Software Engineering and Project Management - Final Exam

2017-12-22. **Duration:** 8:00 - 11:00

Start by reading all the questions, to see if anything is unclear. One of the teachers will visit the exam around 8:30 to clarify questions.

Answers must be written in English. Dictionaries may be used.

Start each answer on a new page. Please hand in the pages in the correct order.

For each question, I give its maximum points of the answer.

The format and extension of your answer should adapt to the type of questions:

- **Specific questions:** a concept, a list… the *optimal* answer is usually around a single paragraph (This does not include drawing).

- **Short questions:** explanations, reviews, comparisons… the *optimal* answer is usually a few (2 or 3) paragraphs (This does not include drawing).

- **Questions for reasoning:** your arguments are presented in a concise, well-reasoned way,… and written with your own words. The *optimal* answer is usually less than 2 pages. (This does not include drawing).

A checklist of common mistakes that cost points:

- Answer all **9** questions. A bad answer never gives less points than no answer.

- Read the question again after you have written the answer. Verify that you have actually answered the question. Verify that you answered *all* parts. Verify that you have *not* hidden the answer between many other irrelevant comments about the topic. *Cursives are added to highlight the key elements of the questions.*

- In particular, don't forget to give an example if that is requested, and make it a concrete one.

- When a question asks you to compare two things A and B, make sure to highlight the contrasts: their differences. I do *not* want a full description of A and a full description of B, leaving it to me to find the differences. It is better to use tables than paragraphs of text to compare.

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Specific questions.

Question 1. [2 points].
Define what is a layered architecture.

Question 2. [2 points].
Compare over-the-shoulder and pre-checking code review processes: Indicate one (1) *advantage* and one (1) *difference* between them.

Question 3. [2 points].
Compare validation and verification: Indicate one (1) *similarity* and two (2) *differences* between them. Three (3) in total.

Question 4. [2 points].
Describe what are the criterias to assess legacy systems: Enumerate the *criterias* and how *they are used* to make a decision.

Short questions.

Question 5. [5 points].
5.a (3/5 points) *Describe* the V-Model using a software project as an *example*.

5.b (2/5 points) *Give* a different *example* than 5.a where it would be reasonable to use a waterfall model instead of a V-Model. *Explain* your answer.

Question 6. [5 points].
The diagram 1 (page 4) is a partial *class diagram* of an online BookingManager for a car service company. It also includes the code for the function bookDriver of the DriversManager interface and the addAddress function for the Client class.

6.a (2/5 points) *Indicate* three (3) design patterns from the diagram.

6.b (3/5 points) For each one of them, *identify* the class/es involved and *explain* how the pattern is used in the context of the example.

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Question 7. [5 points].
7.a (2/5 points) *What* are the components that define every test case? For each component, provide an *example* based on a performance test.

7.b (1/5 points) *Compare* black-box testing with glass-box testing. *Indicate* (1) difference between them.

7.c (2/5 points) A performance test *is* a black-box test, a glass-box text or both? *Explain* your answer with *examples*.

Questions for reasoning.

Question 8. [9 points].
Your company have been tasked with the development of a new online portal to substitute StudentPortalen. The minimum functionality of the platform must include a scheduling module to automatically assign rooms to courses (e.g., based on the number of students registered) and teachers to courses (e.g., based on teachers' expertise and availability).

8.a (4/9 points) Which aspects of the project planning are highlighted by an activity network? Which are hidden? *Give* one (1) *example* of an activity network for the project.

8.b (5/9 points) *Describe* with an activity bar chart and a staff allocation chart the differences between release planning and iteration planning.

Question 9. [9 points].
9.a (3/9 points) *Explain step by step* the process of requirements engineering, with special emphasis on *which* actors and/or stakeholders are responsible of each step of the process and *what* are their responsibilities.

9.b (3/9 points) *Compare* functional and non-functional requirements. Indicate at least two (2) *differences* between them.

9.c (3/9 points) Consider the construction of a software for controlling a snowplow machine (A snowplow is a device intended for mounting on a vehicle, used for removing snow and ice from outdoor surfaces, typically those serving transportation purposes.). *Describe* one (1) safety requirement and *motivate why* it is functional or non-functional.

