CS367 Lecture 7

Wednesday 25 June 2014

Last class:

- Complexity (finish)
    - Application to computer programs and analysis

Today:

- ADTs vs. Data Structures
- Chain of nodes a.k.a Linked Lists
- Practice with chains

ADTs vs. Data Structures

Data structure:

Abstract Data Type:

Arrays, Stacks and Queues

Recall upsides and downsides of arrays

Stack functionality

Queue functionality

Linked List – Chain of Linked Nodes

Conceptual Picture

What can they do?

Java Visibility Modifiers

`public`	`public class ArrayGSack`
`private`	`private E[] items`
`protected`	`protected int numItems`
_____ *(blank)*	`int ID`

Providing package access

Access Levels:

Modifier	Class	Package	Subclass	World
`public`				
`protected`				
(no modifier)				
`private`				

ListNode Class – Building Block

Interface:

```
class ListNode<E> {
    public E getData()
    public void setData(E ob)
    public ListNode<E> getNext()
    public void setNext(ListNode<E> n)
}
```

Sample Java Implementation:

```
(blank) class ListNode<E> {
    private E data;
    private ListNode<E> next;

    public Listnode(E d) { this(d, null); }

    public ListNode(E d, ListNode<E> n) {
        data = d;
        next = n;
    }

    public E getData() { return data; }

    public ListNode<E> getNext() { return next; }

    public void setData(E ob) { data = ob; }

    public void setNext(ListNode<E> n) { next = n; }
}
```

Why not make it public?

Working with chains – Example 1

Create a chain containing the strings “The”, “quick”, and “brown” in that order.

Working with chains – Example 2

Traversing a chain: Write a code fragment that counts the number of items in a given chain of nodes. Assume that `head` points to the first node in a chain of `Integers`.

Working with chains – Example 3

Write a code fragment that adds the number 68 to the end of the chain of nodes of Integers. Assume that `head` points to the first node in the chain.

Linked Lists – Pros and Cons

Advantages at a high level

Disadvantages at a high level

Working with chains: Removing a node

Write a code fragment to remove the third item from a chain of nodes. Assume `head` points to the first node in the chain. You may assume the chain has at least three items.