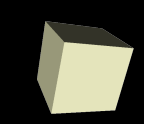
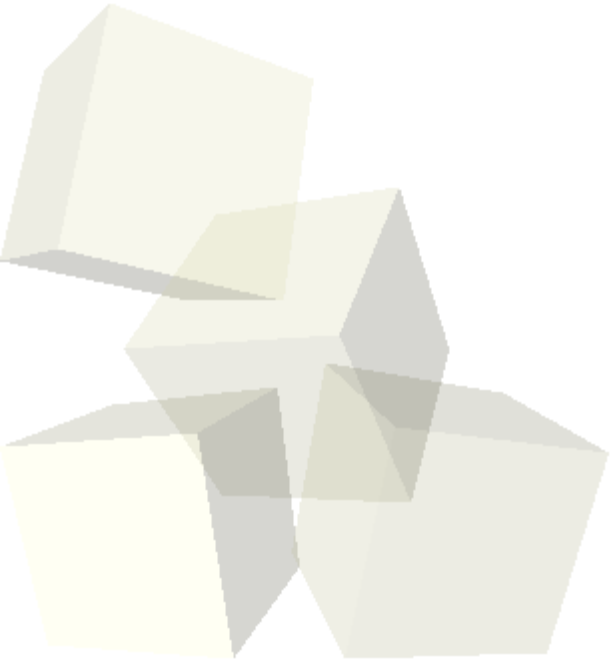


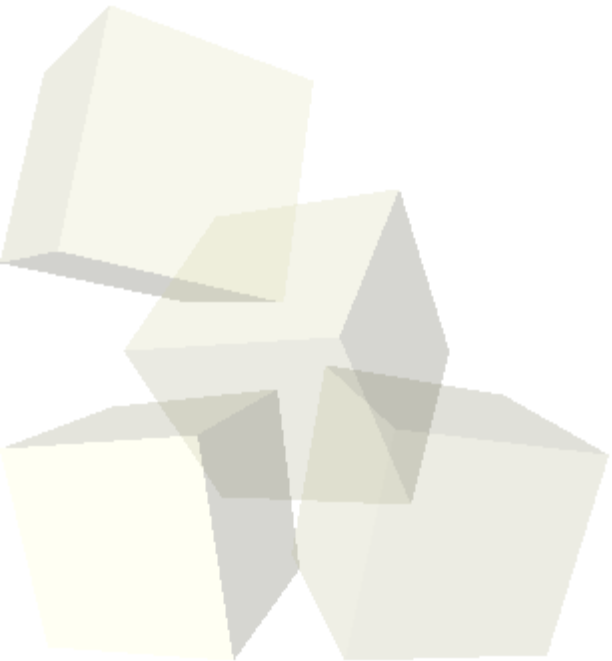
Lists and Arrays

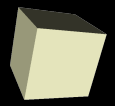
2/11/2008



Opening Discussion

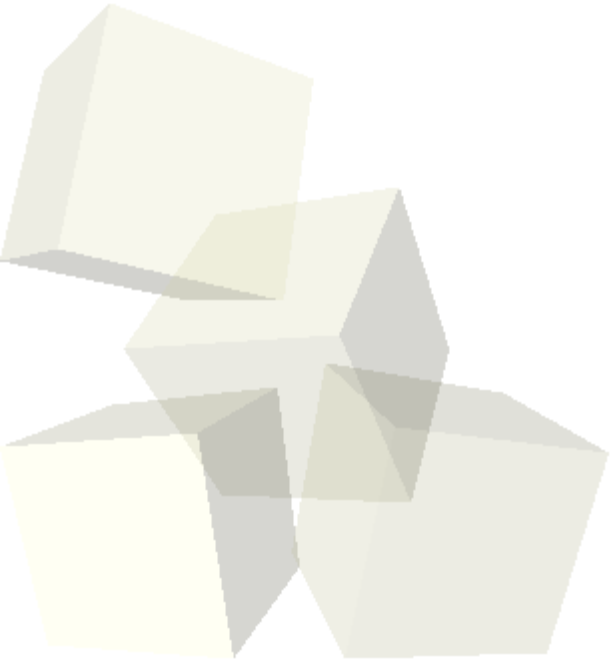
- Let's look at solutions to the interclass problem.
- Minute Essays
  -





Problem

- I want to be able to do our tag game with more objects and I don't want to have to repeat writing the same code over and over again.
- I could also want the mummy to go and attack many other objects in order of proximity and not have to repeat a lot of code.



