Introduction

CSCI 4448/5448: Object-Oriented Analysis & Design

Lecture 1 — 08/23/2011

Two Announcements!

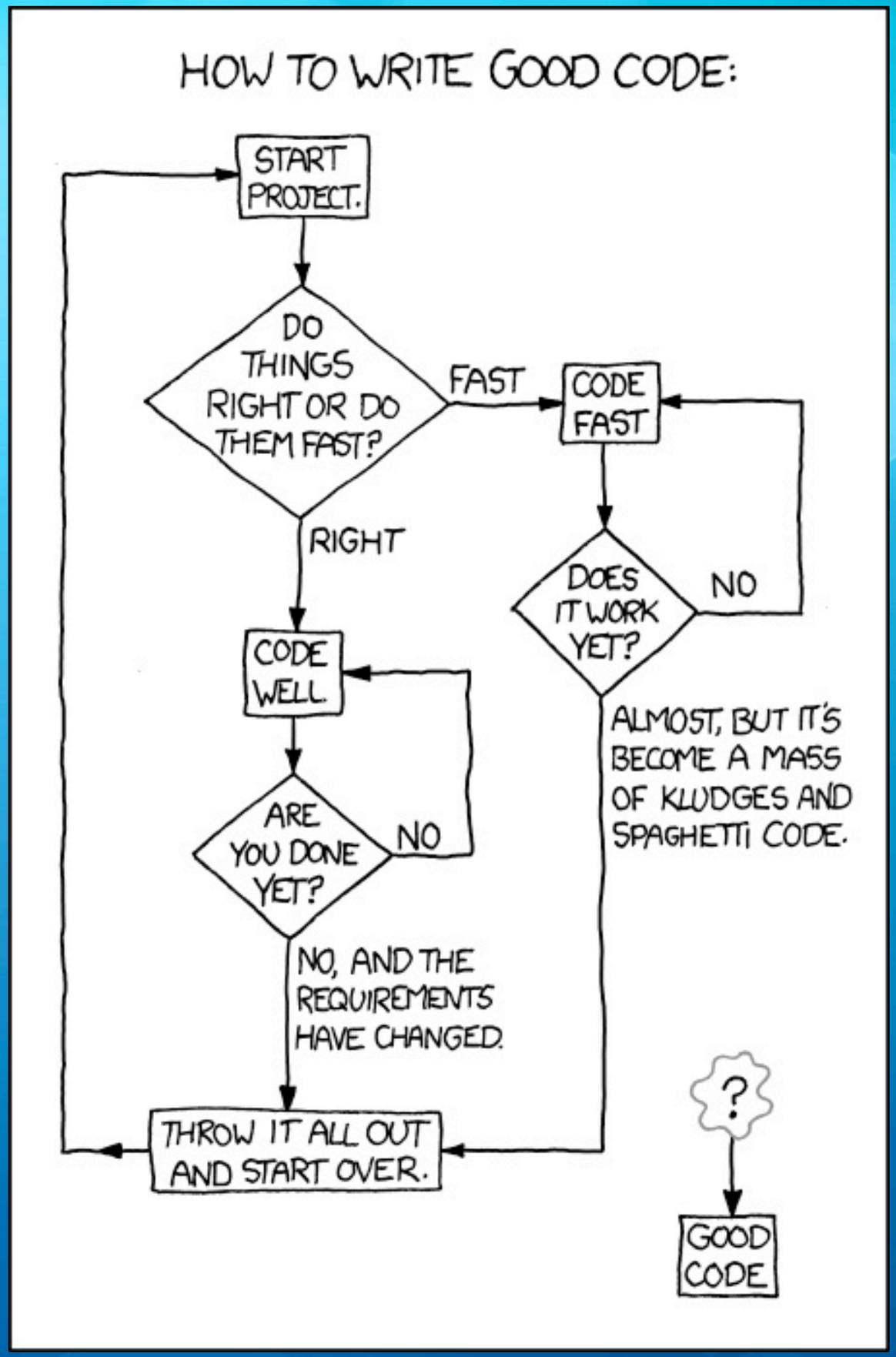
- Code War
  - Windward Reports (a local Boulder tech company) is hosting a Code War in the CSEL (ECCS 128) this Saturday from 10 AM to 6 PM
    - If you want to participate, send me e-mail!
    - <http://blogs.windwardreports.com/davidt/2011/07/code-wars-coming-to-the-university-of-colorado.html>
- Ice Cream Social
  - The department will be hosting an Ice Cream Social as the first colloquium of the year: Thursday, September 1st, 3:30 PM to 4:30 PM in ECCR 265

