

CS3004 Software Design and Analysis Solution

Monday, November 07, 2022

Course Instructors

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Serial No:

Mid-2 Exam

Total Time: 1 Hour

Total Marks: 35

Signature of Invigilator

Roll No

Section

Signature

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

Instructions:

1. Verify at the start of the exam that you have a total of **six (6)** questions printed on **nine (9)** pages including this title page.
2. Attempt all questions on the question-book and in the given order.
3. The exam is closed books, closed notes. Please see that the area in your threshold is free of any material classified as 'useful in the paper' or else there may a charge of cheating.
4. Read the questions carefully for clarity of context and understanding of meaning and make assumptions wherever required, for neither the invigilator will address your queries, nor the teacher/examiner will come to the examination hall for any assistance.
5. Fit in all your answers in the provided space. You may use extra space on the last page if required. If you do so, clearly mark question/part number on that page to avoid confusion.
6. Use only your own stationery and calculator. If you do not have your own calculator, use manual calculations.
7. Use only permanent ink-pens. Only the questions attempted with permanent ink-pens will be considered. Any part of paper done in lead pencil cannot be claimed for checking/rechecking.

| | Q-1 | Q-2 | Q-3 | Q-4 | Q-5 | Q-6 | Total |
|----------------|-----|-----|-----|-----|-----|-----|-------|
| Total Marks | 10 | 08 | 04 | 04 | 04 | 05 | 35 |
| Marks Obtained | | | | | | | |

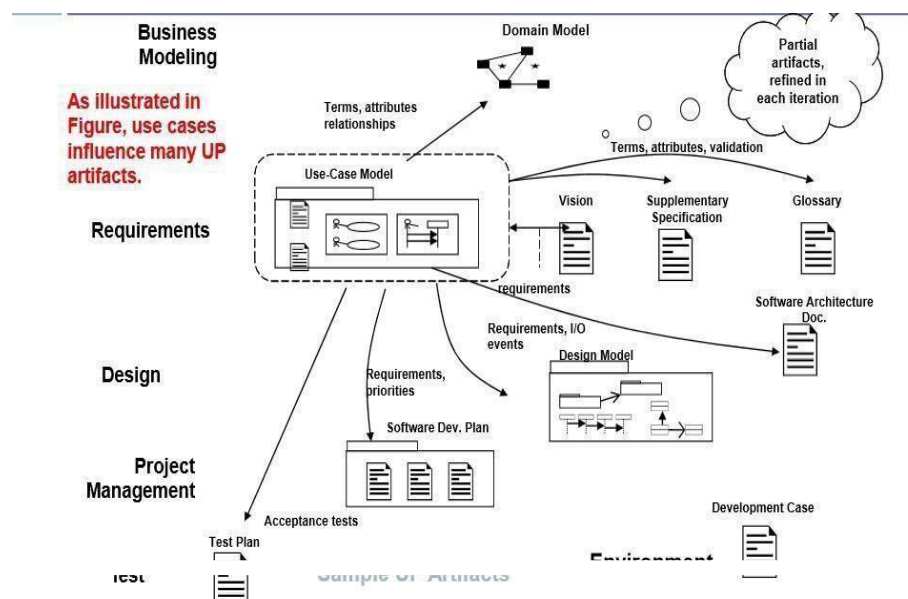
Vetted By: _____ Vetter Signature: _____

University Answer Sheet Required: No ☐ Yes ☐

(5 * 2 = 10 Marks

Answer:

