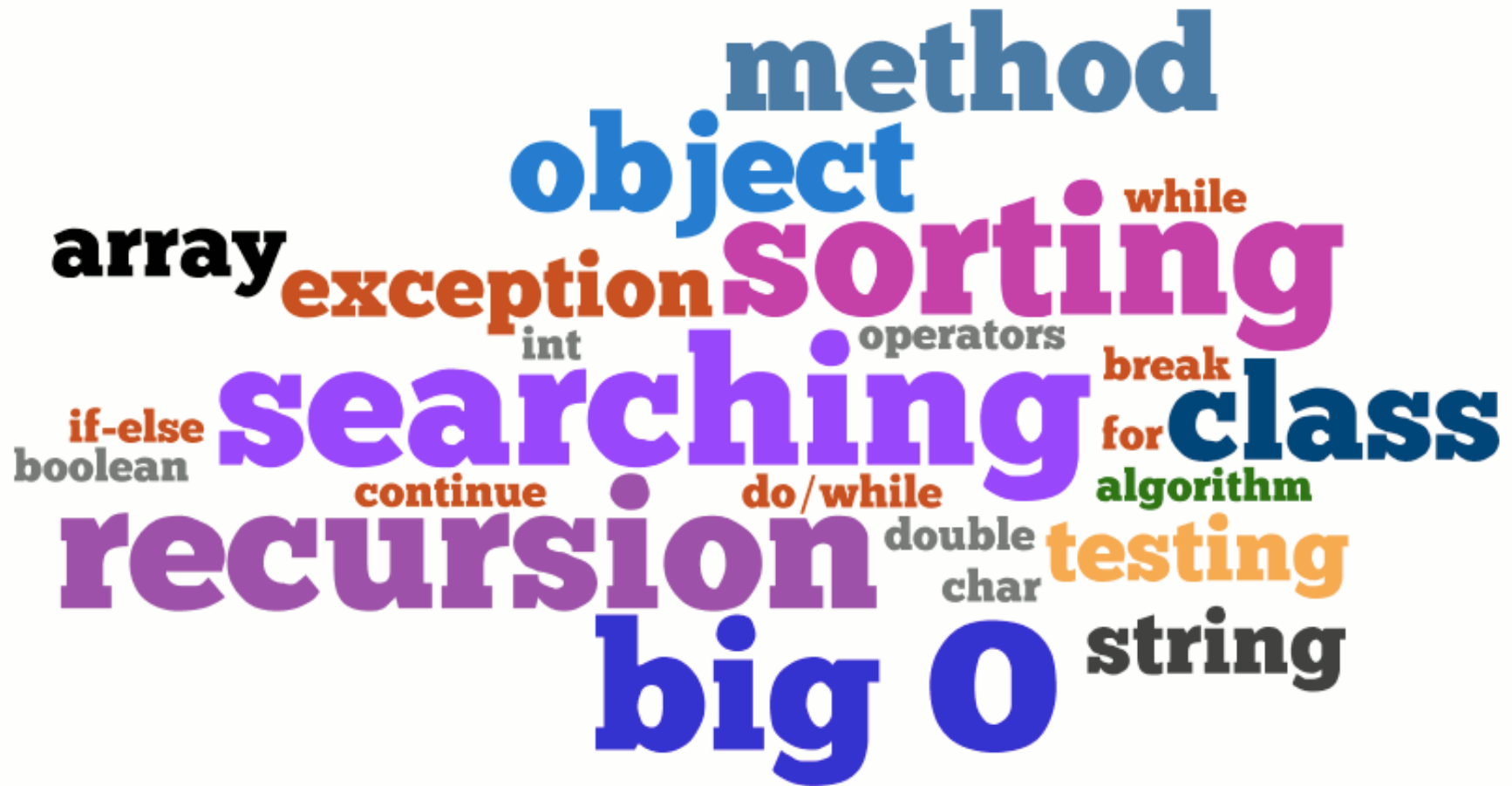
Textbook: Data Structures Outside In with Java

Text programs + documentation
with syllabus in Sakai

Grading

- Assignments (5): 35%
- Midterm 1 (Written): 15%
 - Sun Oct 9, 8:10-9:30pm
- Midterm 2 (Written): 15%
 - Sun Nov 13, 8:10-9:30 pm
- Final (Written): 30%
 - Fri Dec 16, 4pm-7pm
- Recitation problem hw (1 per recitation): 5%

What You (Should Have) Learned in 111



(Graphic Art from wordle.net)

Coming out of 111...

You are expected to hit the ground running with all the topics you learned in 111 - strings, arrays, searching, sorting, recursion, Big O, objects. In order to review objects and Big O in particular, you are urged to read the following from the text:

- Chapter 1: Object-oriented Programming in Java – Sections 1.1 and 1.2
- Chapter 3: Efficiency of Algorithms – Entire chapter, all sections

How to succeed in 112

Come to lecture and PAY attention

Our job is to distill and explain material with emphasis on the most important concepts.