Working with Multiple Objects

- While we have given ourselves a lot of power in Alice, there are still some things that are difficult. Working with a large number of different objects is an example.
- To do this we need some construct in the language that represents a group of things so that we can manipulate the group or give commands to elements in the group.
- In Alice we accomplish this with lists and arrays.

Lists in Alice

- A list is a type of abstract data type with certain operations defined on it that mimic what we generally think of as things we can do to a list.
- You use a list in Alice when you have a collection of objects that you want to add to and remove from.
- The dialog box that comes up for variables, parameters, properties, and function return types has an option that allows you to make it into a list. Lists can hold any of the Alice types in them.

List Operations

- Alice provides the operations forAllInOrder and forAllTogether to allow you to do something to all of the elements of a list.
- The loop will create a variable that stores each item from the list and executes the code in the loop body.
- At this point we need to make a list and demonstrate using each of these constructs on the items of the list.

List Methods

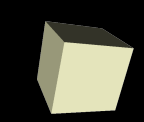
- Lists have methods in them that we can call to modify the contents of the list.
  - Three versions of add put new items in the list as different locations.
  - Versions of remove take something out of the list.
  - The clear method takes everything out of the list.
- Note that the index of a list starts at 0, not 1. This is common in many modern programming languages. So the add method with a first argument of 0 places a new item at the beginning of the list.

List Functions

- Lists also have functions that we can call to get information from the list.
  - size tells us how many elements are on the list.
  - firstIndexOf searches for something in the list and gives the index it first appears at.
  - lastIndexOf is similar to firstIndexOf, but starts searching at the end.
  - [] get an item from the list.
  - getLastItem and getRandomItems return the respective items.

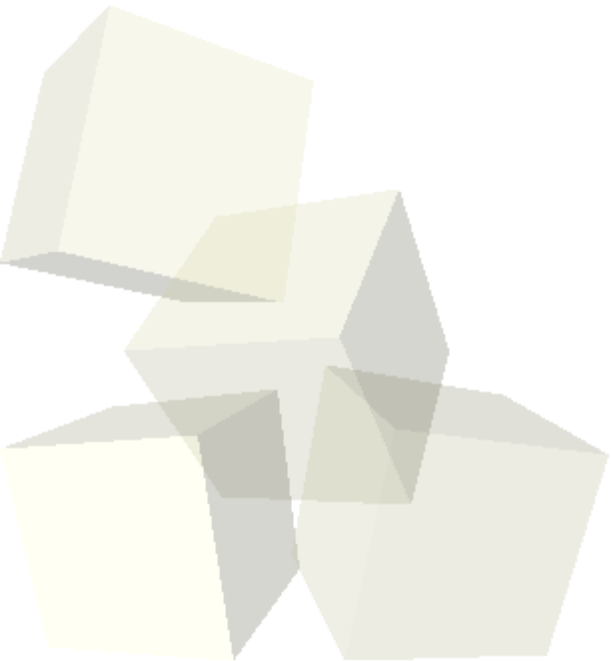
Arrays

- Arrays are much like lists and in most languages are the most commonly used way of dealing with many things.
- Unlike lists, the size of an array doesn't change after it is created. It has a fixed number of slots. You can set elements, but you can't insert and you don't really have the option to remove.
- Unfortunately, arrays don't work well in the current version of Alice so we will pretty much ignore them and use lists.



Coding

- Let's actually do something with a list in our program.



Minute Essay

- How might you use a list in your project?
- Remember to turn in your project ideas.
- Interclass Problem - Place four objects in a world. Three should be characters you move around and one should be a stationary object. Put the three characters on a list and have them move to the stationary object sliding one meter at a time. Each should stop when it gets close to the object.