

Lecture #40: Course Summary

language: Java
analysis
of data structure: Java library structure

on numbers

plementation topics

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Analysis and Algorithmic Techniques

analysis
, $\Theta(\cdot)$ notations
average case.
time
and dynamic programming.

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Sequences

of double link manipulations

arrays
deques, deques
inserting
costs of basic operations

Trees

search: search, representing hierarchical structures
operations: insertion, deletion
traversal
of trees

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Announcements

filling out our CS61B survey. Watch the website.

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Programming-Language Topics

object programming: organizing around data types
structured programming:
static type
polymorphism
interface vs. implementation
programming (the $\langle \dots \rangle$ stuff).
reference: containers, pointers, arrays
recursion
and semantics
abstraction
design patterns:
used as functions (e.g., Comparator)
implementations (e.g., AbstractList)
(e.g., sublists)

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Major Categories of Data Structure

interface and its subtypes
set and its subtypes
concrete implementations of collections, lists, maps (AbstractList, AbstractMap, AbstractSet)
concrete collection and map classes in Java library

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Sorting

ing
rt
rting

d selection
sort

f various algorithms, when to use them?

Graph structures

represented by graphs
sal: the generic traversal template
traversal, breadth-first traversal
ort
ths
ning trees, union-find structures
agement as a graph problem.

Version Control

?
ts behind our particular system:
copy vs. repository copy
g changes
and merging changes.

Searching

s, range searching
onal searches: quad trees.

es and heaps
es
ng by rotation (red-black trees)
y construction (B-trees)
tic balance (skip lists)

s, trade-offs

Random numbers

s
eudo-random sequence
uential and additive generators
tributions:
the range
rm distributions
ndom selection

Debugging

gers can do
o pin down bugs
me debugger (Eclipse, gjdb, various Windows/Sun products,
what it means, how to use it.
nics.

Assorted Side Trips

essing.
agement and garbage collection.

What's After the Lower Division? (II)

cient Algorithms and Intractable Problems (Raghavendra)
ryptography
utability and Complexity (Tal)
inatorics and Discrete Probability (Song)
putational Biology (Yosef)
Neural Networks (Zhang)
ations of Computer Graphics (Ng)
bases (Jain)
ficial Intelligence (Russell, Song)
ine Learning (Shewchuk, Zhang)
ntum Information Science and Technology

And Beyond!

CS are just two of over 150 subjects!
offer more specific skills and exposure to real problems.
think that CS is a creative activity that (to the true
it to be fun!

A Case Study

version-control system as an example of a design using
from this course.

and **tree** structures represented with files as vertices
file names), rather than machine addresses, as pointers.

ing to create unique (or very, very likely to be unique)
abilistic data structure.

What's After the Lower Division?

CS100: Principles & Techniques of Data Science (Perez,
puter Architecture (Wawrzynek)
Interface Design (Canny)
puter Security (Weaver)
ating Systems and System Programming (Joseph, Kubiawicz)
ramming Languages and Compilers (Chasins)
p. to the Internet: Architecture and Protocols
69L: Software Engineering (Ball, A. Fox, P. Fox)

What's After the Lower Division? (III)

orted Special Topics: Computer Vision and Computational
(Efros), Parallel Programming (Yelick)

al Implications of Computer Technology (Hug)

graduate courses: including advanced versions of 152,
0, 184, 186, 189; plus Cryptography, VLSI design and
topics.

se, EE courses!

rtunities for participating in research and independent
or directed group studies (198).