If you don't show up, or phase out for most of the lecture, you will LOSE out – studying by yourself will only get you so far

How to succeed in 112

Spend TIME outside class reviewing concepts and practicing problems.

TIME is the most important factor, and it has to be QUALITY time. There's a lot of thinking involved in this course, it's not just Java.

How to succeed in 112

THINK through the problem sets
BEFORE going to recitation.

And if you can work out the problems for yourself, even better. That way when you come to recitation you can ask questions and fill the holes in your knowledge. (In all recitations except the first, you **WILL** be asked to turn in one solved problem.)

How to succeed in 112

STUDY with a friend.

It's a great way to stay motivated, and learn from each other. (I find that talking about stuff with someone else makes me think better.)

ONWARD!

You Already Know Some Data Structures

Array



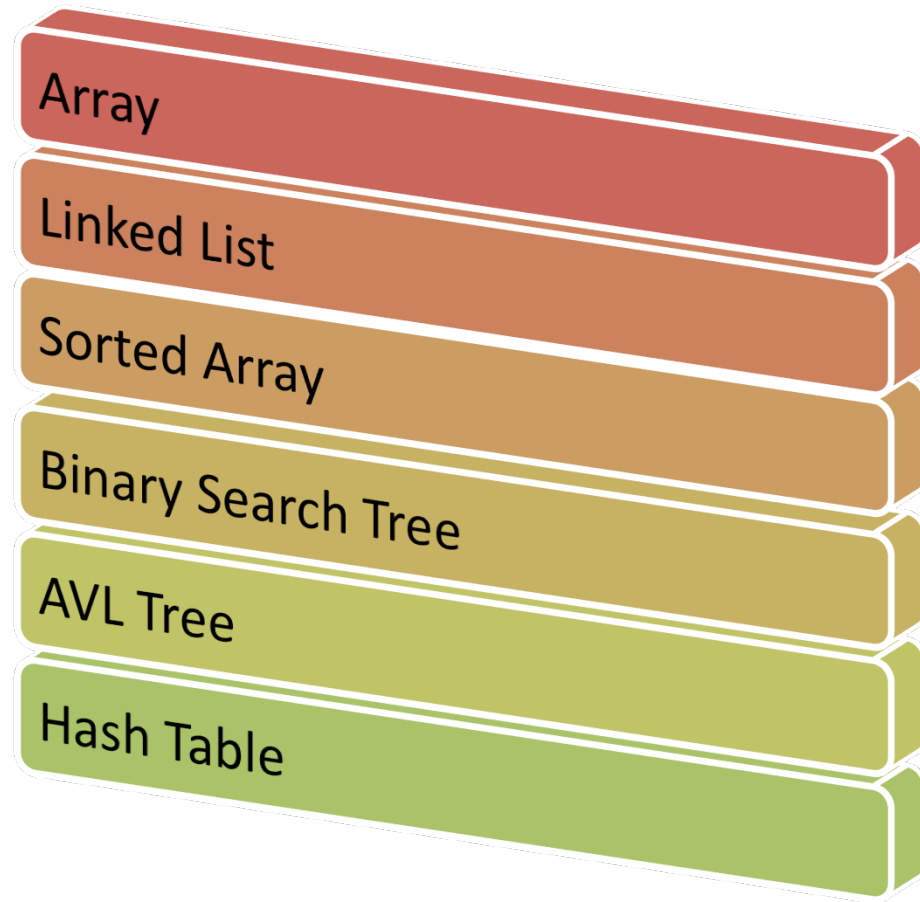
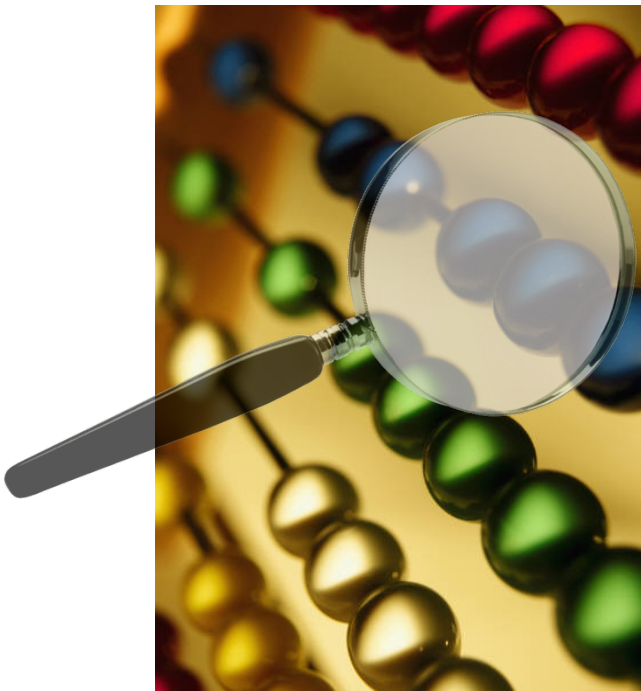
What You Will Learn in 112