-
- Business Modeling**
- Domain Model
- Partial artifacts, refined in each iteration.
- Requirements**
- Use-Case Model
- text use cases
- use case diagrams
- system sequence diagrams
- system operations
- system operation contracts
- Design**
- Design Model
- Sample UP Artifact Relationships for Use-Case Realization
- Domain Model
- Use-Case Model
- Design Model
- Use Cases
- System Sequence Diagrams
- Contracts
- some ideas and inspiration for the post-conditions derive from the use cases
- conceptual classes in the domain inspire the names of some software classes in the design
- domain objects
- the domain objects, attributes, and associations that undergo state changes
- system events
- system operations
- Operation: makeNewSale
- Post-conditions: ...
- Operation: enterItem
- Post-conditions: - A SalesLineItem instance sll was created
- In addition to the use cases, requirements that must be satisfied by the design of the software
- use-case realization
- Register
- ProductCatalog
- Sale
- makeNewSale()
- enterItem (itemID, quantity)
- spec := getSpecification(itemID)
- addLineItem(spec, quantity)
- endSale()
- create()



Q 1.2 : Sometimes, sequence diagrams can be somewhat similar to the actual code. Why not just code up the algorithm? Why bother with sequence diagrams?

Answer:

A good sequence diagram is higher-level than real code and it is (1) language-agnostic, (2) can be read by and written by non-programmers, (3) easier to do in a team, and (4) can allow seeing many objects at one time on the same page. It show message passing between different objects.

Q 1.3 : What are Operational Contract and which diagrams are used to identify them?

Answer:

OC describe detailed system behavior in terms of state changes to objects in the Domain Model, after a system operation has executed. It can be describe in precondition and post condition.

1. Usecase,
2. System Sequence Diagram and
3. Domain Model

Q 1.4 : Difference between Class Diagram and Domain Model?

Answer:

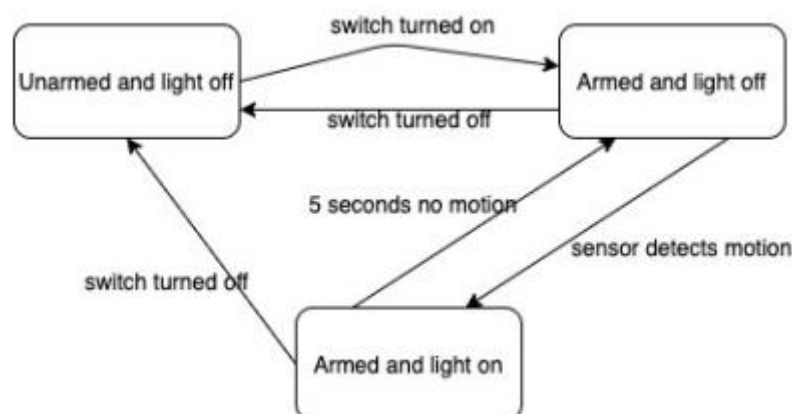
Domain Model : A domain model does not represent software classes : no artificial, programming-related (e.g. interface classes). It captures conceptual/ real world classes.

Class Diagram : A Class Diagram represent software classes : no artificial, programming-related (e.g. interface classes). It captures conceptual/ real world and software classes.

Q 1.5 : Draw a UML state-chart diagram to describe the states of the security light system.

A security light system has a switch and a motion sensor attached. It can be either armed or unarmed. If the switch is in the off position the light is off and the system is unarmed. When the switch is turned on, the light stays off but the system is armed. If the system is armed and the motion sensor detects movement, the light comes on. If no movement is detected for 5 seconds, the light goes off.

Answer:



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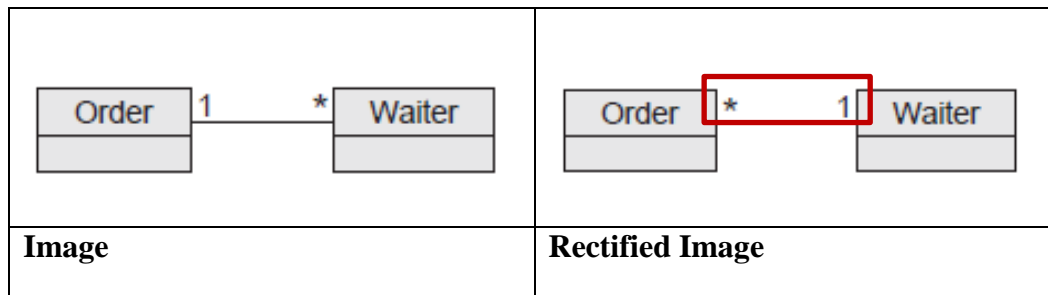
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Question No.2

