FCT/UNL Mestrado Integrado em Engenharia Informática

MSP, 2021/2022

June 2022

Exemplo de teste

Name:_____**Number**:_____

Attention:
This exam has a maximum duration of **120 minutes**.

Please do not remove the staple of this group of pages. Apart from pen, pencil and eraser, no other material is allowed.

To interpret the questions is also part of the evaluation. Therefore, do not expect help from the professor to interpret them. At the end of the test, you must give back this test pages and the bubble sheet.

Please ensure that this page is correctly identified. There is no need to identify the rest of the pages as they are stapled.

When answering the questions, you can use a pencil. This way you can correct if you make some mistake.

Please read carefully before answering. Good Luck!

1. What is wrong about SysML?

(A) SysML is a general-purpose architecture modeling language for Systems Engineering applications.
(B) SysML supports the specification, analysis, design, verification and validation of a broad range of systems and systems-of-systems.
(C) SysML models may include hardware, software, information, processes, personnel, and facilities of a system.
(D) SysML is a subset of UML.

2. Concerning Agile development, select the statement that is false.

(A) Since Agile is flexible, prioritising changes is simple when there are multiple stakeholders.

(B) In the context of requirements practices evolution in software startups, some of turning points are the increase of the number of employees, features, and clients.

(C) Maintaining simplicity can be achieved through constant refactoring of code.

(D) One of the main differences between agile and plan-driven specification is the way they tackle requirements specification.

3. Regarding Scrum, select the statement that is false.

(A) A Sprint Retrospective is done at the end of a sprint. The purpose of the meeting is to reflect on what went well and what didn't go well in the previous sprint and determine how it can be improved in the next sprint.

(B) The Sprint Review is equivalent to a unit test, where the project team demonstrates the results of the work that they have done in the sprint and the Scrum Master accept the work or not.

(C) There is a series of sprint cycles, where each cycle develops an increment of the system.

(D) The initial phase is an outline planning phase where you establish the general objectives for the project and design the software architecture.

4. Concerning user stories, select the statement that is false.

(A) user stories, being brief, do not state all the details necessary to implement a feature.

(B) user stories are inappropriate for formal agreements or writing legal contracts.

(C) A user story is a concise, written description of a piece of functionality that will be valuable to a user (or owner) of the software.

(D) Since they are simple, user stories can be easy to maintain and to scale to large projects.Consider the feature model below.

5. Which configuration below is true?
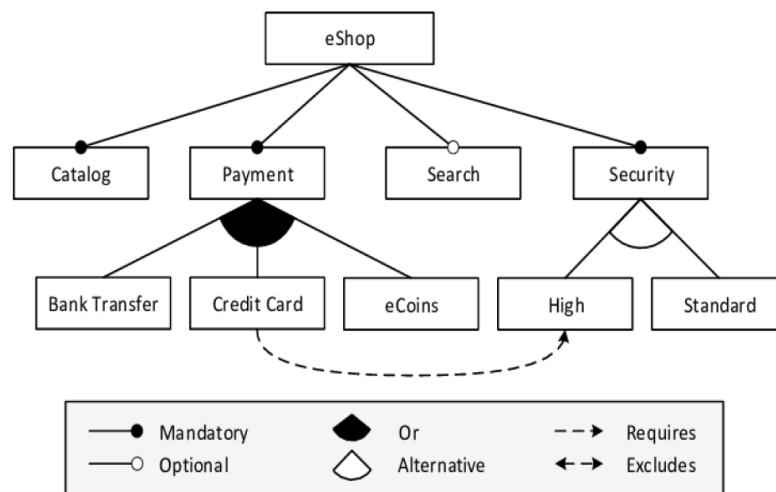
(A) Search, High Security, Bank Transfer and eCoins.

(B) Search, 3 kinds of payment, and Standard Security.

(C) no Search, all kinds of Security, and Credit Card.

(D) None of above is correct.

6. What is not a benefit of software reuse?

(A) same development costs

(B) increased dependability

(C) standards compliance

(D) reduced process risk

7. Concerning architectural patterns, which sentence is false?

(A) MVC is used when there are multiple ways to view and interact with data.

(B) In a client-server architecture, the functionality of the system is organized into services, with each service delivered from a separate server.

(C) In a layered architecture, high performance is one of the main advantages.

(D) In a repository architecture, all data can be managed consistently (e.g. backups) as it is all in one place.

8. Concerning architectural views, which sentence is false?

(A) The Logical view shows the key abstractions in the system as state machines.

(B) The Scenario view can be specified using sequence diagrams.

(C) The Development view shows how the software is decomposed for development and can be specified by a class diagram.

(D) The Deployment view shows the system hardware and how software components are distributed across the processors in the system.

9. Concerning quality attributes and architectural design, which one is false?

(A) Availability: Include redundant components and mechanisms for fault tolerance.

(B) Security: Use a layered architecture with critical assets in the inner layers.

(C) Safety: Localise safety-critical features in a small number of subsystems.

(D) Performance: Localise critical operations and minimise communications by using fine-grain components.

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PART 2: A Car Parking System.

In the context of a car parking, the driver can only access the park if there are places available and it is open. The driver can enter the car park selecting only one of 2 options: getting an ordinary ticket, or choosing "Via Verde". If the ticket option is chosen, a ticket is printed and must be collected from the machine. If Via Verde is selected, the identifier must exist on the windscreen of the vehicle and it is validated by the Via Verde sensor – if it is valid, the car can enter, otherwise an error message is displayed to the driver, and he cannot access the park. Once the entrance option is chosen and validated, simultaneously the entrance is saved in the system and the barrier is lifted. Only when the vehicle passage is detected the barrier goes down. The car can be parked in an available place signalised with a green light on the respective ceiling of the parking place. Once parked, a sensor detects it and the light turns red, and the number of available places is updated.

Regarding the payment, if the ticket option is chosen, the ticket can be paid using one of the payment machines distributed in the car park. Payment can be made through cash, credit card or debit card. If the Via Verde option is chosen, the amount will be debited in the client's bank account.

To leave the car park you must have a paid ticket, or a valid Via Verde identifier. Any problem (e.g., invalid ticket, grace period expired, Via Verde identifier with low battery) when trying to exit the car park triggers an automatic voice message informing the driver what the problem is. In case of fire, detected by sensors, the system should open all the exit gates automatically and trigger an alarm.

Based on the description above, build the models required by questions below:

1. Build a Requirements Diagram that specifies the main services of the system including safety requirements.

2. Build a Block Diagram that models the main elements of the system (interfaces, controllers, tables) Use stereotypes <<interface>>, <<controller>>, <<entity>>, to distinguish the types of blocks identified.

3. In the Requirements Diagram add blocks that satisfy the entering car park requirements.

4. Consider that you want the Car Park System to evolve to an SPL. Design a Feature Model to model the variability to this SPL. Also, propose 2 new optional features to include in the Feature Model.

Answers:

1. D
2. A
3. B
4. D
5. A
6. A
7. C
8. A
9. D