Software Development Methodologies, Analysis and Design

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Lecture Overview

Lecture Schedule

Lectures: Thursday, 16:00-19:00 in CM3

Final lecture is on Thursday, 26th June 2014
No lectures on:

- 1 May 2014 (Workers' Day)

Course Homepage

`http://joshilewis.github.io/ELEN7045/`

Here you will find:

- Lecture slides
- Readings (most will also be given as handouts)
- Assignment details and deadlines
- Student presentations
- Links to additional information

Course Prerequisites and Time Demands

- Basic familiarity with a mainstream object-oriented language (C++, Java, C#, Ruby) is assumed.
- You are able to create executables using one of the above languages.
- Expect to devote around 20 hours per week to this course

Assessment

- In-class presentation on either object-oriented concepts or design patterns, counts **10%**
- Participation in discussions related to readings, counts **10%**
- Two individual assignments, each count **20%**
- The course project, to be done in teams of 5 or 6, counts **40%**.

The minimum criteria for passing this course are:

- A passing grade for at least one of the assignments
- A passing grade for the course project

The Coffee Machine Problem

Requirements 1

Your group have just won a bid to design a custom coffee vending machine for the employees of AmaFijet Works to use. Arnold, the owner of AmaFijet Works, like the common software designer, eschews standard solutions. He wants his own, custom design. He is, however, a cheapskate. Arnold tells us he wants a simple machine. All he wants is a machine that serves coffee for R 5-00, with or without sugar and creamer. That's all. He expects us to be able to put this little machine together quickly and for little cost. You get together and decide there will be a coin slot and coin return, coin return button, and four other buttons: black, white, black with sugar, and white with sugar.

Thinking About the Problem; Communicating the Solution

Draw a diagram or diagrams answering the following:

- What are the components of this system?
- What are their responsibilities?
- Which components communicate with each other?

Driving these design decisions is the need to provide a *service* — coffee for R 5-00.

Requirements 2

After five machines are installed and have been operating for a while, Arnold comes along and says, "I would like to add Milo, at R 5-50. Change the design." You agree to add one more button for Milo, and one more container for Milo powder.

Create a *new* diagram for your coffee machine based on the new requirements.
How have these changes affected your design?

Requirements 3

Arnold comes back a while later with a brilliant idea. He has heard that some companies use their company badges to directly debit the cost of coffee purchases from their employees' paychecks. Since his employees already have badges, he thinks this should be a simple change.

How does this affect your design?

Requirements 4

People are starting to buy Seattle Coffee Company lattes instead of Arnold's coffees. So Arnold wants the machine modified just slightly, so that he can create a "drink of the week." He wants to be able to add new drinks and change prices any time, to match his competition. He wants to be able to add espresso, cappuccino, latte, choco-latte, steamed milk in short, anything he can mix together.

Redesign the coffee machine to support these new services. What do you notice about the abstractions in this new design?

Course Content

- Requirements: Use Cases, User Stories, Specification by Example
- Test-Driven Development (TDD)
- Object-Oriented Programming (OOP)
- SOLID Principles
- Dependency Injection
- Domain-Driven Design (DDD)
- UML
- Design Patterns
- Software Development Methodologies (implicit)