Lecture 21:
Final Review
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Course Content

- Requirements
- Architectural Styles
- Architecture Recovery
- Design Patterns
- Project Scheduling
- Software Estimation
Requirements
Requirements

■ What are SW requirements?
  – Specification of what should be implemented

■ Where requirements come from?

■ What is the process used to come up with SW requirements?

■ Types of requirements? What are requirement specification documents? What do they contain?
Quality Attributes

- Often know as –ilities
  - Performance
  - Scalability
  - Modifiability
  - Availability
  - …
Architectural Styles
What we should know

- Repository
- Pipe-and-Filter
- Object Oriented
- Implicit Invocation
- Layered

You should know **advantages** and **disadvantages** of each

How to apply these when **architecting** large software systems
Architecture Recovery
Architecture Terminology and Views

- Conceptual vs. Concrete vs. Reference

- For each type of architecture:
  - How do we derive it?
  - What is it used for?

- Architectural views
  - Stakeholders
  - Concerns
Design Patterns
Classifying Design Patterns

- **Structural**: concern the process of assembling objects and classes

- **Behavioral**: concern the interaction between classes or objects

- **Creational**: concern the process of object creation
Design Patterns Covered

- **Structural**
  - Adapter
  - Façade
  - Composite

- **Behavioral**
  - Iterator
  - Template
  - Observer
  - Master-Slave

- **Creational**
  - Singleton

- When would you use a specific pattern
- The structure and participants of the pattern
Project Scheduling
Project Scheduling

- Work Breakdown Structures
  - Phase based approach
  - Product based approach
  - Hybrid approach

- Critical Path
  - How to determine it
  - Early, late start and finish
  - Activity slack
Project Scheduling

- **PERT**
  - Optimistic, average and pessimistic estimates

- **Probabilistic network analysis**
  - How likely is a project to finish within X weeks

- **Project crashing**
Cost Estimation
Cost Estimation

- Software Productivity
  - LOC vs. FP vs. OP

- Estimation Techniques
  - Algorithmic cost modeling
  - Expert judgment
  - Estimation by analogy
  - Parkinson’s Law
  - Pricing to win
Cost Estimation - COCOMO

- COCOMO 81
- COCOMO II
  - Early prototyping model (base on OP)
  - Early design model (based on FP -> LOC)
  - Reuse model
  - Post-architecture level
- COCOMO example
Final Exam Logistics

- Dec 14 @ 2:00 PM
- Grant Hall
- 3 hour exam
- Bring your calculators
- I will provide basic formulas, if needed