Specialized Data Structures

Linear	Trees	Graphs	Hash Table
<ul style="list-style-type: none">• Array• Linked List• Stack• Queue	<ul style="list-style-type: none">• Binary Tree• Binary Search Tree• AVL Tree• Heap	<ul style="list-style-type: none">• Undirected• Directed• Weighted	

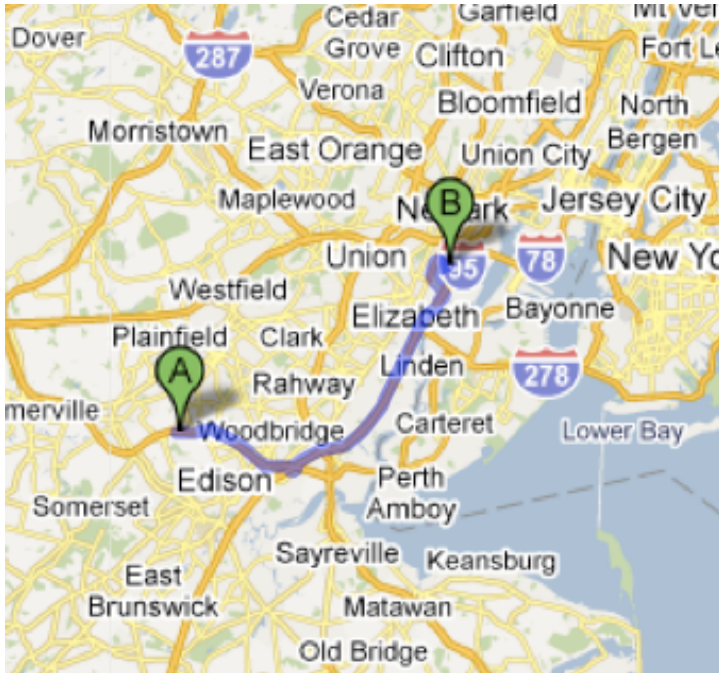
What You Will Learn in 112

Searching



What You Will Learn in 112

Graph Algorithms



(maps.google.com)

Depth first search (DFS)

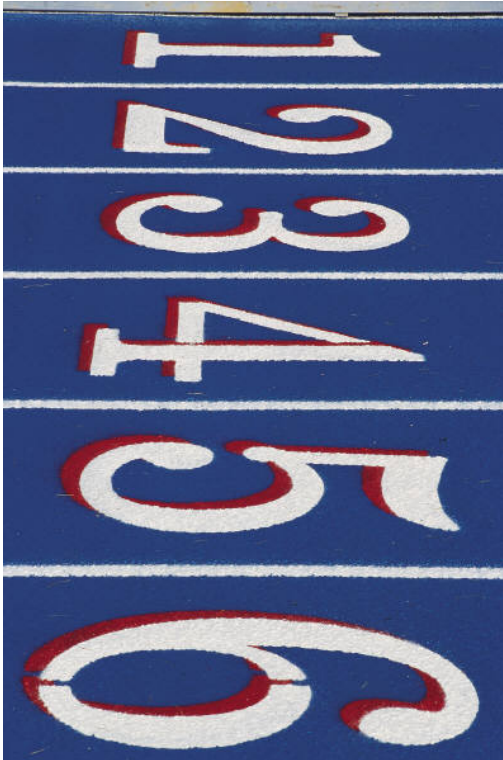
Breadth first search (BFS)

Topological Sorting

Shortest Paths

What You Will Learn in 112

Sorting



Array

- Insertion Sort
- Quicksort

Linked List

- Mergesort
- Radixsort (Time permitting)

Heap

- Heapsort

What You Will Learn in 112

Running Time/Space Analysis



Big O

Worst case

Best case

Average case

What You Will Learn in 112

Programming Data Structures and Algorithms



USING



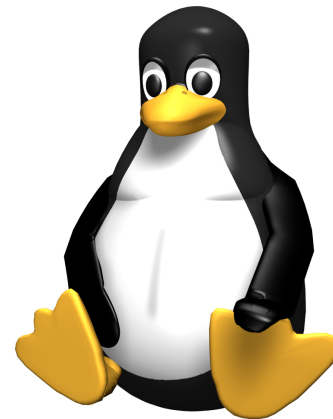
“Bad programmers worry about code.

Good programmers worry about data structures.”



Linus Torvalds

Creator of Linux



*“Smart data structures and dumb code
works a lot better than the other way around.”*



Eric S. Raymond

Famous proponent of open-source software. Author of the widely acclaimed “The Cathedral and the Bazaar.”