Key Contents to Review

Chapter 1

- Characteristics of software systems
- Definition of software engineering (SE)
  - Modeling + Problem Solving + Knowledge Acquisition + Rationale-driven
- SE concepts (Figure 1-1)
- SE methodologies

Chapter 2

- What is UML?
- Five basic UML diagrams
  - Functional modeling: Use case diagram
  - Object modeling: Class diagram
  - Dynamic modeling: Sequence diagram, state machine diagram, activity diagram

Key Contents to Review (Cont.)

Chapter 3

- Project model (Figure 3-1)
- Project organization (Figure 3-3)
- Role, task, work product, activity
- Communication event (Planned, Unplanned)
- Communication mechanisms (Synchronous, Asynchronous)

Chapter 4

- Software lifecycle used in this course
- Types of requirements, Greenfield/Re-/Interface Engineering
- Scenarios (As-is, Visionary)
- Use case
  - Essentials of use case (6 basic parts)
 - Relationships among use cases: <<include>>, <<extend>>, inheritance

Key Contents to Review (Cont.)

Chapter 5

- Object modeling
  - Entity/Interface/Control object, stereotype
  - Object identification: Syntactic approach (Abbot's techniques)
  - Steps in generating class diagrams
- Dynamic modeling
  - Sequence diagram: Impact on object model, layout/access, fork vs. stair
  - State machine diagram: state/event, action vs. activity, superstates, concurrency, navigation path
- Validation vs. Verification
  - Requirements validation: correctness, completeness, consistency, unambiguity, realism
  - Syntactical problems: different spellings/omissions
- Model dominance
- RAD (Requirement Analysis Document)

Key Contents to Review (Cont.)
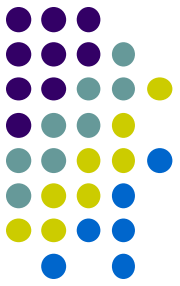
Chapter 6

- Design goal (stakeholders, trade-offs)
- Subsystem decomposition
  - Layers vs. Partitions, Opaque layering vs. Transparent layering, Coupling vs. Coherence
- Architectural style
  - Client/Server, Peer-to-Peer, Repository, Model-View-Controller

Chapter 7

- Concurrency: Synchronization of threads
- Hardware/Software Mapping: Component/Deployment diagram
- Persistent Data Management: File system vs. Database
- Global Resource Handling: Access matrix, Table with triples, Access control list, Capabilities
- Software Control: Centralized/Decentralized
- Boundary Conditions: Initialization/Termination/Failure, Boundary use case

Key Contents to Review (Cont.)

Chapter 8

- Reuse
    - Application domain objects vs. Solution domain objects
    - Specification inheritance vs. Implementation inheritance
    - Delegation: An alternative to implementation inheritance
    - Frameworks: Infrastructure/Middleware/Enterprise frameworks, whitebox/blackbox frameworks, class libraries vs. frameworks, components vs. frameworks

- Design Patterns
    - What is design pattern?
    - Composite pattern
    - Adapter pattern
    - Bridge pattern (relationships with adapter pattern)
   - Façade pattern

Key Contents to Review (Cont.)

Chapter 9

- Class user, Class implementer, Class extender
- Add visibility information: Public (+), Protected (#), Private (-)
- Add type signature information: Operation input/output
- Add contracts: Invariant, Precondition, Postcondition
- OCL (Object Constraint Language)
  - Local/directly related class/indirectly related class
  - Only the "local" case is required for examination

Chapter 10

- Four mapping concepts
  - Model transformation, Refactoring, Forward engineering, Backward engineering
- Typical techniques
  - Optimizing the class models, Mapping associations to collections, Mapping contracts to exceptions, Mapping class model to storage schemas (not required for examination)

On Final Examination
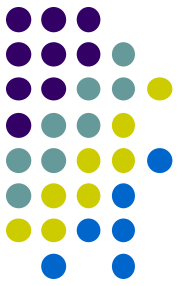
Time: Jan. 15, 09:00-11:00

Location: Teaching Building 6, Room 102

Type: Closed-book (闭卷考试)

Q&A: Computer Building, Room 528 (Jan. 14, 14:00-16:30)

题型分布

判断题 **(1x10=10分)**

选择题 **(1x10=10分)**

简答题 **(10分)**

问答题 **(9+11+5x10=70分)**

以理解为主

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