This class aims to teach you a style of software design that can enable you to reach the box labelled "Good Code" in the diagram on the right.

Software Design is not completely a black art... there are design techniques that lead to better results when applied in support of creative expression.

From the excellent web comic, xkcd:

<http://xkcd.com/844/>



About Me

- Associate Professor
  - Ph.D. at UC Irvine (1997)
  - 13 Years at CU
- Tenth Time Teaching This Class
- Research
  - Software Engineering
  - Hypermedia & The Web

Office Hours

- Thursdays 2 PM to 4 PM
- DLC 170M (Discovery Learning Center; Just knock and we'll let you in)
- Please send me e-mail to let me know you'll be attending
- You can also meet with me at other times by sending e-mail to make an appointment

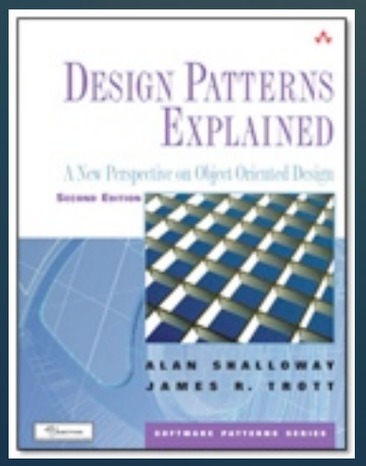
Class Website

http://www.cs.colorado.edu/~kena/classes/5448/f11/

Check the Website Everyday!

- There is an RSS feed associated with the What's New page to make this easy for you to do!
- The website is your source for
  - the class schedule
  - homework assignments
  - announcements
  - etc.

Textbook



- Design Patterns Explained
  - A New Perspective on Object-Oriented Design, Second Edition
- Alan Shallloway and James R. Trott
- Addison Wesley, © 2005

- Book discusses a design methodology that encourages the use of design patterns early in a software development effort
- I will also be drawing on other resources throughout the semester

Teaching Philosophy

- I want you to participate!
  - Feel free to interrupt me when you have a question
  - Feel free to tell me to slow down if I'm speaking too fast
- I will try to learn your name (although, with roughly 78 students, it's going to be tough!!)
- Learning by Doing
  - I will try to create conversations each lecture and will also insert in-class activities where appropriate
  - Homeworks will ask you to apply techniques learned in class

Goals of the Class

- Provide students with knowledge and skills in:
  - object-oriented concepts
  - OO analysis, design and implementation techniques
  - OO design methods (software life cycles)
- Students should view OO software development as a software engineering process that has well-defined stages with each stage requiring specific tools and techniques
- Gain some experience with the Android and iOS frameworks

Course Structure **(Tentative)**

- Weeks 1 - 4: Chapters 1 - 11 of the Textbook
- Weeks 5 - 7: Introduction to Java, Objective-C, Android and iOS
- Week 8: Midterm; Exact Date: **Tuesday, October 11, 2011**
- Weeks 9 - 10: Intermediate and Advanced Android and iOS
- Weeks 11 - 13: Chapters 12-25 of the Textbook
- Fall Break: November 21–25, 2011
- Weeks 14 - 15: Object Relational Mappings (Hibernate); Dependency Injection (Spring); Project Presentations

Course Evaluation

- Undergraduates
  - Midterm (30%)
  - Homeworks (70%)

Note: Grading standards will be higher for graduate students.