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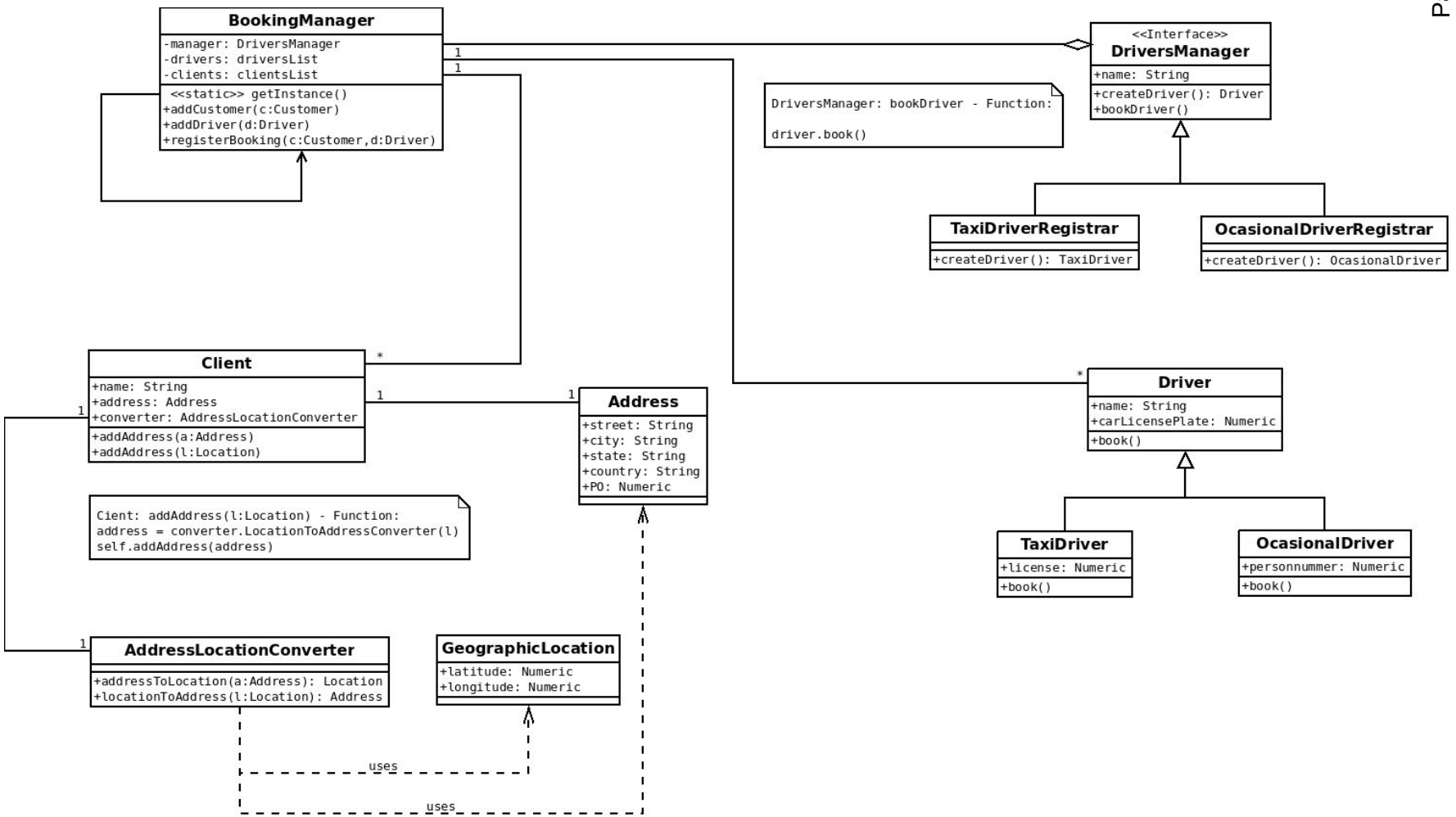
BookingManager
-manager: DriversManager
-drivers: driversList
-clients: clientsList
<<static>> getInstance()
+addCustomer(c:Customer)
+addDriver(d:Driver)
+registerBooking(c:Customer,d:Driver)
<<Interface>>
DriversManager
+name: String
+createDriver(): Driver
+bookDriver()
DriversManager: bookDriver - Function:
driver.book()
TaxiDriverRegistrar
+createDriver(): TaxiDriver
OcasionalDriverRegistrar
+createDriver(): OcasionalDriver
Client
+name: String
+address: Address
+converter: AddressLocationConverter
+addAddress(a:Address)
+addAddress(l:Location)
Address
+street: String
+city: String
+state: String
+country: String
+PO: Numeric
Cient: addAddress(l:Location) - Function:
address = converter.LocationToAddressConverter(l)
self.addAddress(address)
Driver
+name: String
+carLicensePlate: Numeric
+book()
TaxiDriver
+license: Numeric
+book()
OcasionalDriver
+personnummer: Numeric
+book()
AddressLocationConverter
+addressToLocation(a:Address): Location
+locationToAddress(l:Location): Address
GeographicLocation
+latitude: Numeric
+longitude: Numeric
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