8 Marks

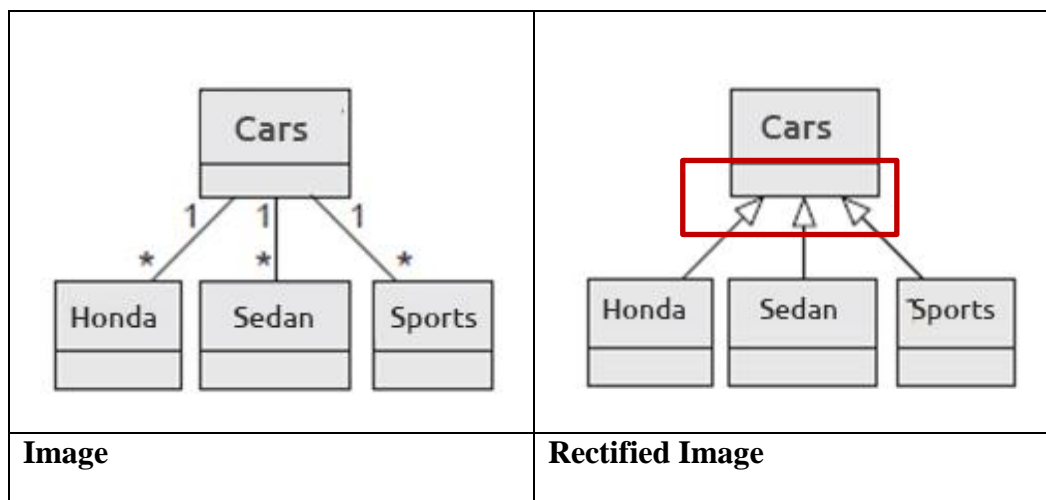
2.1 How will you model the following situation . Order will be made with exactly one of the waiter, moreover one waiter can handle multiple orders. The given is class diagram identify error from it and Redraw the Rectified Image below. (1 Mark)

Solution:

