CHALMERS
EXAMINATION / TENTAMEN

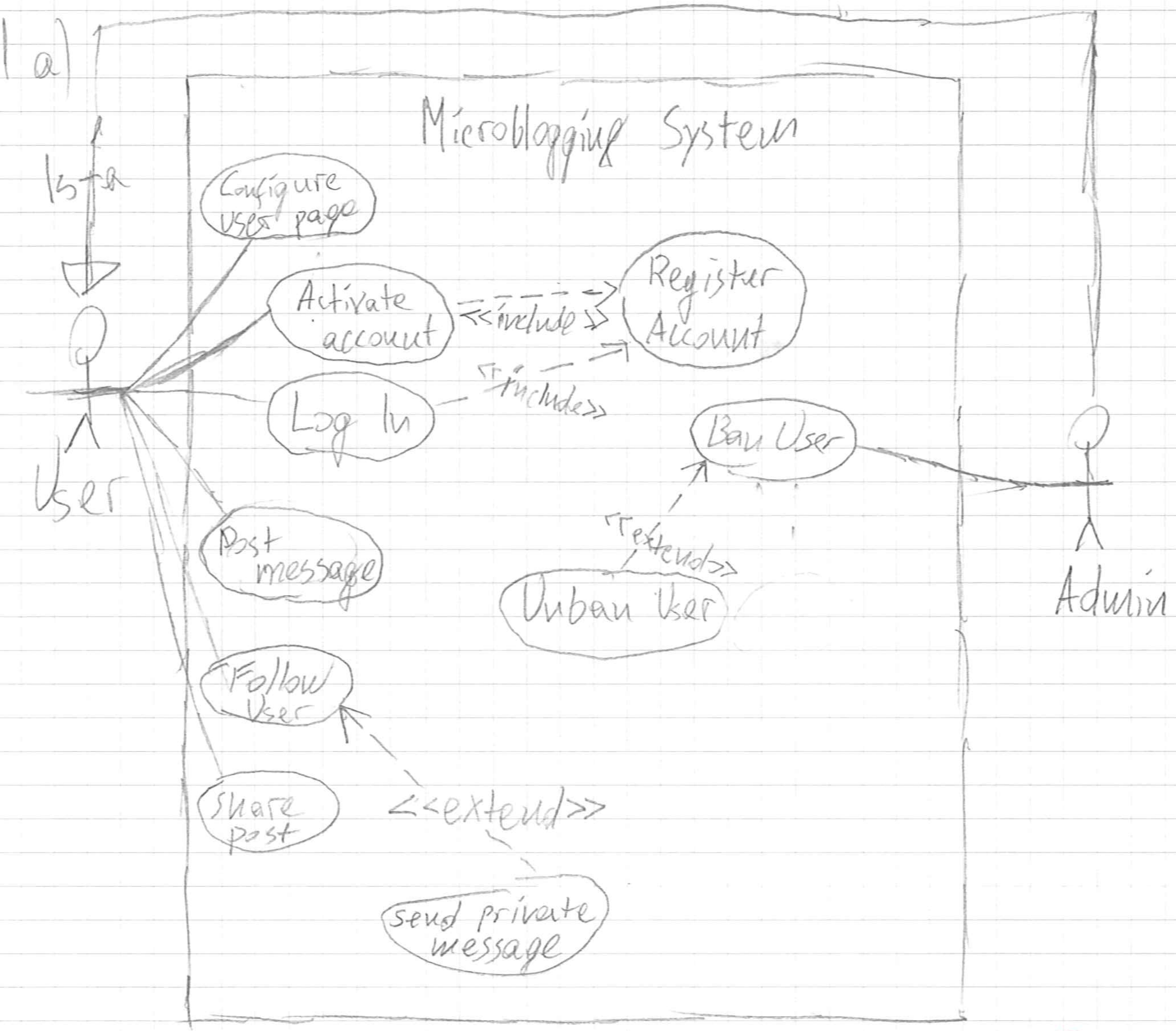
Course code/kurskod	Course name/kursnamn			
DIT 185	Software Analysis and Design			
Anonymous code Anonym kod		Examination date Tentamensdatum	Number of pages Antal blad	Grade Betyg
0016 - XYW		2023-01-03	11	5

* I confirm that I've no mobile or other similar electronic equipment available during the examination.
Jag intygar att jag inte har mobiltelefon eller annan liknande elektronisk utrustning tillgänglig under eximinationen.

Solved task Behandlade uppgifter No/nr		Points per task Poäng på uppgiften	Observe: Areas with bold contour are to completed by the teacher. Anmärkning: Rutor inom bred kontur ifylles av lärare.
1	X	13	
2	X	13	
3	X	13	
4	X	12	
5	X	12	
6	X	10	
7	X	12	
8	X	15	
9			
10			
11			
12			
13			
14			
15			
16			
17			
Bonus poäng			
Total examination points Summa poäng		99	

CHALMERS	Anonymous code Anonym kod	Points for question (to be filled in by teacher) Poäng på uppgiften (ifylles av lärare)	Consecutive page no. Löpande sid nr 1
DIT 185	0016-XYW		Question no. Uppgift nr 1

1 a)



great! 9

1

CHALMERS	Anonymous code	Points for question (to be filled in by teacher)	Consecutive page no. Löpande sid nr 2
DIT 185	Anonym kod 0216-XYW	Poäng på uppgiften (ifylles av lärare)	Question no. Uppgift nr 1

1b) Use Case Name: Register Account

Goal in context: User attempts to register an account on the system

Primary actor: User

Precondition: User has an email address and does not have an account on the system

Success End Condition: An inactive user account is created and an activation email is sent to user's mail.

