Instructions

Please, read these instructions carefully. Failure to comply with *any* of the following instructions means *invalidation of your exam*:

1. This exam consists of 35 multiple-choice questions. For each question one answer is correct.
2. Not answering a question is considered an incorrect answer.
3. In principle, given P correct answers in one set of questions, the grade for that part G will be determined by the formula: $G = max(1, 10 - (35 - P)/2)$
4. Fill in your answers on the provided separate answer sheet and hand in the answer sheet at the end of the exam. The set of sheets with the questions (the one you are reading) is for you to bring home.
5. The use of books, papers, computers, or other material is not permitted.

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Part I
SCRUM

1. Scrum includes a series of meetings, organized as shown in Figure 1.

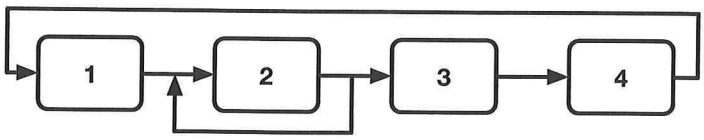


Figure 1: Graphical view of Scrum meetings.

What is the name of the meeting [2] in Figure 1?

A. Sprint planning B. Daily Scrum C. Sprint retrospective D. Sprint review

2. What is the name of the meeting [3] in Figure 1?

A. Sprint planning B. Daily Scrum C. Sprint retrospective D. Sprint review

3. Select the description that best explains the *sprint review*:

   A. Each development team member describes what she did the previous day, what she will do today and possibly what problems she faces.

   B. Demo of the new working version to the Product Owner and other interested parties. Product Owner reviews which commitments made in the sprint planning are considered done (or not).

   C. Product owner and the team negotiate which *Product Backlog* items are attempted to be implemented in the next working version.

   D. The team reflects on its own process and take action to adapt for future sprints if needed.

4. Select the description that best explains the *daily scrum*:

   A. Each development team member describes what she did the previous day, what she will do today and possibly what problems she faces.

   B. Demo of the new working version to the Product Owner and other interested parties. Product Owner reviews which commitments made in the sprint planning are considered done (or not).

   C. Product owner and the team negotiate which *Product Backlog* items are attempted to be implemented in the next working version.

   D. The team reflects on its own process and take action to adapt for future sprints if needed.

5. Fill in the blank, with the correct role: The _____ is typically a project's key stakeholder. Part of the _____ responsibilities is to have a vision of what is to be built, and convey that vision to the scrum team.

   A. Product Owner B. Scrum master C. Agile coach D. None of the others

6. Fill in the blank, with the correct role: The _____ is the facilitator for an agile development team. The _____ manages the process for how information is exchanged.

   A. Product Owner B. Scrum master C. Agile coach D. None of the others

Part II

Requirements Engineering

7. The engineering of requirements involves a series of phases and outputs, organized as shown in Figure 2. Phases are above (white rounded rectangles) and outputs are below (gray documents).

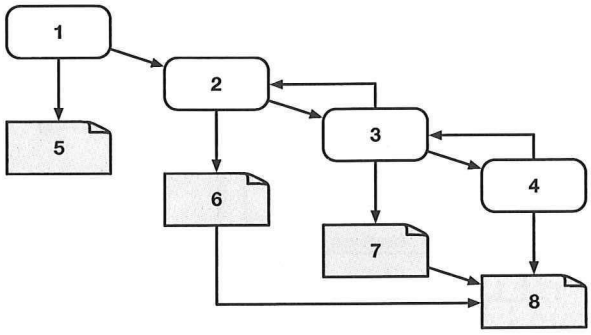


Figure 2: Graphical view of requirements engineering.

What is the name of phase 1 in Figure 2?

A. Requirements definitions B. Feasibility study C. Requirements study D. None of the others

8. What is the name of output 6 in Figure 2?

A. System models B. User requirements C. Feasibility report D. None of the others

9. Which of the following sentences best describes the *feasibility study* phase?

A. To define the requirements in detail, written as a contract between client and contractor

B. To define the requirements in a form understandable to the customer.

C. To discover what the system stakeholders require from the system.

D. None of the above

10. Consider the requirement: 'The game should load in less than 2 seconds on iOS11.'
Fill in the blank: This is a _____ requirement.

A. Non-functional B. Functional C. Consistent D. Evolutionary

11. Consider the requirement: 'The game has to be implemented in Java 12.'
Fill in the blank: This is a _____ requirement.

A. Non-functional B. Functional C. Evolutionary D. None of the above

12. Consider the requirement: 'When the player goes to a higher level, the speed is increased.'
Fill in the blank: This is a _____ requirement.

A. Non-functional B. Functional C. Throw-away D. Consistent

Part III

Software Modeling with UML

13. Consider the UML diagram depicted in Figure 3.

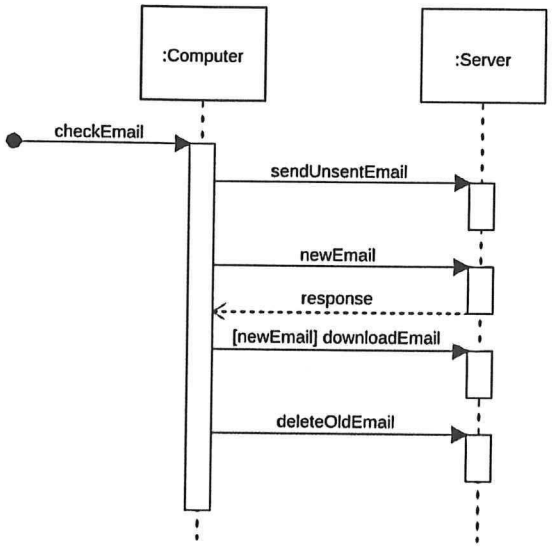


Figure 3: An example UML diagram.

