

## Sample Questions (1)

**Q1:** What UML diagram types exist? Name each diagram type and describe its main purpose (one sentence each).

**Q2a:** (actually, this is a mean question. „Mean questions“ will not appear in the exam): What software development methodology from beginning (inception) to realization and deployment does the UML recommend? What methodology does it require?

**Q2b:** What defines the software development methodology from the inception to realization and deployment?

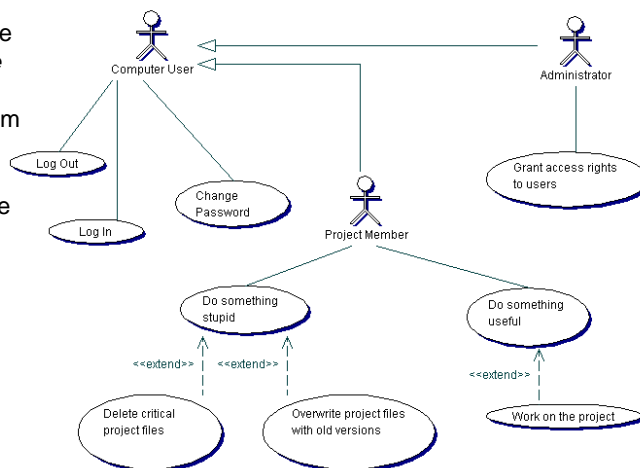
**Q3:** What phases exist in the Unified Process? Describe the main purpose of each phase by one sentence.

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Sample Questions-1

## Sample Questions (2)

**Q4a:** The following Use Case diagram contains several use cases. Describe each *dependency* (not use case) between the use cases present in the diagram in one sentence each. Number the dependencies for this purpose. What is the conceptual difference between the “include” and the “extend” relationship?



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Sample Questions-2

## Sample Questions (3)

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**Q4b:** Have a look at the use case diagram of Q4a: Can a project member log in (following the use cases)? If yes, why; if no, why not? How many use cases are defined for an administrator?

**Q5:** Please classify the following UML diagram types as static or dynamic diagram types:

- Class diagram,
- State diagram,
- Sequence diagram,
- Interaction diagram,
- Use case diagram,
- Package diagram,
- Deployment diagram.

Justify by a sentence for each diagram why it is a static or dynamic diagram type.

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Sample Questions-3

## Sample Questions (4)

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**Q6:** The Unified software development process is said to be “iterative” and incremental”. Describe each of the concepts “iteration” and “increment” in 1-2 sentences.

**Q7:** A master student shall be modelled using a UML diagram. A student can be asleep or awake. A woken student can be at the TUHH, at home, i.e. in his room, in the kitchen and in the bathroom. Which diagram type would you use to describe this? Draw a diagram for this.

**Q8:** A master student can take courses at the TUHH. Courses can be lectures or lab classes. Each master student must take at least one course. Each course is held by a research department. Each research department has at least one professor and 0 to 30 research assistant. Students, professors and research assistants have a lot in common: They have a name, a first name and a date of birth. Which diagram type should be used to describe this? Draw such a diagram for this.

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Sample Questions-4

## Sample Questions (5)

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**Q9:** You will find – (minus signs), + (plus signs), # (hash marks) in front of operation names and attributes in UML class diagrams. They look pretty ugly. What the heck are they for? Explain in 1-2 sentences. Also explain the different semantics of +, -, #.

**Q10:** There are two different types of interaction diagrams: sequence and collaboration diagrams. Compare the two types of diagrams. What are the key differences between those diagram types considering their characteristics and their application?

**Q11:** What is the difference between aggregation, association and composition? Which one is the most general concept, which one is the most specific? Please explain.

**Q12:** Model the relationship between a car (that has an engine and a color) and its owners (having a name) in a UML class diagram. A car can have several owners over time, but only one or none owner at a time. Do not forget cardinalities, role names, attributes and their types.

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Sample Questions-5

## Sample Questions (6)

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**Q13:** Model a ticket machine (Fahrkartenautomat) of the Deutsche Bundesbahn:

**Q13a:** Create an activity diagram describing the process of a person (user) using the machine to buy a ticket from Hamburg to Lübeck. Actually, the machine only takes coins (no credit cards, debit cards).