Failed End Condition: No account is made

Trigger: User clicks on the 'Register Account' button

Main Success Scenario:

1. User inputs a username
2. User inputs an e-mail address
3. User inputs a password
4. User clicks the 'Proceed' button
5. System verifies the inputs
6. A success popup is displayed saying that the account must be activated.

Extentions: 3 User inputs a very short password

3a1 User clicks the 'Proceed' button

3a2 A fail popup is displayed stating that the password is too weak and must be longer

Sub-Variations:

1. User may input using:

A keyboard,
A touch screen,
A speech-to-text device (since the user may have disabilities)

4

Answer only one question on this page. Do not write on the back of this paper
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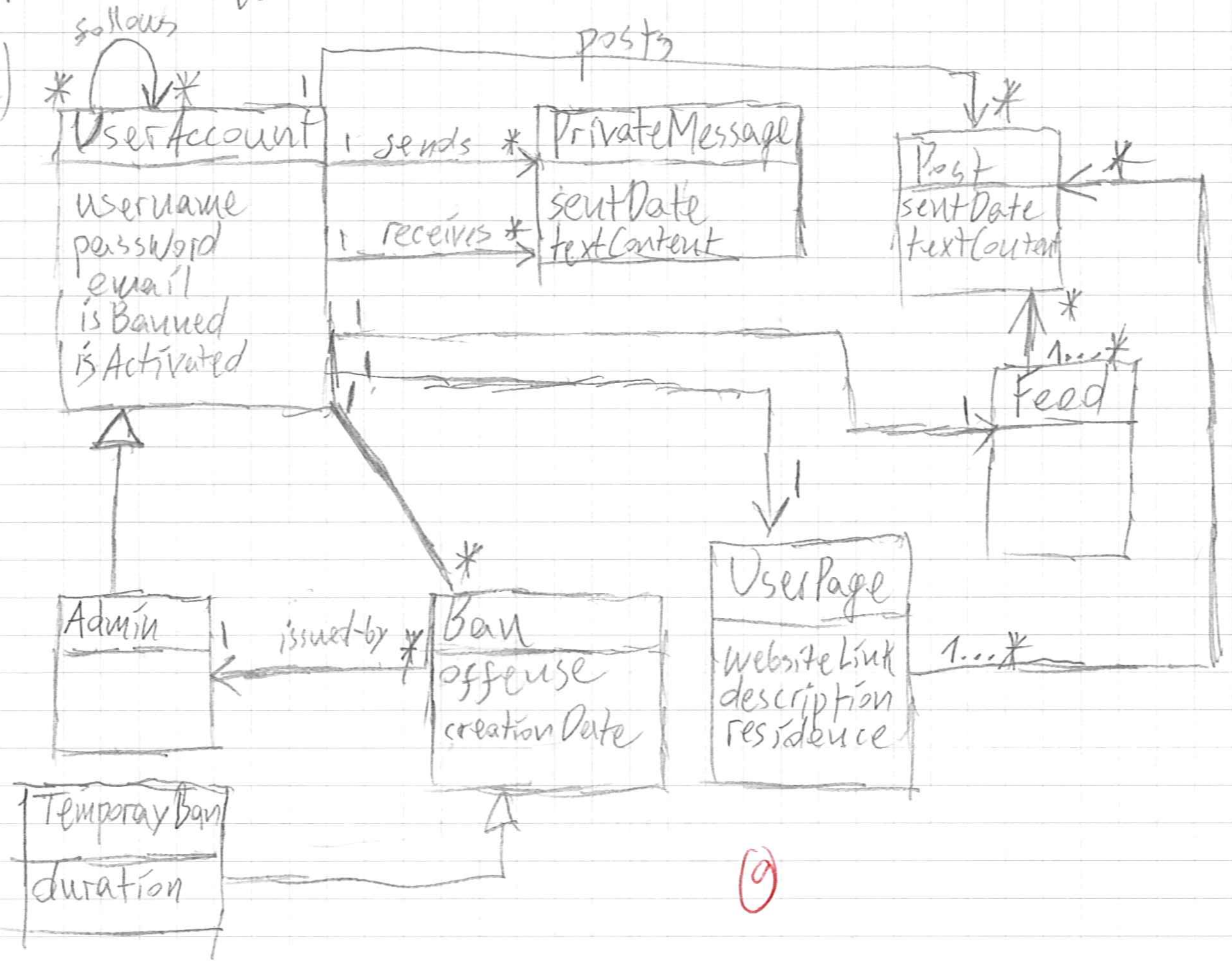
1

CHALMERS	Anonymous code Anonym kod	Points for question (to be filled in by teacher) Poäng på uppgiften (ifylles av lärare)	Consecutive page no. Löpande sid nr 3
DIT165	2016-XYW		Question no. Uppgift nr 2

2a)



9

b) I have first analyzed the system description. I looked for nouns to identify candidate classes. Then I used the CRC cards method to analyze the responsibilities and collaborators of each candidate class. The ones that did not have responsibilities or collaborators were discarde The remaining ones were made into classes and I have analyzed them to determine multiplicities and relationships between them based on their responsibilities/collabrations. Lastly, I have inserted attributes based on the classes' responsibilities and system description.