Fill in the blank: The one depicted in Figure 3 is _____ diagram.

A. a state B. a swimlane C. an object D. a sequence

14. Fill in the blank: The diagram Figure 3 represents the _____of the system.

A. dynamic behaviour B. static structure C. structural relationships D. call graph

15. What do the vertical dotted lines in Figure 3 represent?

A. The associations between the methods

B. The time a class is active

C. The time an object is idle

D. None of the above

16. Fill in the blank: The box with the label `:Computer` depicted in Figure 3 represents _____.

A. a class B. an actor C. an object D. None of the above

17. Considering Figure 3, how many instances of the class Server are created?

A. None B. One C. Two D. Four

18. Fill in the blanks: The acronym UML stands for _____ _____ Language.

A. Usable Modeling B. User Model C. Usage Modeling D. Unified Modeling

Part IV

Code Review

19. Which of the following sentences about formal inspections is false?
    A. Code inspection is a method of static testing to verify that software meets its requirements.
    B. It engages developers and others in a formal process that usually detects more defects in the product than does machine testing.
    C. Code inspection is a method of dynamic testing to verify that software meets its requirements.
    D. None of the above.

20. Email-based code reviews suffer of limitations like:
    A. They are not persistent and flexible.
    B. They lack of structure and metrics.
    C. They cannot be easily implemented and people cannot be easily added to a review.
    D. None of the above.

21. Which of the following sentences better characterize Modern Code Reviews?
    A. They are informal and tool based.
    B. They follow a formal inspection process.
    C. They require the physical presence of developers and reviewers.
    D. None of the above.

Part V

Traceability

25. Traceability can support many software engineering activities, such as:
    A. Code inspection, software validation, and software testing.
    B. Software architecture design, software quality evaluation, and effort estimation.
    C. Control of requirement evolution, management of risks associated with missing requirements, and management of maintenance costs.
    D. Release Planning, requirements specification, and UML diagrams specification.

26. Fill in the blank: Traceability is the discipline that shows _____.
    A. the relationships between software developers' communications.
    B. forward and backward relationships linking requirements with design, implementation, test, and maintenance.
    C. the backlog between clients and software developers.
    D. the backlog between software developers and software management.

27. Fill in the blank: Given a software artifact, you have a *forward traceability link* when you look for software artifacts that have been developed _____.
    A. in a later stage of software development.
    B. in an earlier stage of software development.
    C. in the context of requirement specification.
    D. in the context of UML modeling.

28. Traceability links can be kept using:
    A. a traceability schedule.
    B. a traceability timeline.
    C. a traceability matrix.
    D. a traceability graph.

29. Knowledge-based traceability links can be retrieved:
    A. by parsing the static structure of the source code.
    B. by developers who know the semantics of the source code.
    C. by running specific test cases to expose the dynamic behavior of the code.
    D. by analyzing sequence diagrams.

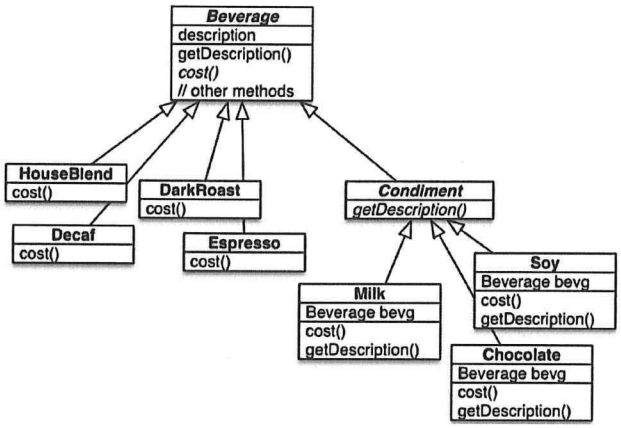
30. When recovering traceability links, heuristic-based approaches aim at:
    A. detecting structural relationships between source and test code.
    B. identifying knowledge-based links between the implemented artifacts.
    C. identifying traceability links only between requirements.
    D. detecting relationships between UML diagrams.

Part VI

Design Patterns

31. What problem does the observer pattern address?
    A. You can create sets so that the called set does not need to know how many objects are included.
    B. You can create an interface between the publisher of event and those interested in it.
    C. You can make a new object appear to be one of the old ones to existing legacy code.
    D. None of the above.

32. Which of the following sentences about design patterns is *false*?
    A. They are independent on the specific system type, language.
    B. They are used to communicate complex ideas more easily.
    C. They are elegant solutions that a novice would not think of.
    D. None of the above.



33. What is the design pattern in Figure 32, which describes a model for beverages in a coffeeshop?
    A. Strategy. B. Decorator. C. Observer. D. None of the others.

34. Fill in the blank: The Strategy Pattern defines _____.
    A. a family of algorithms, encapsulates each one, and makes them interchangeable.
    B. a one-to-many dependency between objects so that when one object changes state, all of its dependents are notified and updated automatically.
    C. additional responsibilities that can be attached to an object dynamically.
    D. an interface for creating an object.

35. The Abstract Factory Pattern:
    A. Provides a flexible alternative to subclassing for extending functionality.
    B. Provides an interface for creating families of related or dependent objects without specifying their concrete classes.
    C. Allows the migration of legacy code to a more object-oriented composite structure in a manageable way.
    D. None of the above.