- Graduate Students
  - Midterm (30%)
  - Presentation (30%)
  - Homeworks (40%)

Homeworks will include a class project that can be worked on in teams of 2 to 4 people. The "presentation" for graduate students will address an advanced topic of OO A&D or OO Programming or introduce an OO Framework in depth. Presentations will appear on the website and "executive summaries" will be presented in class.

Honor Code

- I encourage collaboration in this class via the homeworks (which will include a semester project); You may work on them in teams of 2 to 4 students
- All students must work on the midterm individually (obviously)
- **Graduate students must work on their presentations individually**
- The Student Honor Code applies to classes in all CU schools and colleges. You can learn about the honor code at:
  - <http://www.colorado.edu/academics/honorcode/>

Submitting Assignments

- Assignments will be submitted via e-mail and will vary via format
  - Text: submitted within the body of an e-mail message
  - PDF: submitted as an attachment of an e-mail message
  - .zip or .tar.gz: send a link in e-mail and we'll download the file
- Adopting this approach as OIT will sometimes nuke a message that contains a .zip attachment
  - When they do this, the message simply disappears!
  - I don't receive it and you don't know it wasn't delivered!

Late Policy

- Assignments submitted after the deadline incur a 15% penalty
  - meaning the maximum grade on a late assignment is a B
- Assignments can be submitted up to one week after the initial due date (except for the final assignment of the class)
  - after that you are out of luck…

Syllabus Statements

- The University asks that various policies be presented to students at the start of each semester. These policies include
  - Disability Accommodations
  - Religious Observances
  - Classroom Behavior
  - Discrimination and Harassment
  - Honor Code
- See <http://www.cs.colorado.edu/~kena/classes/5448/f11/syllabus-statements.html> for more details

Programming Languages

- Examples will be written in Java, Objective-C, Python and Ruby
- OO Programming is NOT a central topic of the class
  - This stance stems from my view that analysis and design are the hard parts of OO software development
  - However, I will be devoting lectures to introduce Java and Objective-C
- Assignments
  - Note: You will be required to write **some** homework assignments in the Java language, otherwise any OO language may be used

Bias?

- I do not have much experience with C++, C# or .Net
  - As a result, I do not include examples of these two languages or the .Net framework in my lectures
- However, I am not "anti-Microsoft" or "anti-C++" and therefore welcome student presentations on C++ or Microsoft technologies

Discussion (I)

- How many people have used an object-oriented programming language before?
  - Java? C#? C++? Objective-C? Python? Ruby? Others?
- What features make a language object-based?
- What features make a language prototype-based?
- What features make a language object-oriented?

Discussion (II)

- How many people are comfortable starting from scratch and creating:
  - a script?
  - a desktop application?
  - a web service?
  - a mobile application?
  - a system of systems? (i.e. desktop plus web service)
  - a database-backed application?

Discussion (III)

- When you create a program from scratch:
  - do you use OO techniques?
  - OO design heuristics?
  - design patterns?
- If not, what style of software design do you use?
  - What styles of software design are you aware of?

Discussion (IV)

