Searching and Sorting
Lecture 27

Borrowing from slides by Alan Hu, Kurt Eiselt, Paul Carter, and Tamara Munzner

News
- Midterm 2 marking will take a little longer
- We had a lot of ill instructors…

Reading Assignments
- Reading for this week: sorting & searching
  - Edition 3: Ch 14.1, 14.3
  - Edition 2: Ch 19.1, 19.3

Objectives for Today
- Get acquainted with searching, sorting
- Practice more programming with loops, conditionals, arrays

Recap: Searching
- How do you find your homework in the pile outside my door?
- How would the police search for stolen property that the suspect hid at a motel?
- How do you write a program to find something in an array?

Recap: Searching – Word Count
- Want program that
  - reads text (or java) file
  - asks user for a word
  - outputs how often the word occurs in the text

- What is different in this problem compared to the search problems we have already seen (CokeEmpire, CPSC111Student)?
  - Every search term can occur multiple times…
Recap: Word Count – Solution 1
- First attempt:
  - read all words, store them in array
  - for each user query, traverse full array
  - compare word against reference
  - count number of instances

Word Count – Solution 2
- Another solution:
  - Sort all words alphabetically
  - Use binary search to find the words

Recap: Sorting
- A simple sorting algorithm: Bubble Sort
  - Go over all elements in the array
    - Compare each element with its successor
    - If element > successor, swap the two elements
  - Repeat until no changes are made to the array
    - Alternatively: repeat n times, where n is the size of the array

Bubble Sort
- Time Complexity
  - Worst Case
  - Best Case
  - On Average

Visualizations of bubble sort:
- [http://www.youtube.com/watch?v=pNkbHmJlhkU](http://www.youtube.com/watch?v=pNkbHmJlhkU)
- [http://www.youtube.com/watch?v=vxENKics2Tw](http://www.youtube.com/watch?v=vxENKics2Tw)

Back to WordCount
- Let's implement Bubble Sort in our WordCount program
Let's implement Bubble Sort in our WordCount program

How do we use the sorted array to find the word count for a particular word?
- Binary search for ONE copy of the word
- Then go backwards and forwards from that point to count all instances

Another Solution
- Also possible:
  - Use the sorted array of words to compute the word counts for ALL words…