Introduction

Object Orientated Analysis and Design

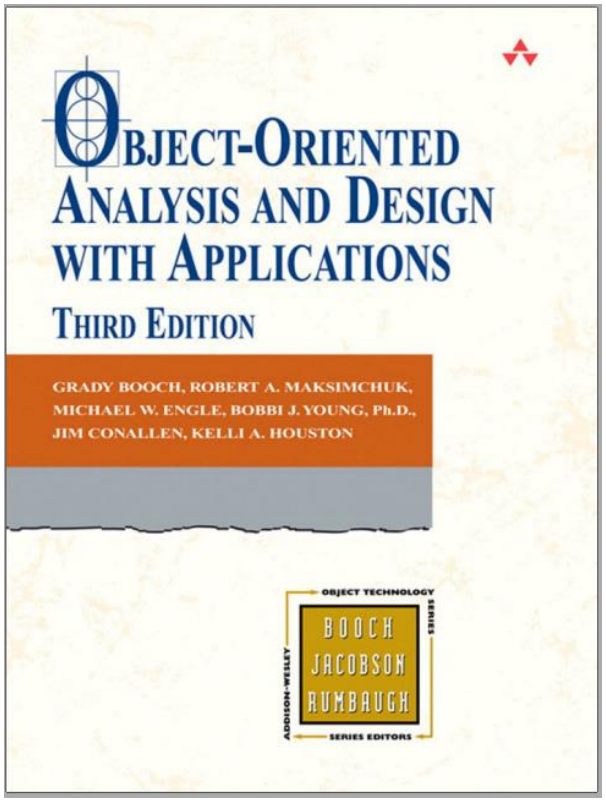
Benjamin Kenwright

Outline

- What do we mean by Object Orientated?
- Why do we need to analyze and design our solutions?
  - ▷Give examples
- What analysis and design tools are available?
- Course structure
- Grading/assessment

Recommended Book

- Object Oriented Analysis and Design with Applications 3rd Edition by Booch
  - Ebook Available: https://zjnu2017.github.io/OOAD
  - Complete Reading Chapter 1 Before Next Week



Recommended

- Also read around the subject to gain a broad/comprehensive understanding of the topic
  - Articles, books, online-tutorials, …

Question

- What is a Great Software Solution?

Answer

- A great software must satisfy the customer
- The software must do what the customer wants it to do!
- Great software is also
  - well-designed
  - well-coded
  - easy to maintain, reuse, and extend

Question

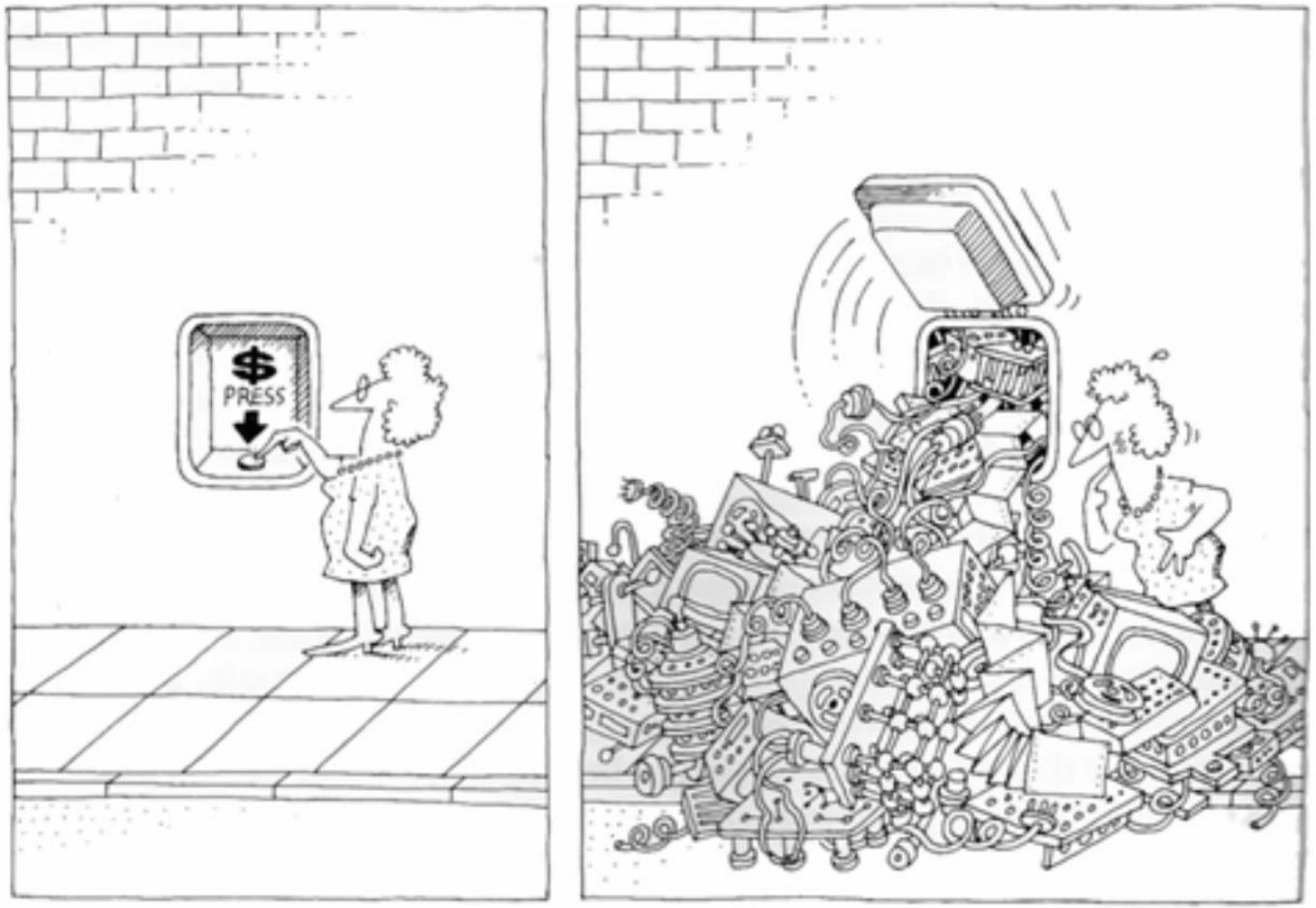
- How do we make Great Software Solutions?