4

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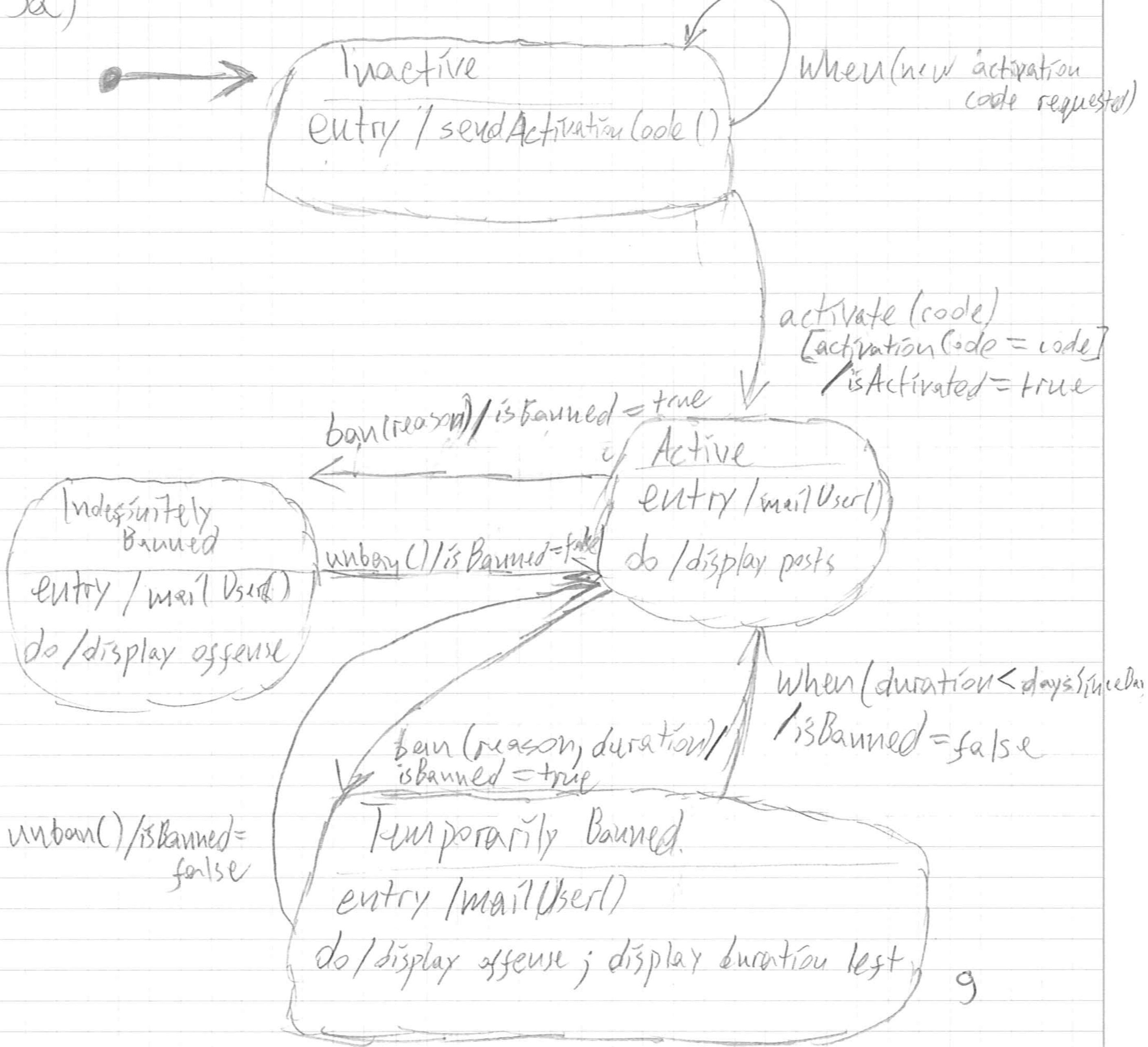
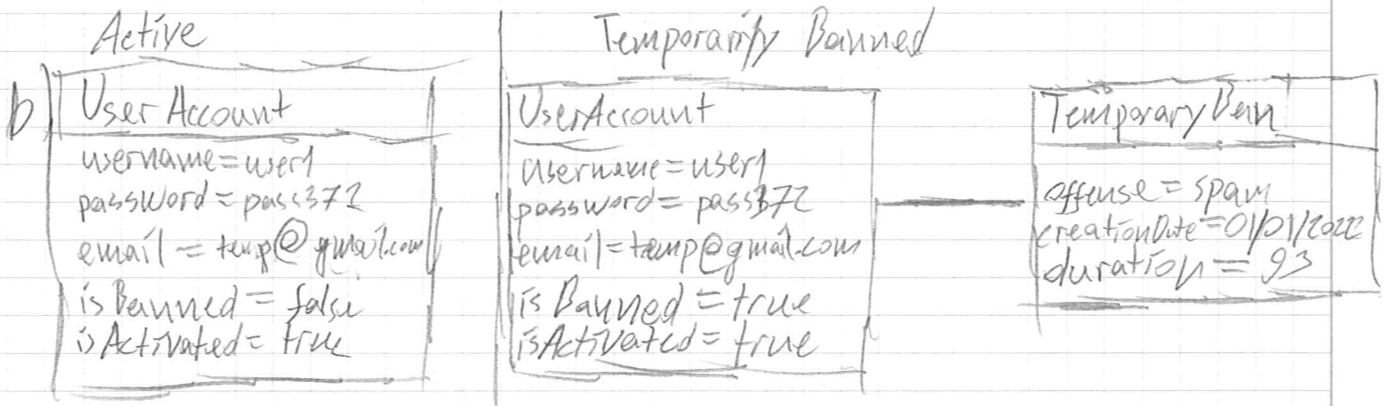
1