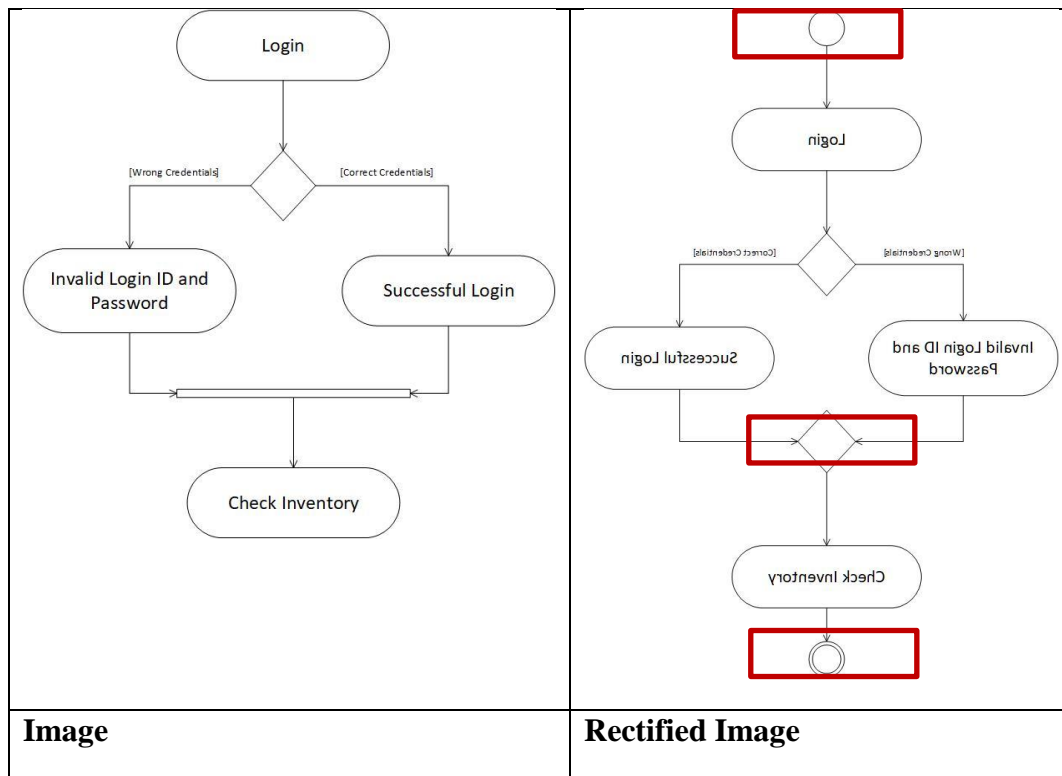


2.2 Given is class diagram where there are multiple different car types, e.g. honda , sedan and sports car. The given is class diagram identify error from it and Redraw the Rectified image below. (2 Marks)

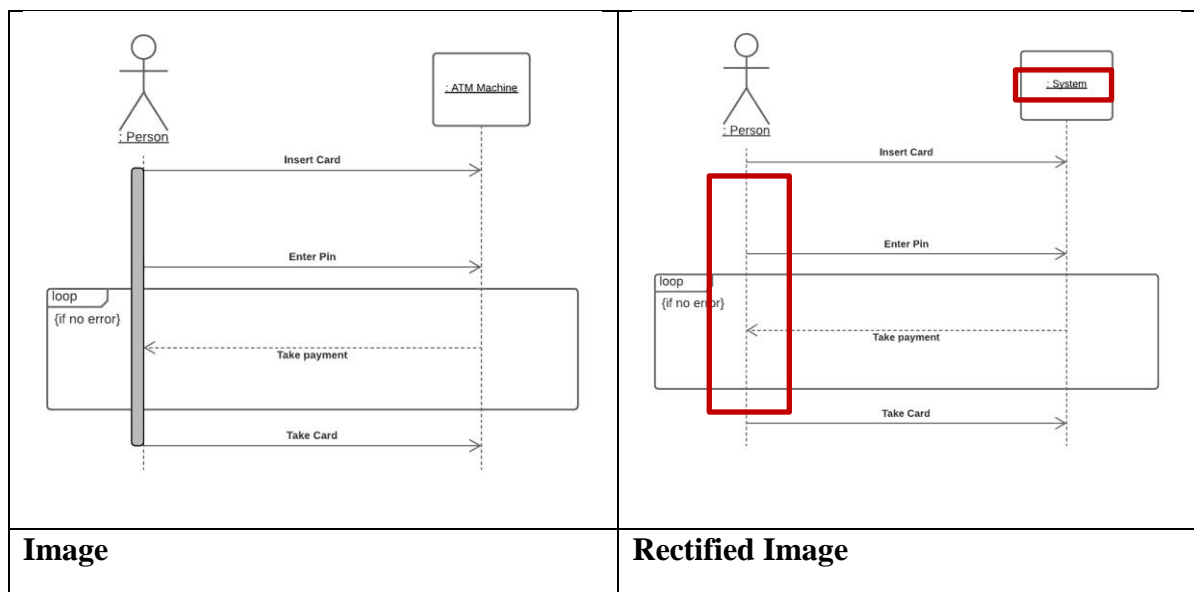
Solution:



