



# Software Design

## Midterm

December 2<sup>nd</sup>, 2016



*During this Exam I will not undertake any illegal acts of accepting or providing any solutions to other students. I also state that my health condition is good and that I am capable for taking this Exam.*

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*Student ID*

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1. (1 mark) Iterations of spiral model requirements engineering process does not involve:
  - A. requirements elicitation
  - B. requirements management planning
  - C. requirements validation
  - D. requirements specification
2. (1 mark) Denote true statements of software engineering process models characteristics:
  - A. Implementation of changes is the easiest in waterfall model.
  - B. Iterations are applicable only in Rational Unified Process model.
  - C. Evolutionary model generates the best structure.
  - D. Component model generates the least of new code.
3. (1 mark) The result of analysis phase in requirements engineering process is:
  - A. cost estimation
  - B. algorithms and data structures
  - C. functional and behavioral model
  - D. program architecture and structure
4. (1 mark) The process of writing down the user and system requirements in a requirements document is named as:
  - A. requirements elicitation
  - B. requirements management planning
  - C. requirements validation
  - D. requirements specification
5. (1 mark) For which software engineering process model the reuse-oriented development is the key characteristic?
  - A. waterfall
  - B. evolutionary
  - C. component
  - D. Rational Unified Process
6. (1 mark) For which software development methodology the concept based on small increments development, design and delivery is the key characteristic?
  - A. spiral
  - B. agile
  - C. iterative
  - D. Rational Unified Process
7. (1 mark) In which phase of Rational Unified Process the work environment installation is carried out?
  - A. elaboration
  - B. construction
  - C. inception
  - D. transition
8. (1 mark) Denote the true statement for UML use-case and sequence diagrams:
  - A. Use-case is dynamic type diagram, and sequence diagram is static type diagram.
  - B. Both are static type diagrams.
  - C. Use-case is static type diagram, and sequence diagram is dynamic type diagram.
  - D. Both are dynamic type diagrams.
9. (1 mark) Generalization is in use-case diagram valid relation between:
  - A. Actors only,
  - B. Actors and use cases,
  - C. Use cases only,
  - D. Neither actors nor use cases.
10. (1 mark) With which type of inter-element relation is functional decomposition presented in UML use-case diagram?
  - A. association
  - B. generalization
  - C. inclusion
  - D. extension

11. (1 mark) Which type of UML use-case relation presents the symbol in figure?



- A. association
- B. generalization
- C. inclusion
- D. extension

12. (1 mark) Denote a true statement of UML sequence diagram synchronous messages characteristics:

- A. reply can be implicit

- B. Sender is always waiting for reply.
- C. They represent the state of objects.
- D. They are used to represent code structure.

13. (1 mark) Which one of the following statements is true for the aggregation relationship in UML class diagram:

- A. Aggregate represents an Is-Part-Of relationship.
- B. Aggregate represents an IS-A relationship.
- C. When the aggregate is destroyed all its parts are destroyed.
- D. Aggregation is stronger than composition.

### 13. Problem Solving

An ATM machine is used for cash withdrawal. A client can use ATM machine in the following way. First the client inserts the bank card, then he enters a PIN number. The PIN is verified with the bank database. If the PIN is incorrect the machine displays the appropriate message and returns the bank card. If the PIN is correct the client can do one of the following:

1. Check the account balance on screen
2. Withdraw a desired amount of cache
3. Cancel all ongoing operations

To withdraw the cache the client must enter the desired amount. The ATM verifies with the bank database if there is enough money on the bank account. If the database response is affirmative, the ATM gives the client the money and returns the card. If the database response is negative the client is informed that there is not enough money on the account and is offered either with the option to re-enter the amount or cancel operation and get the card back.

The client can choose to cancel all operations at any time upon which the ATM returns the bank card.

1. [4 marks] Develop use case model for ATM machine.
2. [4 marks] Use UML sequence diagram to show the success case of money withdrawal.
3. [4 marks] Use UML class diagram to model the cash withdrawal subsystem. Note: do not model the ATM user interface.