CHALMERS	Anonymous code	Points for question (to be filled in by teacher)	Consecutive page no. Löpande sid nr 4
DIT165	Anonym kod 2016-YYW	Poäng på uppgiften (ifylles av lärare)	Question no. Uppgift nr 3

3a)


Inactive
entry / sendActivationCode()
when(new activation code requested)
activate(code) [activationCode = code] / isActivated = true
ban(reason) / isBanned = true
Active
entry / mailUser()
do / display posts
Indefinitely Banned
entry / mailUser()
do / display offense
unban() / isBanned = false
when(duration < daysSinceBan
/ isBanned = false
ban(reason, duration) / isBanned = true
unban() / isBanned = false
Temporarily Banned
entry / mailUser()
do / display offense ; display duration left

9



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The Transition is ban(reason, duration)

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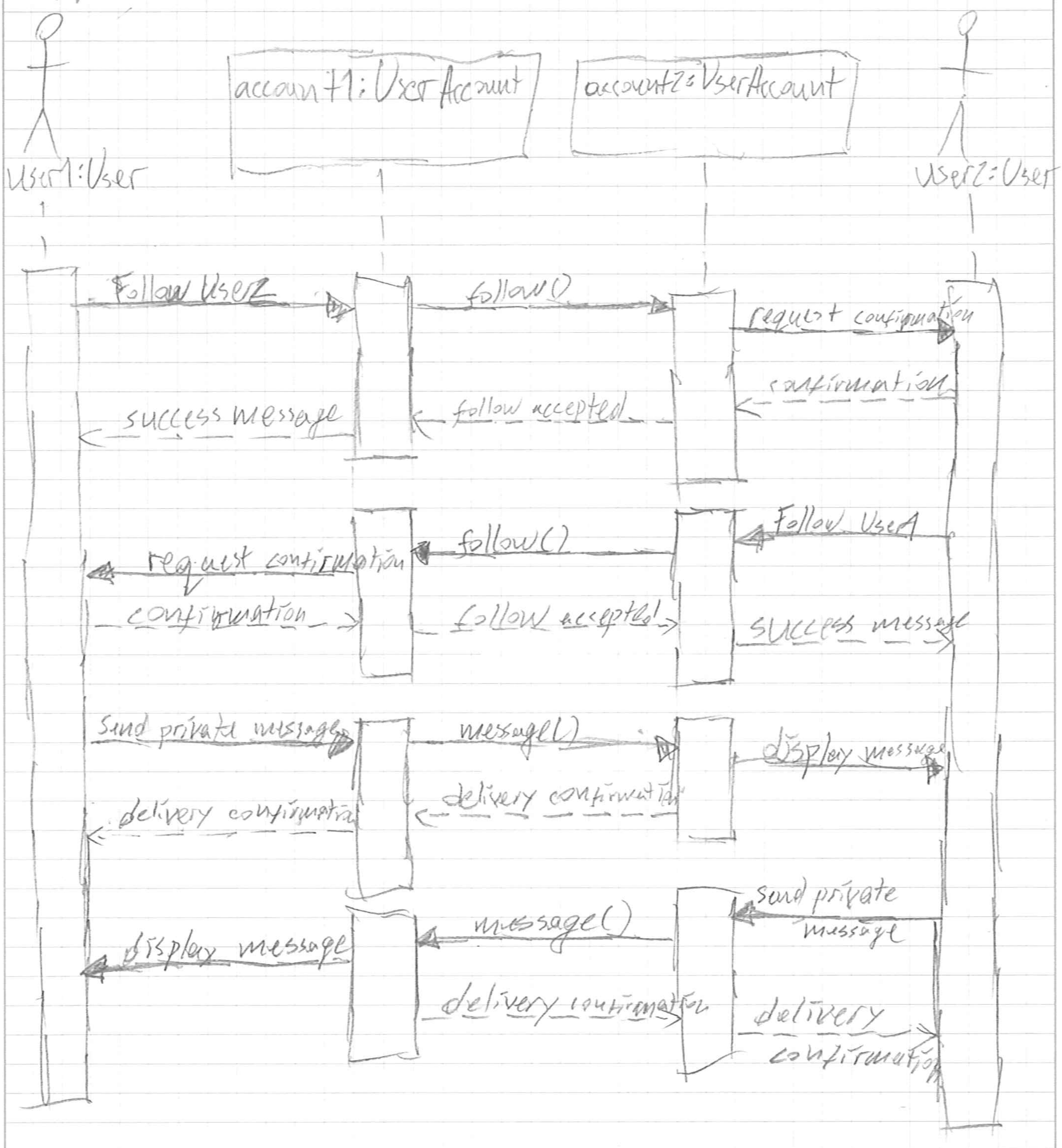
CHALMERS	Anonymous code Anonym kod	Points for question (to be filled in by teacher) Poäng på uppgiften (ifylles av lärare)	Consecutive page no. Löpande sid nr 5
DIT165	0016-XXW		Question no. Uppgift nr 4



