Software System Engineering

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Lesson 20:
Software Stability
Lesson Objectives

- Overview of Previous Lecture
- Understand the following:
  - Enduring Business Theme
  - Business Objects
  - Industrial Objects
  - Framework Layering
Roadmap

- Scare - General State of Panic
  - Identify the Killers (Problems)
  - Catch the killers (Solutions)
The Current State of Software - I

- Current software projects are engineered for the “here and now.”
- Changes in the support structure or the software market require massive reengineering projects.
- This reengineering costs ridiculous amounts of money.
The Current State of Software - II

- Software has short life span.
- Often wrong software application is implemented
- Sometimes cancelled before completion
- Maintenance cost over 80% of the development lifecycle
Sample Problem - The Loan

- January 1998
  - I gave a loan of $1000 to one of my students.
  - He promised to return the money by May 1998.

- April 1998
  - Received an e-mail asking for an extension until August 1998

- March 2002
  - I have not received the money
Where Is The Problem?

- After giving this problem to the students in a software engineering class, I received the following responses.
  - There is no problem.
  - Take him to court.
  - Kick his $@%#&!
  - Ignore it.

- What do you think?
A Traditional Model

Do you think this model is an accurate representation of the problem?
Roadmap

- Scare - General State of Panic
- Identify the Killers (Problems)
- Catch the killers (Solutions)
Problems

- Wrong Analysis
- Industrial Objects
- Not stable architecture
- Missing the most enduring concepts
Roadmap

- Scare - General State of Panic
- Identify the Killers (Problems)
- Catch the killers (Solutions)
Open Discussion

Problem Domain

- Friendship
- Education
- Other Relationships
- Family
- Expenses
- Needs
- Schedule
- Employment
- Finance
- Health

Borrower
Loan
Lender

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L4-1-S13
Software Stability
EBT-Based Model - The Loan Problem

- Friendship (Enduring)
  - Friend (Business)
    - Borrower
    - Lender
      - Loan (Business)
        - Finance (Enduring)
          - Solvency (Enduring)
            - Employment (Business)
              - Expenses (Business)
                - Need (Enduring)
                  - Health (Business)
                    - Education (Business)
                      - Family (Business)
                        - ...

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Sample Problem II - The Kitchen

- Kitchens are systems that we are all familiar with.
- What makes a kitchen a kitchen?
- Traditionally, people think of a certain set of objects when they think of a kitchen:
  - Stove
  - Sink
  - Refrigerator
  - Dishwasher
  - etc...
The Kitchen - A Traditional Model

- The result is a model like this:
This model has inherent flaws, however.
The model can be thought of as a “tree” of aggregations and generalizations.
Many of the roots of the subtrees can change drastically, causing this model to break.
For example, imagine replacing the appliance node with a Star Trek food replicator...
The Kitchen - Correcting The Model

- To correct this model, one must concentrate on those aspects that do not change over time.
- Enduring Business Themes are those concepts that remain constant for a given problem.
- Business Objects are those support objects that remain externally stable.
- Objects that may be replaced as times change are Industrial Objects.
The Kitchen - Correcting The Model

- What does a kitchen need?
- What do people do in a kitchen?
- What is a kitchen for?
The Kitchen - A Stable Model

- Kitchen
  - Cabinet
  - Pantry
  - Microwave
  - Cooking (Enduring)
  - Range
  - Microwave (Enduring)
  - Cuisine (Enduring)
  - Recipe (Business)
  - Food
  - Cooktop
  - Oven
  - Livability (Enduring)
  - Convenience (Enduring)
  - Cleanliness (Enduring)
  - Light (Business)
  - Counter
  - Shelf
  - Window
  - Electric Light
  - Sink
  - Dishwasher

- Refrigerator
- Freezer

Food Storage & Preservation (Enduring)
Identifying Enduring Business Themes & Business Objects - Identification Criteria

- Stability
- Adaptability
- Essentiality
- Explicitness
- Intuition
- Tangibility
- Commonality to the Domain
# Identification Criteria

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<thead>
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Identification Heuristics - Enduring

- Enduring Business Themes and Business Objects must be *enduring*.

- Watch out - Long field histories will not necessarily translate to true endurance.
Identification Heuristics - Industrial Object Identification

- Is the object present in a “classical” model?
- Can the object be replaced?
- Is the object a representation of a concrete item?
Identification Heuristics - Top-Down Identification

- Break off conceptual pieces of the problem.
- Recursively break these concepts down.
- Stop when a layer of industrial objects is reached.
Identification Heuristics - Bottom-Up Identification

- Start with a “classical” model.
- Group the industrial objects under a conceptual “heading.”
- Continue this grouping until further grouping is impractical or nonsensical.
Identification Heuristics - There Is No Silver Bullet

- EBT’s are conceptual themes… *Usually*

- Business objects are more concrete objects… *Usually*

- There are always exceptions to any rule.
HealthCare Example: PID

- Security (enduring)
  - Security_Manager (I/O)
    - CheckPassword()
  - Trait_Gatekeeper (I/O)
    - CheckTraits()
- Identity (enduring)
  - IDSession (B/O)
    - DomainName: type = string
    - FindCandidates()
    - AddPerson()
    - DeletePerson()
    - GetPersonProfile()
- DataManager (B/O)
- IDManager (B/O)
- PersonProfile (I/O)
  - uniqueID: type = longval
- PersonTraits (I/O)
- CandidateListGenerator (I/O)
- PersonIdentifier (B/O)
  - Search()
Discussion Questions

- Explain the following statements:
  1. Objects should be intelligent agents
  2. Mechanism rich and policy free
  3. A valuable object works and plays well with others
  4. Analysis model should not be too elaborate or too formal
- Explain how to build an analysis model
- Explain how do you make the analysis model more adaptable
Questions for the Next Lecture

Define: Criteria for Enterprise Frameworks

Let’s discuss of how to build Enterprise Frameworks

T/F:

EBTs are testing patterns.

BOs are stable design patterns.

EBTs + BOs = Framework.
Tasks for Next Lecture

Task 1: Stable Analysis Patterns
Task 2: Stable Design Patterns
Task 3: Design Sessions for SSM (Discuss)