LOGISTICS

- HW5 due on 4/20
- Project presentation on 4/27
  - Will summarize what you've learned about your systems over the course of the semester
- More details next week
PROGRAMMING STYLE

- A set of constraints on how code is written which help achieve specific requirements or quality attributes

- Describe alternative ways in which code might be written
  - make it object-oriented
  - make it functional
  - lazily load data from input source
  - give each element a separate thread

- Like architectural styles and design patterns, has consequences that adopting programming style help achieve
  - But not always as well-defined and enumerated
EXERCISES IN PROGRAMMING STYLE

- Presentation is centered around an example problem
- Each program offers the same baseline behavior (sometimes adding an additional feature)
- Can directly compare and contrast how the same problem is solved each style
- Directly illustrates the diversity of ways of programming
  - Many different ways to solve the same problem
- Some are related to programming language features (e.g., OO, functional, reflection)
  - But many modern languages support a range of language features that support a diversity of styles
  - Can write something in a procedural style (i.e., ignoring OO features) even in Java
- Examples written in Python
EXAMPLE PROBLEM: TERM FREQUENCY

- Given a text file, print the 25 most frequent words and corresponding frequencies.
- Sort from most frequent to least frequent.
- Normalize for capitalization and ignore "stop" words (e.g., the, for, ...).

**Input**

- Tigers live mostly in India
- Wild lions live mostly in Africa

**Output**

- live - 2
- mostly - 2
- africa - 1
- india - 1
- lions - 1
- tigers - 1
- wild - 1
SOME TYPES OF PROGRAMMING STYLES

▸ Basic styles
▸ Functional styles
▸ Reflection styles
▸ Data-centric styles
▸ Concurrency styles
EXAMPLES OF PROGRAMMING STYLES

https://github.com/crista/exercises-in-programming-style

- 5-cookbook/procedural  https://github.com/crista/exercises-in-programming-style/tree/master/05-cookbook
- 6-pipeline  https://github.com/crista/exercises-in-programming-style/tree/master/06-pipeline
- 8-infinite mirror / recursive  https://github.com/crista/exercises-in-programming-style/tree/master/08-infinite-mirror
- 16-b board /publish subscribe  https://github.com/crista/exercises-in-programming-style/tree/master/16-bulletin-board
- 31-map reduce  https://github.com/crista/exercises-in-programming-style/tree/master/31-map-reduce
SUMMARY

- Many choices about how to implement a solution
- Programming styles offer a vocabulary for talking about alternative implementations
- Makes explicit the constraints which lead to a specific style of programming
- Can consider explicitly the consequences of following these constraints
IN CLASS ACTIVITY
SKETCH IMPLEMENTATION IN LAZY-RIVER STYLE

- Work in groups of 2 or 3, pick an OO language (e.g., Java, Python, C#)
- Sketch an implementation of the following
  - Given a text file, output all words alphabetically, along with the page numbers on which they occur. Ignore all words that occur more than 100 times. Assume a page is a sequence of 45 lines.
    - abatement - 89
    - abhorrence - 101, 145, 152, 241, 274, 281
    - abhorrent - 253
    - abide - 158, 292
  - Does not need to compile and run, just looking for a sketch that illustrates following the programming style for this problem
  - Hand in through Blackboard