UC Berkeley EECS
Lecturer SOE
Dan Garcia

CS10 : The Beauty and Joy of Computing

Lecture #18
Higher Order Functions I

2012-04-02

CODING IS COOL AGAIN!

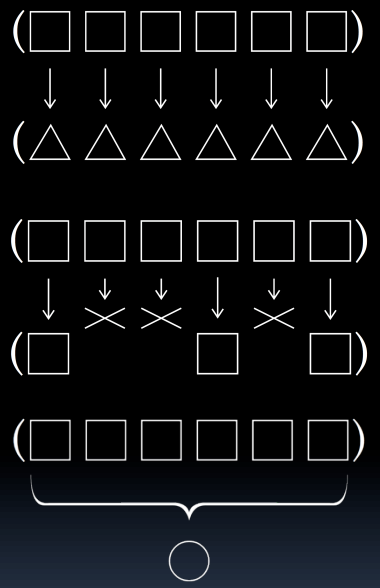
The market for classes in coding (esp focused on the Internet) is booming, so says the NY Times. Codeacademy is one of the biggest sites; CS10 is a great first step!!

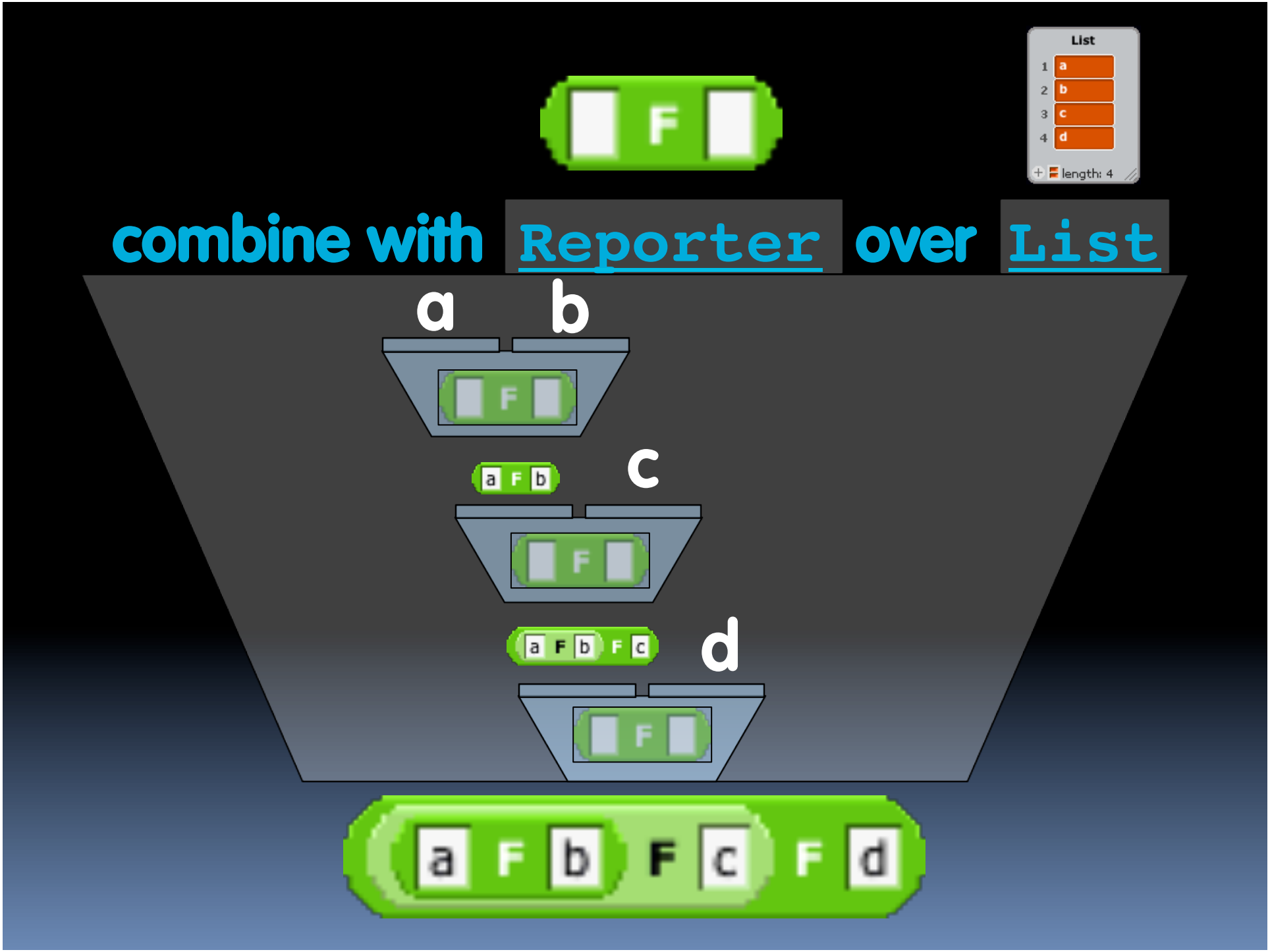
(Image Credit: New York Times)

http://www.nytimes.com/2012/03/28/technology/for-an-edge-on-the-internet-computer-code-gains-a-following.html

Today

- Functions as Data
- Higher-Order Functions
- Useful HOFs (you can build your own!)
  - map `Reporter` over `List`
    - Report a new list, every element `E` of `List` becoming `Reporter(E)`
  - keep items such that `Predicate` from `List`
    - Report a new list, keeping only elements `E` of `List` if `Predicate(E)`
  - combine with `Reporter` over `List`
    - Combine all the elements of `List` with `Reporter(E)`
    - This is also known as "reduce"
- Acronym example
  - keep → map → combine




F
List
1 a
2 b
3 c
4 d
length: 4
combine with Reporter over List
a
b
F
a F b
c
F
a F b F c
d
F
a F b F c F d

Peer Instruction

I understand higher-order functions.

a) Strongly disagree
b) Disagree
c) Neutral
d) Agree
e) Strongly agree

Summary

- Functions as data is **one of the two (programming) big ideas** in this course
- It's a beautiful example of the **abstraction of the list iteration details**
- Google (and other companies) use this!
  - They use "map-reduce"

(Image Credit: *Simply Scheme* by Brian Harvey & Matt Wright)

Turning function machines into plowshares