**Q13b:** Create a state diagram depicting in what states the machine can be.

**Q13c:** Think of it: Would the activity diagram have a process end or an endless loop? Would the state diagram have a final state? Justify your decision.

**Q14:** Create a sequence diagram for the following collaboration. Use the classes and methods on the next slide.

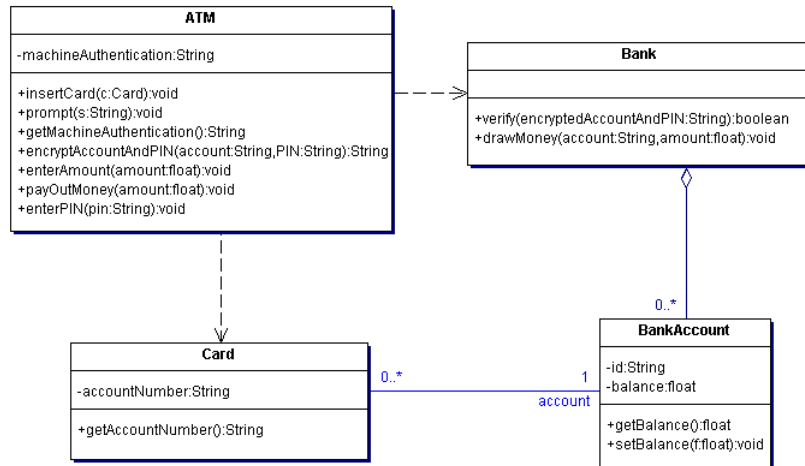
A customer wants to draw money from his bank account. He enters his card into an ATM (automated teller machine). The ATM machine prompts „Enter PIN“. The customer enters his PIN. The ATM (internally) retrieves the bank account number from the card. The ATM encrypts the PIN and the account number and sends it over to the bank. The bank verifies the encrypted Account and PIN number. If the PIN number is correct, the ATM displays „Enter amount“, draws money from the bank account and pays out the amount.

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Sample Questions-6

## Sample Questions (7)

Q14 continued...



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Sample Questions-7

## Sample Questions (8)

**Q15:** Which analysis is usually done with PERT charts? What is the important insight you get from it? Write about 3 sentences.

**Q16a:** Below an activity diagram is shown. Give an interpretation of the diagram. Describe the workflow that is shown in full sentences that are understandable separate from the diagram. Write about 10 short sentences.

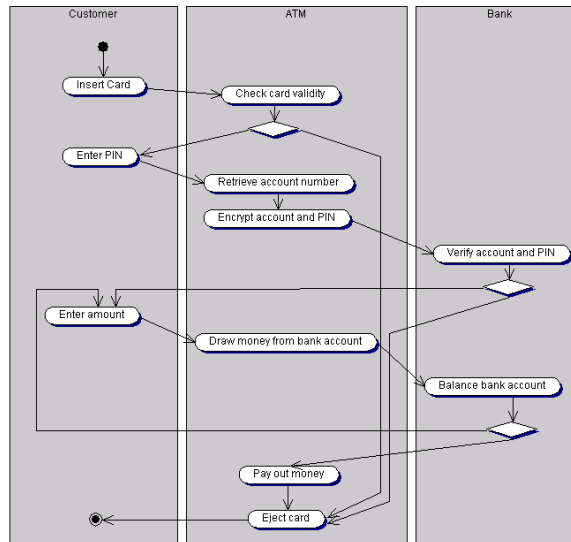
**Q16b:** The activity diagram (next slide) is related to the sequence diagram of Q14. Decide which objects of classes shown in the class diagram can be added to the activity diagram. Add those objects to the activity diagram and add object flow dependencies. Furthermore, add conditions where necessary.

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Sample Questions-8

## Sample Questions (9)

Q16 continued.



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Sample Questions-9

## Sample Questions (10)

**Q17:** What parts constitute a software development plan? Name 5 important aspects. Describe one of the aspects in more detail (2-3 sentences).

**Q18:** A state transition in a state diagram may be labeled with an event, a guard or an action or with combinations of these three.

