CS367 Lecture 15

Wednesday 9 July 2014

Announcements/Reminders:

- HW2, P1 feedback should be visible.
- Midterm logistics
- Readings

Last class:

- Recursion (cont'd)

Today:

- Recursion (end)
- Search
- Trees (intro)

Recursion Example: Palindromes

Write a recursive method to determine if a given input String is a palindrome. Palindrome examples:

eye
kayak
racecar
Was it a rat I saw?
Never odd or even!
Amy, must I jujitsu my ma?
Are we not drawn onward to new era?

Assume: input String is not null, all spaces and punctuation removed, all lowercase.

Useful String methods:

```
char charAt(int index)
int length()
String substring(int begin, int end)
```

Analyzing Complexity of Recursive Methods

Recursion Examples: Matrix Multiplication

Recursion Example: Fibonacci Sequences and Towers of Hanoi

How bad is 2 ^ n anyway?

n	n ^ 2	2 ^ n
5	25	32
10	100	1024
15	225	32,768
20	400	1,048,576
40	1600	1,099,511,627,776
50	2500	1,125,899,906,842,624

Search techniques

Linear/Sequential Search

Binary Search

Another way to categorize ADTs

Linear

Non-linear

Tree Data Structures

Tree Terminology

Implementing Trees (general)

(Tree) Nodes:

```
_________ class TreeNode<E> {

    private E data;

    private _____________<_____________> children;

    ...
```

Tree:

```
public class Tree<E> {
    private TreeNode<E> root;

    ...


    public Tree() {
        root = null;
        ...
    }

    ...
}
```

Working with Trees: Example

Write a method to determine the height of a general tree.

```
public int height() {
```