12

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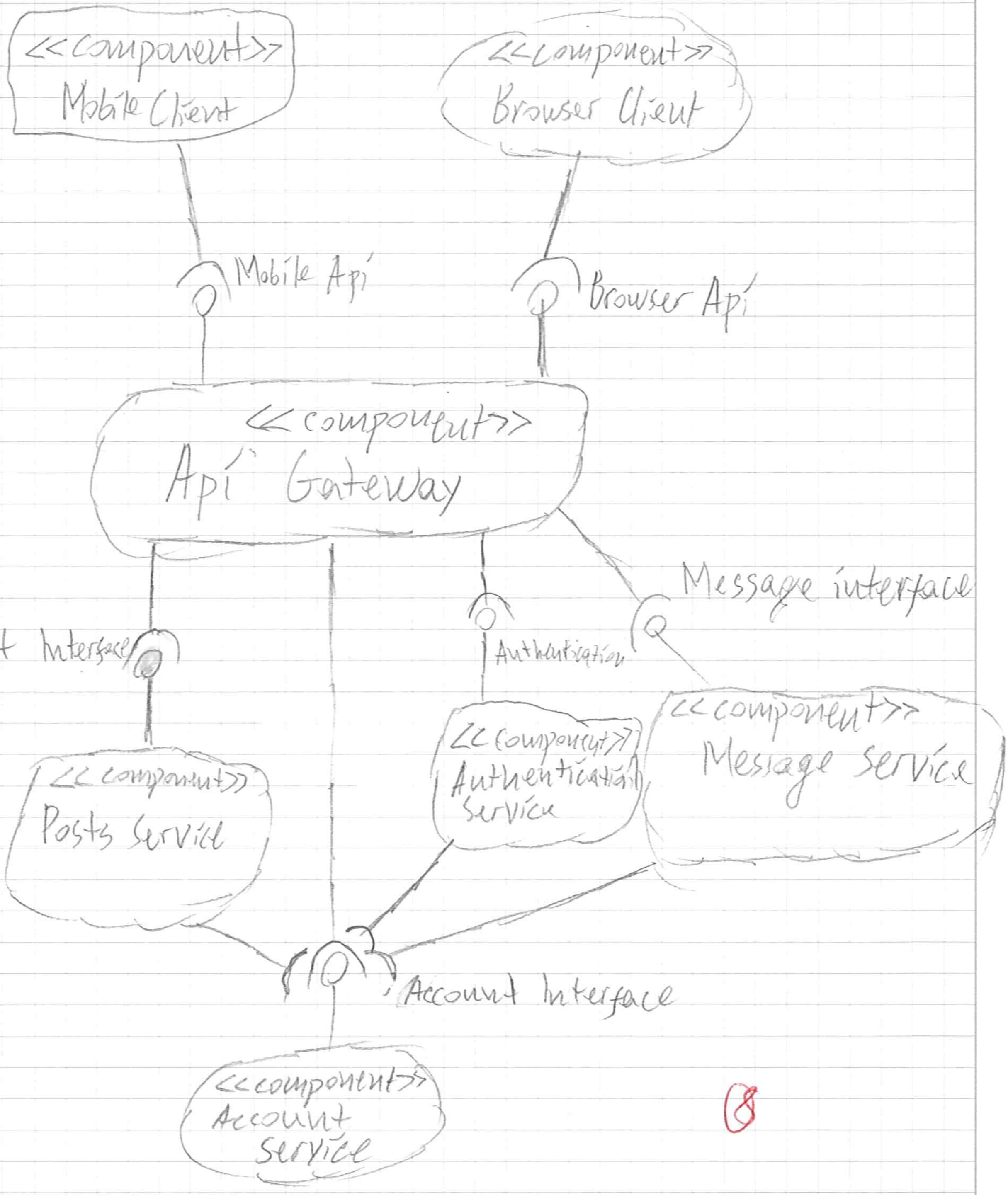
CHALMERS DIT169	Anonymous code Anonym kod 0016-XYW	Points for question (to be filled in by teacher) Poäng på uppgiften (ifylles av lärare)	Consecutive page no. Löpande sid nr 6 Question no. Uppgift nr 5

5a)



8

b) I have chosen microservices since they offer great scalability since the components are very modular (great cohesion, minimal coupling). Each service can be scaled independently based on the apps growth and new services can be added later on. 4

1

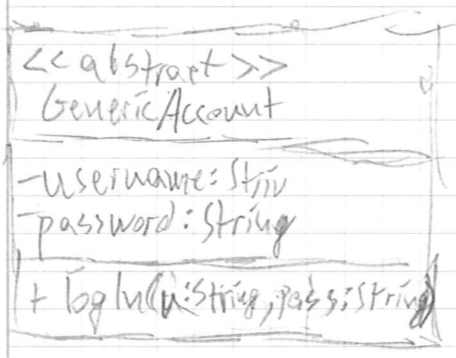
CHALMERS

Anonymous code Anonym kod	Points for question (to be filled in by teacher) Poäng på uppgiften (ifylles av lärare)	Consecutive page no. Löpande sid nr 7
DIT 163 DAK-XYW		Question no. Uppgift nr 6

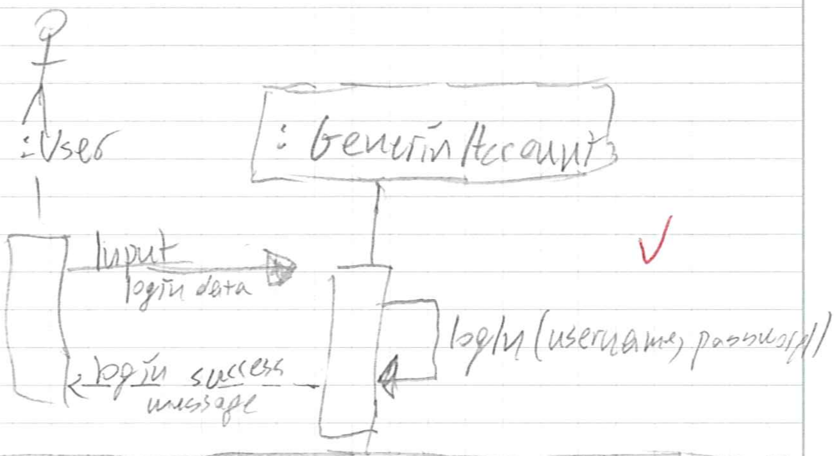
6a)

