# Collection Methods

9-29-2010

# Opening Discussion

- Do you have any questions about the quiz?

- Solutions to the interclass problem.

- Minute essay comments:

    - If you feel confusion, you should try to schedule a time to come talk to me.

    - Why are array lengths fixed? Are there variable length arrays?

# Parametric Types

- You should notice that when we make an array or a list, the type is followed by square brackets.

- These types are parametric. So they take type arguments.

- In Scala, type parameters are placed in square brackets.

# Using Arrays

- We can get to the elements in an array by putting an index in parentheses.

  - arr(5)

- This syntax can be used in expressions to read values.

- It can also be used in assignments to store values in the array. This is what it means to be mutable.

- Let's look at some examples of this.

# Using Lists

- You can do direct access on lists, but it is inefficient.

- The better method is to use the head and tail methods.

- The elements in a list can't be changed. However, you can efficiently add new elements at the front of the list.

# Standard Methods

- There are lots of methods on collections. The API can help us see all of them.

- Part of collections:
  - drop, init, last, slice, splitAt, take, takeRight

- Boolean tests:
  - contains, endsWith, isEmpty, nonEmpty, startsWith

- Searching:
  - indexOf, lastIndexOf

- Other:
  - mkString, reverse, zip, zipWithIndex

# Other Methods

- If the elements in a list support addition or multiplication, you can use the sum and product methods.

- If they are ordered you can do min and max.

- Having sum and length makes averages really easy.

- With min you can even drop a grade easily.

# Higher Order Methods

- The most powerful methods are ones you can pass functions into.
    - exist, forall – Boolean checks like for math.
    - filter, partition – separate collection based on Boolean.
    - map – apply function to all the elements.
    - reduceLeft – apply function moving through collection
    - foldLeft – apply function moving through, but allows initial value so it can return a different type. This is curried.

# Let's Put These Into Action

- I want to spend the rest of the class time playing with these methods and seeing what we can do with them.

- A String is a collection so you can do these things with a String as well.

# Minute Essay

- Assume you have an array called numbers. Write code to take the average of all the numbers less than 100 in the array. (This is easily done in two lines.)

- No class on Friday.

- Interclass problem:

  - Write a function that takes an array of numeric grades, determines a letter grade for each and calculates a GPA.