CompSci 6
Programming Design and Analysis

April 1, 2010
Prof. Rodger
Announcements

• Exam 2 is now on Thursday, April 8
• No Reading for next time
• No Reading quiz next time
• Today– Sorting, Comparators
• Next Class– will review
• Practice the old exams handed on on 3/30
Selection Sort

• How does it work?

8 2 6 7 3 1 9 5

Goal: 1 2 3 5 6 7 8 9
Selection Sort

• How long does it take?
  – If there are N elements to sort

• Consider sorting two sets of data, does one take longer than the other?
  9 8 7 6 5 4 3 2 1
  1 2 4 5 3 9 6 7 8
Binary Search

• Given a sorted array of names, how do you find a name?

• How does binary search work?
• Can you apply binary search to any array?

• How long does binary search take?
Problem

- Given data on books in a library
  - Title, author, year published
  - May have multiple copies of books
- Search for books
  - Sort by title
  - Sort by author
  - Sorty by number of copies
  - (we will not focus on how to sort for this problem, just use Collections.sort();
Sort by Title

We have 1 copy of 1421: The Year China Discovered America by...
We have 1 copy of Abraham: A Journey to the Heart of Three Empires by...
We have 1 copy of Balzac and the Little Chinese Seamstress by...
We have 1 copy of Bias: A CBS Insider Exposes How the Media...
We have 1 copy of Bush at War: Inside the Bush White House by...
We have 1 copy of By the Light of the Moon by Dean R. Koontz...
We have 1 copy of Fast Food Nation: The Dark Side of the All-American Meal by...
We have 1 copy of For Spacious Skies: The Uncommon Journey of...
Sort by Count

Amazon Lite

File
input
Search for: The

output
We have 1 copy of The Woman Who Wouldn't Talk by Susan McDoug
We have 1 copy of On Top of the World: Cantor Fitzgerald, Hop
We have 1 copy of Into the Woods by V. C. Andrews published
We have 1 copy of Walter, the Farting Dog by William Kotzwink
We have 2 copies of Harry Potter and the Deathly Hallows (Book
We have 3 copies of Harry Potter and the Order of the Phoenix
We have 5 copies of Harry Potter and the Half-Blood Prince (B

message
Found 75 books!
How does one sort a type?

- ints, doubles: Compare with <, >, ==
- Strings: how do you compare?

- Book objects: how do you compare them?
Comparable interface

- public interface Comparable
- Classes must implement Comparable interface
- public class Book implements Comparable
- Book must have a compareTo method defined
- Which class do you use that already has compareTo?
How does `compareTo` work?

- Compares two objects of the same type
- Returns an int
  - returns -1 if first object < second object
  - returns 0 if objects are equivalent
  - returns 1 if first object > second object
- What does compare two Book types mean?
  - By author
  - by title
  - by counts and then author
Classwork today – Amazon Lite

• Library Class
  – Read in the data to create Book object and put them in the library
  – findBooks to return a list of books on some criteria

• Book class
  – Write the method equals to return true if two books have the same author and title
  – Write the method matches – finding a word in a string
Classwork today (more)

- We will compare books several ways
  - 1) We will create Specific Comparator classes and pass them to a sorter
     - TitleComparator (DONE)
     - AuthorComparator
     - CountComparator
  - 2) We will change the Book class to make it Comparable
     - Implement the compareTo method based on titles