2.3 The given is activity diagram identify error from it and Redraw the Rectified Image below. (3 Marks)



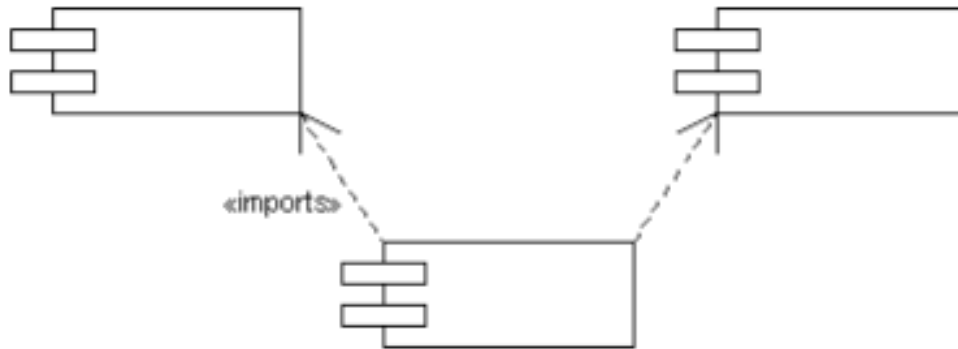
2.4 The following is a system sequence diagram for banking transaction. Identify the errors and Re Draw the Rectified Image below.(2 Marks)



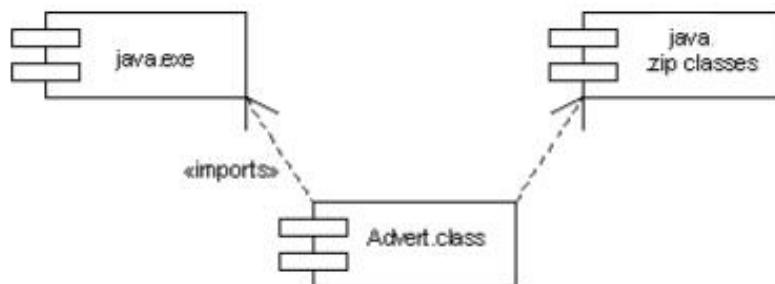
Question No.3
4 Marks

Given is an empty component diagram. Read the given scenario and mark it.

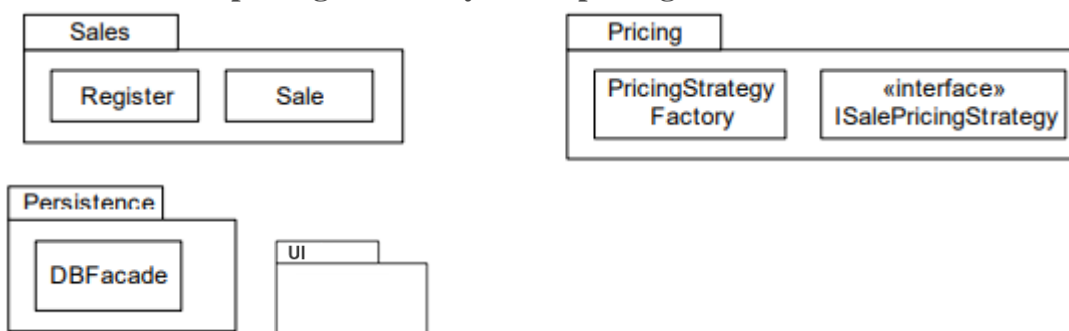
In a computer program there is run time dependency between a java advert class file, java.exe run time program and java classes in a zip file. The advert class import exe. Moreover, advert class have relation with java zip classes as well.



Solution:


Question No.4
4 Marks

Given are list of packages. Identify which package will come in which architecture layer.