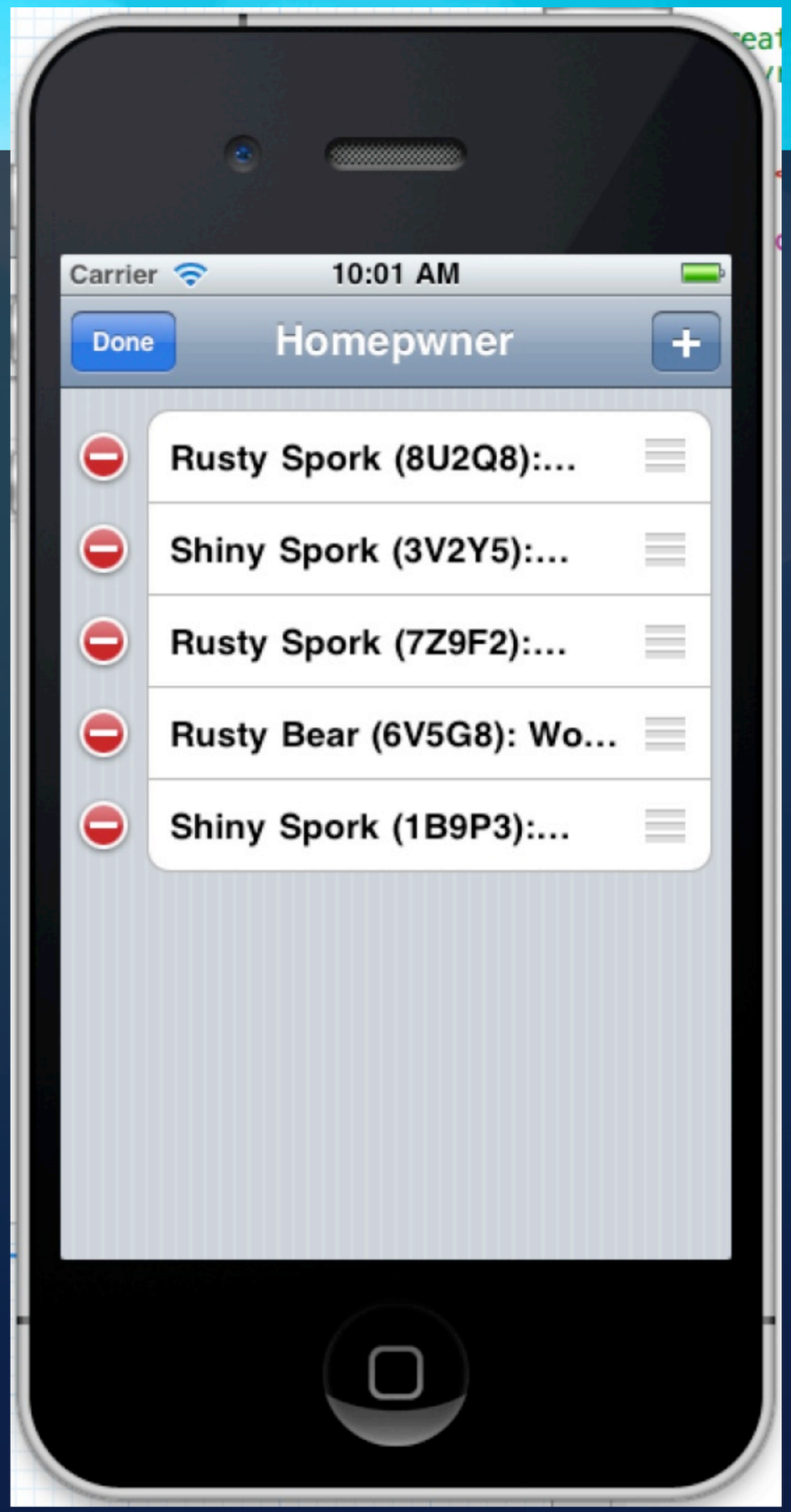
- What is design?
- What comes before design?
- What comes after design?
  - Do these questions make sense in software development?
- What would make the process of software design object-oriented?

Discussion (V)

- Let's try this out…
  - Find a partner (or two) to discuss in a group the following
  - Take what you know (or don't know) about OO A&D and describe what you would do to design a software system that does the following
    - Help people navigate the labyrinthian corridors of CU's beloved engineering center
- What components (hardware/software) would you include in your design? What requirements must be met? What objects would appear in your design? What constraints might you encounter when working on this project?

Discussion (VI)

How many objects do you think are working together to create the application shown on the right?



(This is an example app from Joe Conway & Aaron Hillegass's excellent book: iOS Programming: The Big Nerd Ranch Guide, 2nd Edition)

Coming Up Next

- Lecture 2: The OO Paradigm
  - Read Chapter 1 of the Textbook
- Homework 1: To be assigned on Thursday