Answer

- Apply Object Orientated Analysis and Design Processes
  - e.g., Make sure your software does what the customer wants it to do
  - Use OO principles to add flexibility
  - Strive for a maintainable, reusable design
  - …

Why do we need Object Orientated Analysis and Design (OOAD)?

Why we need OOAD?



Why we need OOAD?

- Software is inherently complex
  - Complexity of software systems often exceeds the human intellectual capacity
- Helps create illusion of simplicity
- Order to Chaos
  - Add meaningful logic

Object Orientated Analysis and Design

- Techniques that allow us to decompose problems/tasks into manageable components
- Employs object-oriented methods for organising the complexity of the system
- Provides a rich set of models to understand the different aspects of the system under consideration

The primary tasks for the object-oriented `analysis' (OOA)

- Find the objects
- Organize the objects
- Describe how the objects interact
- Define the behavior of the objects
- Define the internals of the objects

Common models used in OOA are use-cases and object models

Class Participation

- Welcome participation by students
- Feel free to interrupt me during lectures to ask questions!
- Stupid Questions — No such thing!
- No participation leads to “silent tomb” - Boring!
- If I speak too fast or you are unsure of something, stop me and ask/tell me to slow down

Class Participation

- Quizzes
- Discussion/Project
- Homeworks
  - Reading Chapters
  - Researching Topics
  - Case studies

Question

- Which of the following is the functionality of ‘Data Abstraction’?

a) Reduce Complexity

b) Binds together code and data

c) Parallelism

d) None of the mentioned

Answer

- Answer: a

Explanation: An essential element of Object Oriented Programming is ‘Data Abstraction’ which means hiding things. Complexity is managed through abstraction.

Goals

- Provide students with knowledge and skills in:
  - Object-oriented concepts
  - OO analysis, design, and implementation techniques
  - Object-oriented design methods
    - (aka software development 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

Grading

- Attendance 10%
- Experiments & Discussion 40%
- Final Exam 50%

Structure Topics

Topic	Overview	Lecture/Discussion
01 Introduction	(Course structure, grading, aims, ...)	L
02 Complexity	(Modern software, managing complex systems, organising, ...)	L
03 Object Model	(Design and analysis concepts, abstraction, responsibilities, ...)	L
04 Classes and Objects	(Nature and interplay of classes/objects)	L
05 Classification	(Importance and identifying classes and objects)	L
06 Notation	(Diagrams, Unified Modeling Language (UML), Use-Case Diagrams, ...)	L
07 Processes	(Principles, lifecycle, ...)	L
08 Pragmatics	(Management, planning, risk, quality, tools and documentation, ...)	L
09 Examples/applications	(review/apply techniques from previous lectures)	L/D
10 Examples/applications	(review/apply techniques from previous lectures)	L/D
11 Examples/applications	(review/apply techniques from previous lectures)	L/D
12 Examples/applications	(review/apply techniques from previous lectures)	L/D
13 Review and Questions	(review/discussion/quizzes)	L/D

Experiments/Discussion

Group 2-3 People
18 hrs

1. System analysis: study, understand, and define requirements for the system
2. Defining the boundaries of the problem
3. Use-case model
4. Deployment view
5. Sequence diagram and operation
6. Design to code

Contact Details

- Questions/Issues

Benjamin Kenwright
email: bkenwright@ieee.org

- Open Door Policy
  - Problems/Help
  - Within Reason

Question

- Which of the following mechanisms is/are provided by Object Oriented Language to implement Object Oriented Model?

a) Encapsulation

b) Inheritance

c) Polymorphism

d) All of the mentioned

Answer

- d) All of the mentioned

Question

- An object is a combination of data and logic; the representation of some real-world entity

a) True
b) False

Answer

- a) True

Summary

- Clear idea of the goal of this course/topic
- Structure of the course
- Assessment/grading

This Week

- Review Slides
- Read Chapter 1
- Challenging so Start Early

Questions/Discussion