

CISC 322

Software Architecture



Lecture 21:
Final Review
Emad Shihab

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