Case 1 Rule: The type of lifeline in a sequence diagram must not be an interface or an abstract class

Class diagram



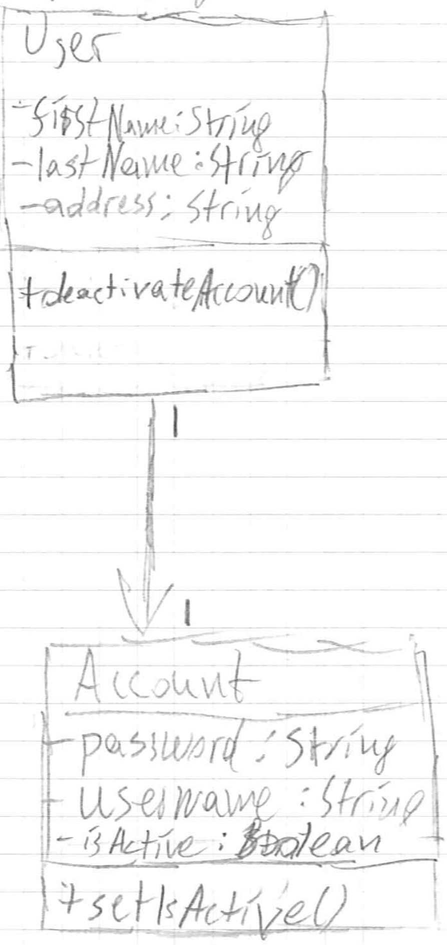
Sequence diagram



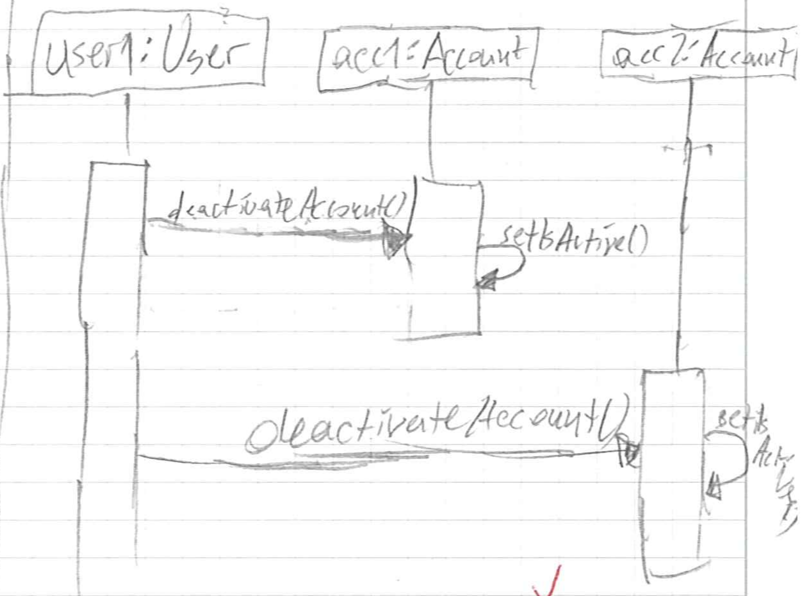
✓

Case 2 Rule: Interactions between objects (in a sequence diagram) must follow multiplicity restrictions of the class diagram

Class Diagram



Sequence Diagram



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5

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CHALMERS	Anonymous code	Points for question (to be filled in by teacher)	Consecutive page no. Löpande sid nr 8
DIT165	Anonym kod 0016-XYW	Poäng på uppgiften (ifylles av lärare)	Question no. Uppgift nr 6

6b) 1. the UserAccount must have a follow() function and a message function since they are refered to in the sequence diagram.