**Q18a:** What is the difference between an event and a guard ?

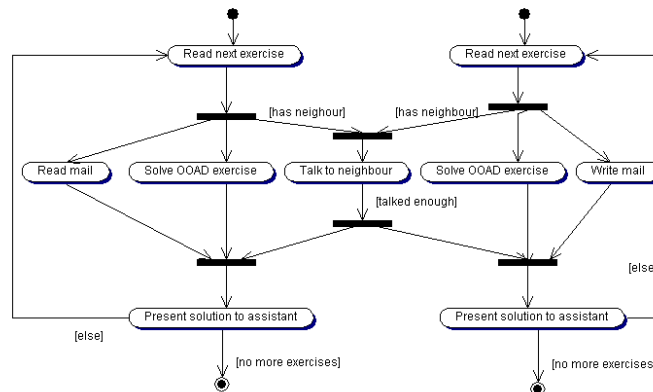
**Q18b:** What is the difference between an event and an action ?

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Sample Questions-10

## Sample Questions (11)

**Q19:** Compare the use of the two guards (“has neighbour” and “talked enough”) in the following fragment of a diagram (defining the normal activities of OOAD lab class groups). Explain the difference in the *effect* the two guards have concerning the (concurrent) flow of control



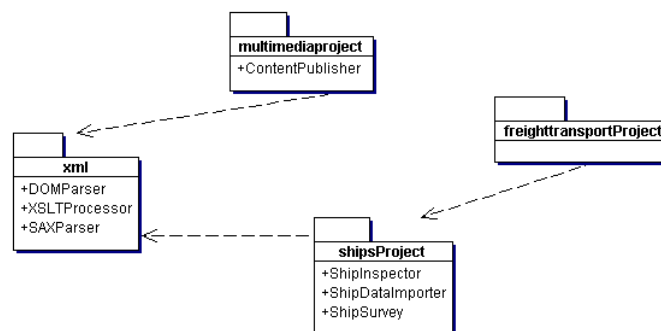
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Sample Questions-11

## Sample Questions (12)

**Q20:** Packet diagrams: True or false?

- Does the *multimediaproject* package depend on the *xml* package?
- Does the *ContentPublisher* class depend on the *XSLTProcessor*?
- Does the *freighttransportProject* package depend on the *xml* package?



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Sample Questions-12

## Sample Questions (13)

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**Q21:** True or false:

- An interface defines operation implementations.
- An aggregation implicitly defines a 1:n relationship.
- Navigability defines for implementation, which class keeps reference(s) to the other class.
- Composition means, that an object throws an exception when it is deleted.

**Q22:** What is the purpose of a deployment diagram?

**Q23:** What is the purpose of an interface? Name and explain two software developer roles related to interfaces.

**Q24:** What cannot be defined in an interface: operation signature, attribute, constructor.

## Sample Questions (14)

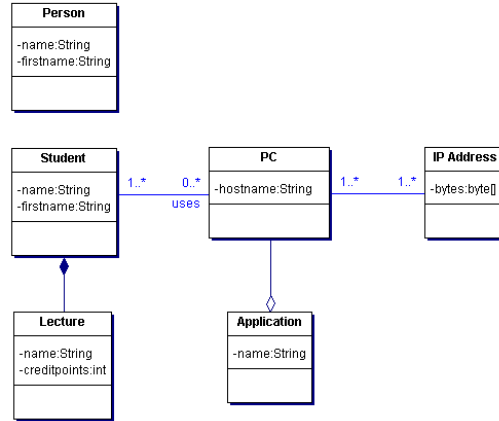
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**Q25:** What diagram type(s) can be used to describe the following:

- Behaviour of an object
- Interaction between different objects
- Life-cycle dependencies of objects
- Generalization of domain-specific concepts (documents, persons, ...)
- Specialization of user roles and their interactions with a system
- One specific case of behaviour of objects
- Many cases of dynamic interaction between objects in one diagram
- Location of software components on the hardware
- Organization of a large amount of classes
- 1-to-many relationships between classes
- Behaviour over time

## Sample Questions (15)

**Q26:** This class diagram models a part of a university. It relates students, PCs, Applications installed on the PCs and lectures. What is wrong with this class diagram? Correct it and justify your corrections.



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Sample Questions-15