# Argument Passing

10-4-2010

# Opening Discussion

- Interclass problems. (We won't give them on days assignments are due in the future.)

# 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 some 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.

# Variable Length Argument Lists

- You can make functions that don't specify exactly how many arguments they take.
- These are often called var-args.
- To do this, but a * after the type. It can only be the last argument in a list.

# Calling Var-Args with Collections

- It is often helpful to call a var-args method passing a collection for the variable length arguments.
- You can do this, but you have to tell Scala what you are doing.
- Follow the collection with :_* to do this.
- The : is like specifying a type.
- The _ says you don't care about the exact type.
- The * is like the * in var-args declarations.

# Aliasing and Mutability

- I argue that immutable collections like Lists can be safer than mutable ones like Arrays.
- One of the big reasons for this is aliasing.
- An alias in programming is just like in normal life. It is a second name for something.
- Variables are really references to objects.
- If a second variable is assigned the same value as the first, they are aliases to that object.
- Let's play with this and draw on the board.

# Aliasing for Argument Passing

- When you pass arguments, you are really passing references.
- So arguments in functions are aliases to the objects outside the function
- If the object is mutable, the function can change it.

# Pass-by-Name

- There is another way to pass things in Scala called pass-by-name.
- When you pass something by name, it isn't evaluated at the time it is passed. Instead it is turned into a function and that function is evaluated every time the variable is used.
- The syntax is to put an => before a type, but not have an argument list before the arrow.

# Fill and Tabulate

- There are two other ways of creating collections: fill and tabulate. Both are curried. Second argument to fill is by name, second argument to tabulate is a function.
- The fill method on Array or List takes a first argument of how many elements. After that is a by-name parameter that gives back the type you want in the array or list.
- Tabulate also takes a size first. After that is a function that takes the index.

# Minute Essay

- What questions do you have about collections?
- Remember to do assignment #3.
- Interclass problem:
  - None as assignment #3 is due on Wednesday.