No other violation seem to be present

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1

CHALMERS DIT165

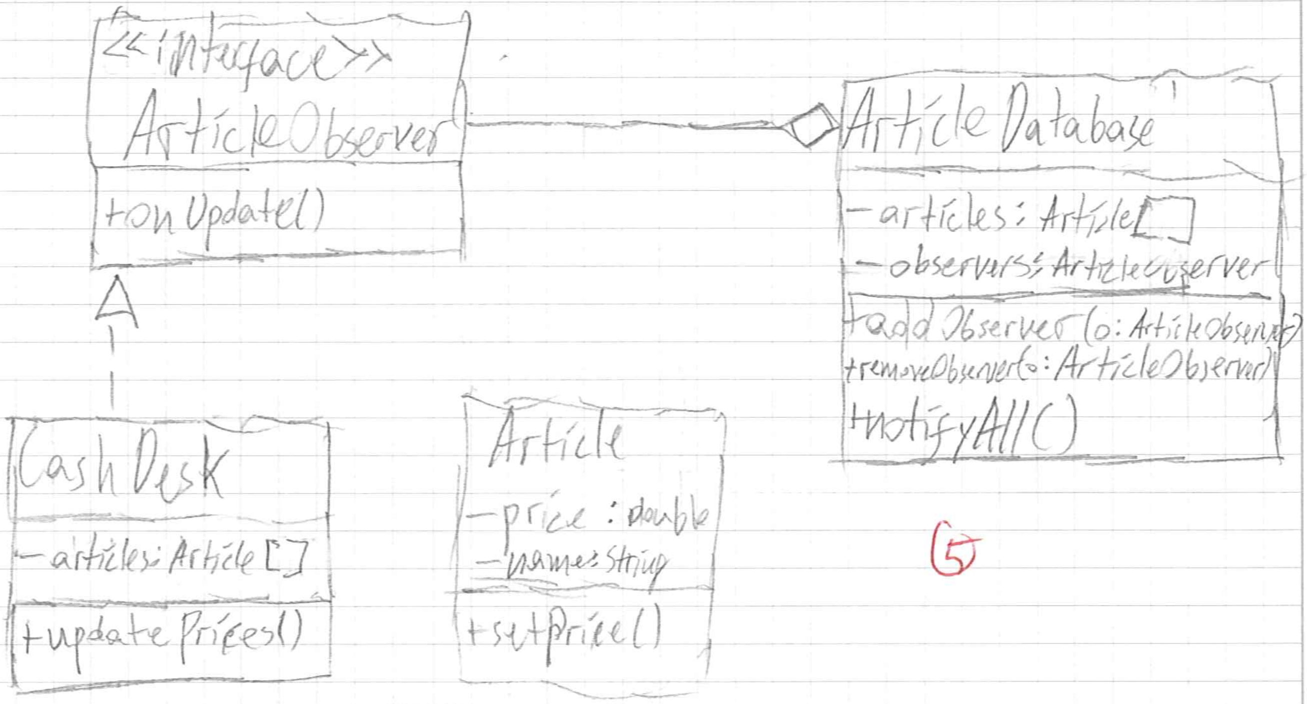
Anonymous code / Anonym kod: 0016-XYW

Points for question (to be filled in by teacher) / Poäng på uppgiften (ifylles av lärare)

Consecutive page no. / Löpande sid nr 9

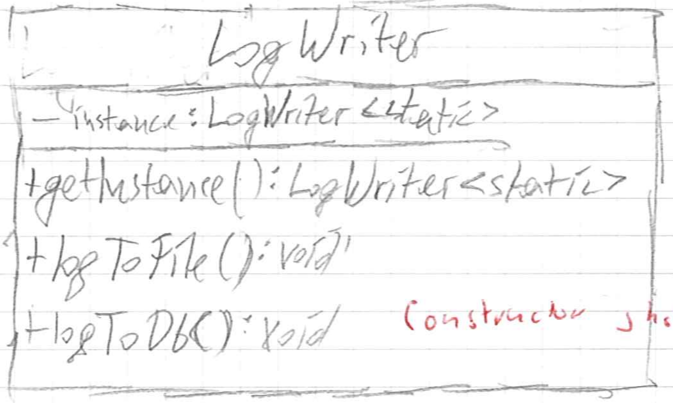
Question no. / Uppgift nr 7

7 case 1. Observer Pattern



5

case 2 Singleton Pattern

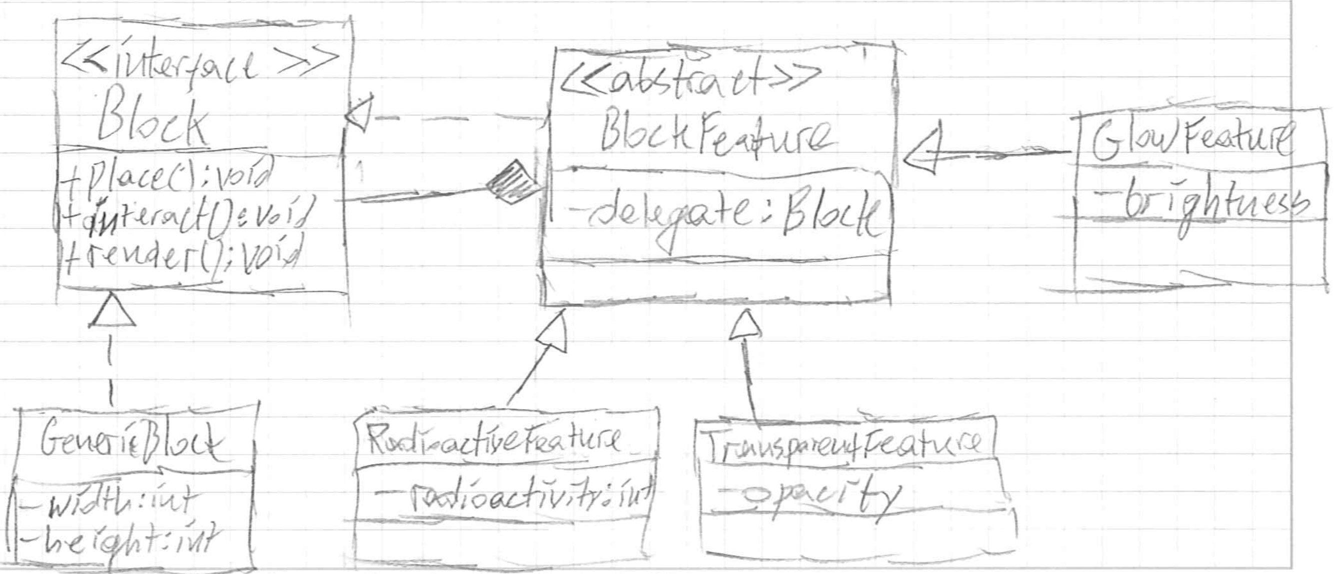

LogWriter
-instance: LogWriter <static>
+getInstance(): LogWriter<static>
+logToFile(): void
+logToDb(): void

