

Functions

9-13-2010

Opening Discussion

- Let's look at solutions to the interclass problem.
- Minute Essays:
 - Why isn't there a decent API available?
 - How many different commands will you have to memorize as a CS major?
 - I/O redirection.
- ACM and Major's e-mail list.

Functions in Math

- Let's review the concept of functions from math.
- In algebra a function would take one or more values and give you back a value. The values were generally numbers.
- In higher level math this is generalized with things like sets.
- In math functions the same input leads to the same result.

Functions in Programming

- The concept of a function is critically important to programming.
- Functions can take one or more arguments and give us back values. (Most languages allow only one return value.)
- Let's think of some examples of functions that we could write.

Functions in Scala

- We declare functions in Scala using `def`. Here is the general form.
 - `def name(arg1:Type1, arg2:Type2, ...):Type = expression`
- The argument list can have zero or more elements. If there are zero even the parentheses can be left off.
- Function arguments must have types.
- The return type is optional, but it is recommended.

Why Functions?

- Functions are used in programs for a number of reasons.
 - Reduce code duplication. You can call the same function multiple times and only write it once.
 - Improve readability and maintainability. Good function names make it easier to read. Small functions are easier to test and debug.
 - Break problems down/problem decomposition.

Problem Decomposition

- Never solve a hard problem. If a problem is hard, break it into smaller problems that are easier. Repeat until you are only solving trivial problems.
- Top-down
 - This is the “normal” approach where you start with the full problem and break it into pieces.
- Bottom-up
 - Sometimes you realize that different trivial pieces will be useful and build up from those.

Minute Essay

- Do you have any questions about functions?
- Interclass Problem:
 - Write two functions that do unit conversions.