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Presentation

Domain

Technical Services

Solution:

Presentation

UI

Register

Sale

Sales

Pricing

PricingStrategy
Factory

«interface»
ISalePricingStrategy

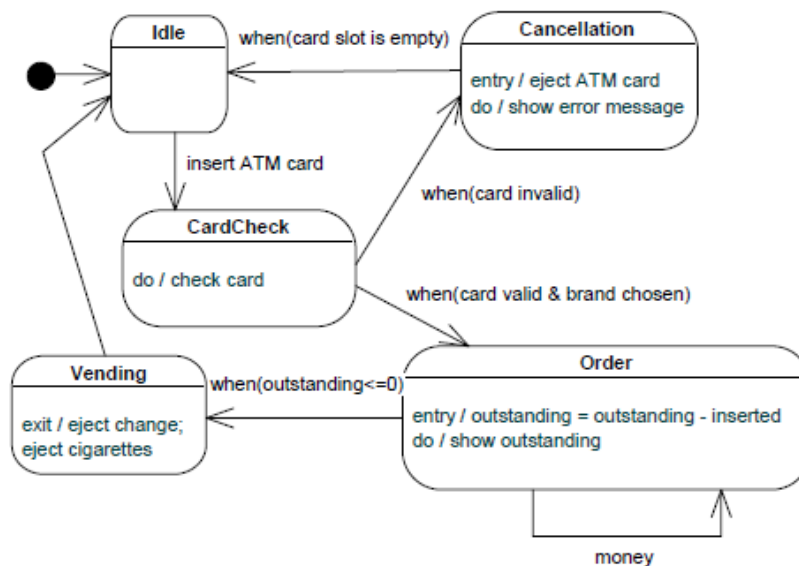
Technical Services

Persistence

DBFacade

Question No.5
4 Marks

You are given the following state machine diagram. Are the following statements about the state order true?



| | True | False |
|---|------|-------|
| 1. If CardCheck is the active state and the card is invalid, the machine changes into state Idle. | | False |
| 2. As soon as a costumer has inserted an ATM card into the machine, the active state changes from Idle to CardCheck. | True | |
| 3. If the card is invalid, an error message is shown and the ATM card is ejected. After that a transition to Idle takes place. | | False |
| 4. If the card is valid and a cigarette brand has been chosen, but the customer does not insert any money, the card is ejected and an error message is shown. | | False |

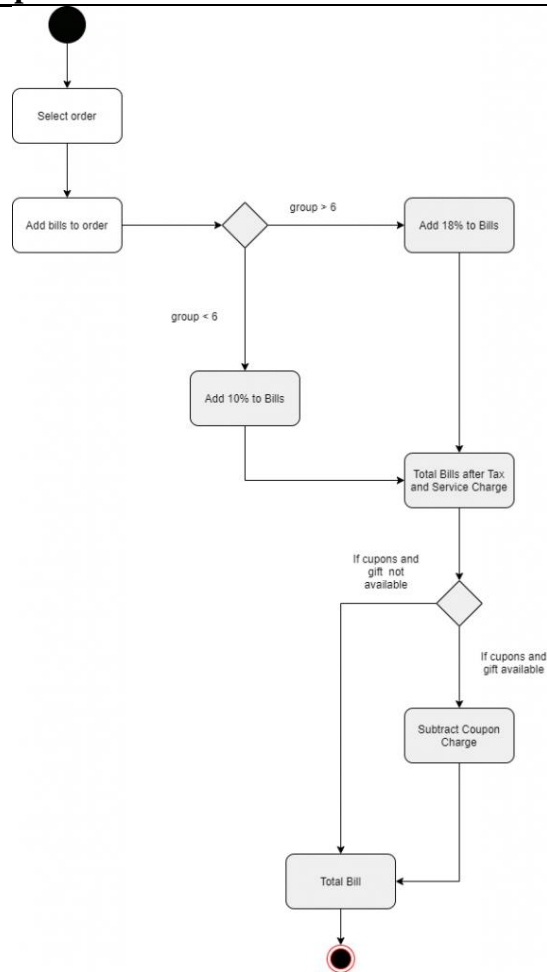
Question No.6
5 Marks

Draw an activity diagram for computing a restaurant bill.

There should be a charge for each delivered item. The total amount should be subject to tax. There is a service charge of 18% for groups of six or more and 10% for smaller groups. Any coupons and gift certificates submitted by the customer should be subtracted.

** Draw activity diagram on the next page*

Solution:



OR

