CSC151.02 2014S, Class 34: Iteration

Overview

- Preliminaries.
  - Admin.
  - Questions.
- Reflecting on procedures and side-effects.
- A useful tool for repetition: for-each.
- Contrasting map, for-each, repeat, and recursion.
- Lab.

Preliminaries

Upcoming Work

- Homework for Wednesday: HW 7: GitHub
- Today’s lab writeup: 4c and 4d.
- Reading for tomorrow: Geometric Art through Numeric Recursion
- HW 8 is also posted.

Admin

- If our Web server is not working correctly, you should be able to get to today’s lab at the URL
- Continue your partner assignments from Monday. If you missed class on Monday, work with someone else who missed class on Monday.
- CS T shirts soon to be available. Vote if you plan to buy one by sending email to sepc-cs@grinnell.edu. The list of possibilities is at [http://imgur.com/a/P0haH#0](http://imgur.com/a/P0haH#0)
  - You should encourage the SEPC to make a "Curried Lamb-Duh" T-shirt
- Extra credit:
  - Convocation, Wednesday, noon: Elizabeth Kolbert (the Sixth Extinction)
  - Technology in liberal arts education, lots of talks on Thursday
  - No CS extra this Thursday.

  [http://doi.acm.org/10.1145/2576792](http://doi.acm.org/10.1145/2576792)
Questions

Reflecting on procedures and side-effects

- A transition in how we think about procedures (not necessarily positive)
- It used to be, we called procedures to return a result
  - And nothing else
- Now, procedures have "side effects" - they change "the world" (or themselves, or an image)
- When you’re doing (+ (square 5) (square 7)), it doesn’t matter which order we do the square
- If you do (turtle-forward! t 10) (turtle-turn! t 10)
- Order of operations is much more important!
- We didn’t tell you, but map does not necessarily do the transformations in order from left to right
  - (map square (list 1 2 5 7 9))
- map is not a good tool for side-effeting operations, since order matters

What is a procedure with a side-effect?

- One view: The procedure changes something external (e.g., an image, the implicit position of the turtle, ...)
- Another view: We are not assured of getting the same behavior each time we call the procedure on the same parameters

Examples

- Side effects: turtle-forward!, image-select-ellipse!, ...
- No side effects (pure): square, increment, iota, rgb-redder, irgb-new, ...
- Badly named: image-show

A useful tool for repetition: for-each

- When you want to apply the same function to one thing and then another and then another (as in map)
- But you care about the order
- To different values
- and we do this more for the side effects than the resulting list

- USE for-each
  
  (for-each PROCEDURE LIST-OF-PARAMETERS)
Contrasting map, for-each, repeat, and recursion

- Are we doing the work with side effects or not?
  - With side effects: for-each, repeat, recursion
  - Without: map, recursion
- What does our result look like?
  - A list of transformed values: map
  - Nothing: for-each, repeat
  - Variable: recursion
- Do we something different at each step?
  - No: repeat, (recursion)
  - Yes: for-each, map, recursion

Lab

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