Software Design

Midterm

November 26th, 2018.

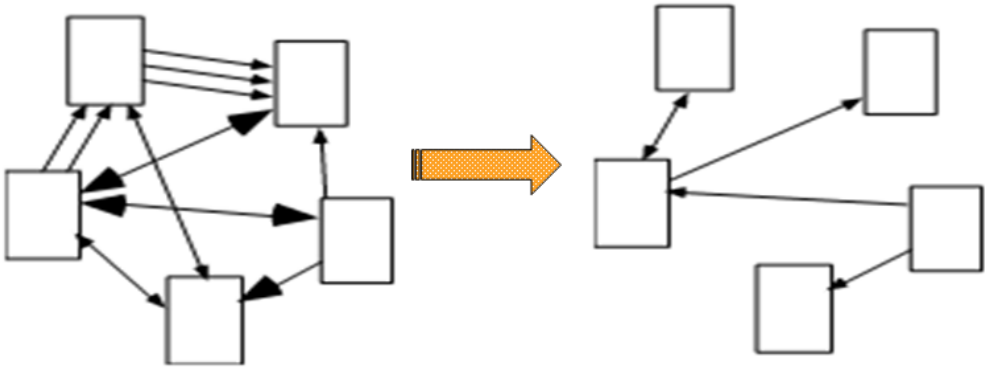
During this Exam I will not undertake any illegal acts of accepting or providing any solutions to other students. I also state that my health condition is good and that I am capable for taking this Exam.

_____	_____	_____
Student ID	*Name and Surname*	*Hand-written signature*

1. (1 point) The result of analysis phase in requirements engineering process is _____.
2. (1 point) Characteristics of a good software documentation are _____.
3. (1 point) The main domain requirement problem in software engineering is _____.
4. (1 point) For what type of software projects is Agile software development particularly good for and what is its main feature?

   _____
5. (1 point) In UML Use Case Diagrams, what type of connection can have multiplicity indicated on it? _____
6. (1 point) In UML Sequence Diagrams, the rectangle on the object lifeline is used for specifying _____.
7. (1 point) In which phase of the Unified Software Development Process is the analysis and modelling performed? _____
8. (1 point) Product backlog, sprint backlog and _____ are artefacts of Scrum.
9. (1 point) Architectural analysis is concerned with the identification and resolution of the system's _____ requirements.
10. (1 point) An idealization of an external person process, or thing interacting with a system, subsystem, or class is called _____.

11. (1 point) Which object-oriented software design principle leads to architecture transformation as illustrated on the picture?



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12. (1 point) Draw a UML Class diagram showing an example of dependency of one class on a lifecycle of another class.

13. (1 point) Write the Git command which saves the changes from branch "*master*" into branch "*dev*", i.e. changes the state of repository from the one shown in Figure a) to the one shown in Figure b).

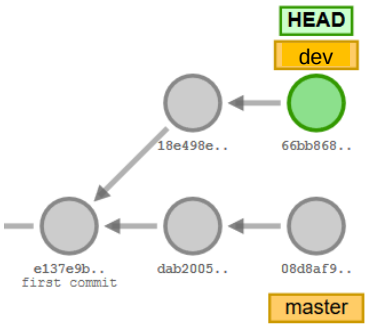

Figure a)

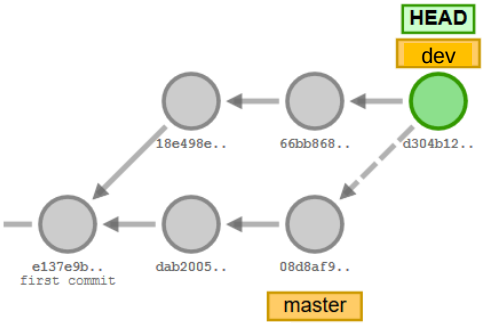

Figure b)

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Problem solving – **Protein shake vending machine**

Protein shake vending machines connected to central ordering & supply system will be placed in gyms around town. Each machine will be equipped with a touch-screen, cash input slot, cash return slot and shake delivery slot. The machine will also have a cash storage compartment, control module and internet connection to central ordering & supply system.
In order to purchase a protein shake, the user must first select one of 10 available protein shakes. Then, user selects the base for the shake: water or milk. The machine reads the amount of available ingredients via internal sensors and if there are not enough ingredients in the machine, the user receives appropriate message on the touch-screen and purchase is cancelled. If there are enough ingredients, the machine displays the shake price. Then the user can insert the cash and machine updates the amount of funds. When the user confirms the purchase, the machine calculates if there are enough funds. If not, the machine displays the appropriate message, aborts the purchase and returns the funds to the user. If there are enough funds, the machine makes the shake based on water or milk. When the shake is done user can take the shake and the machine returns excess funds.
The user can cancel the purchase at any time and will get all funds back.
When the machine detects that the level of any of the 5 ingredients for making the shake are below 20% it will send an order for that ingredient to the central ordering & supply system.
Machine owner can open the machine to refill the ingredients or withdraw the cash.

14. (4 points) Use Case Diagram

Model the protein shake vending machine using UML Use Case Diagram.

15. (4 points) Sequence Diagram

Use UML Sequence Diagram to model the shake purchase.

16. (4 points) Class Diagram

Use UML Class Diagram to model the shake vending machine software.
The software system must contain a control module that is responsible for communication with all its users, locking and unlocking the machine. Assume that the machine has a special sensor for each one out of 5 ingredients, and that each shake is made from a special combination of those ingredients. DO NOT model users, owner and machine interface (touch-screen, cash slot etc.).