4

Constructor should be private

case 3 Decorator Pattern

5



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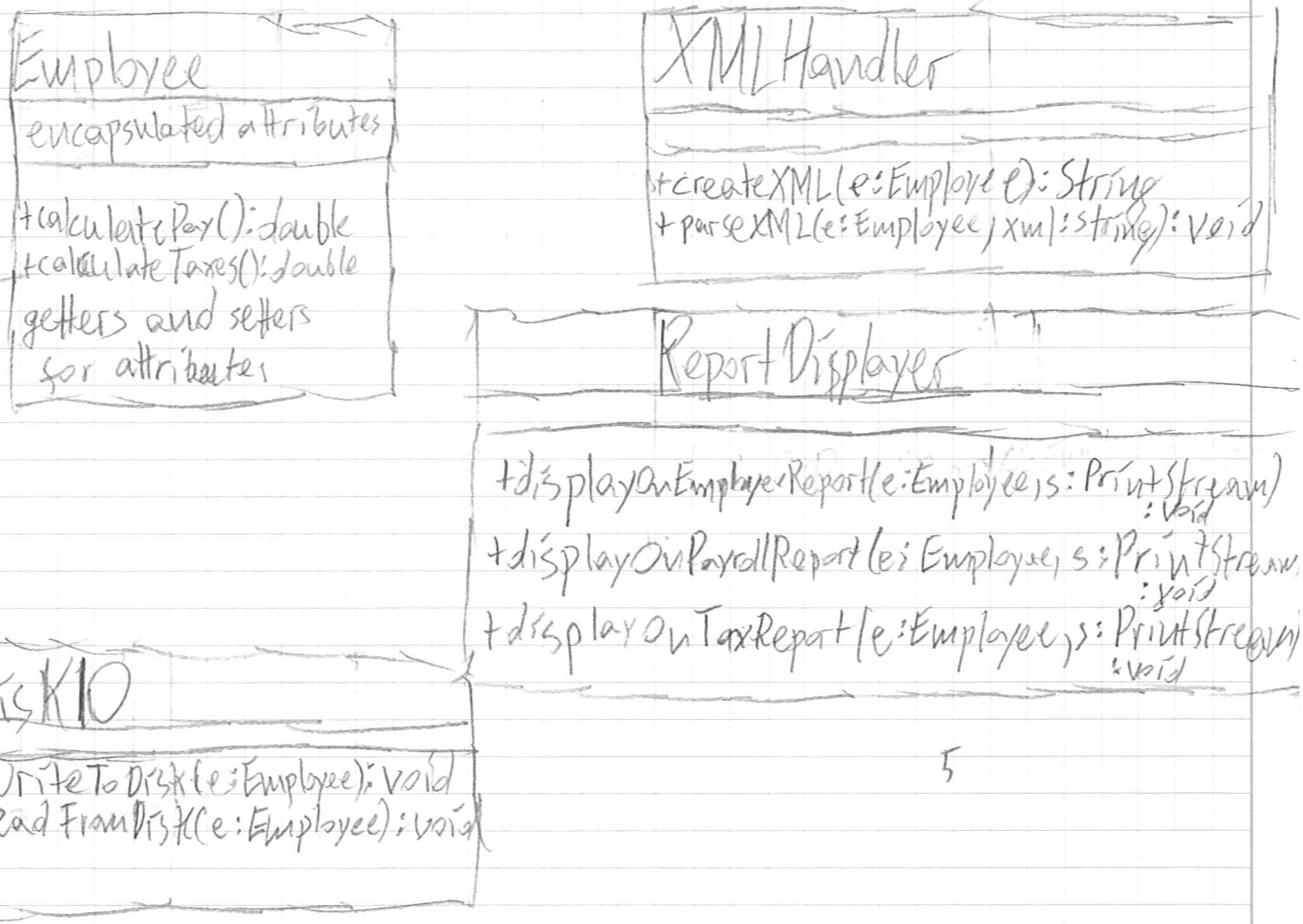
CHALMERS DIT165	Anonymous code Anonym kod 0016-XYW	Points for question (to be filled in by teacher) Poäng på uppgiften (ifylles av lärare)	Consecutive page no. Löpande sid nr 10 Question no. Uppgift nr 6

separation of ~~concerns~~

8a) The Employee class suffers from a number of problems. The main one is the lack of separation of concerns as the class has too many methods that should not be part of this class. Reading/Writing from disk, XML creation/parsing and report displaying can be moved to different classes. This would help with DRY principle since now we need to repeat similar methods for each new class. For example if an Admin class is added and needs to have the read/write to disk functionality, we wouldneed to repeat ourselves, but if we have a DiskWriter class we dont have to reimplement (almost) the same code. 5

b)


Employee
encapsulated attributes
+calculatePay(): double
+calculateTaxes(): double
getters and setters for attributes
XMLHandler
+createXML(e: Employee): String
+parseXML(e: Employee, xml: string): void
ReportDisplayer
+displayOnEmployeeReport(e: Employee, s: PrintStream): void
+displayOnPayrollReport(e: Employee, s: PrintStream): void
+displayOnTaxReport(e: Employee, s: PrintStream): void
DiskIO
+writeToDisk(e: Employee): void
+readFromDisk(e: Employee): void

5

1

CHALMERS	Anonymous code Anonym kod	Points for question (to be filled in by teacher) Poäng på uppgiften (ifylles av lärare)	Consecutive page no. Löpande sid nr 11
DIT463	00K-XYW		Question no. Uppgift nr 8

8c) Since the attributes of the employee were not present, I have implicitly added them, together with getters/setters thus improving encapsulation. I have also created 3 extra classes for: XML, Report and Read/Write functionalities thus improving seperation of concerns since the classes now have specific "jobs". This also means that future classes can utilize those helper classes keeping with DRY.

3