Home Work 1 (2007-09-10)

Submission deadline: 2007-09-17

For UML Exercises You are supposed to install an UML tool. You are free to decide which UML tool you are going to use. Some available tools are listed on http://www.jeckle.de/umltools.html

In particular, http://argouml.tigris.org/ is open source software (version 0.22 was released 8 august 2006)

Question 1: What is the difference between an abstract class and an interface?

Question 2: i). Give an account of advantages and disadvantages of inheritance and composition. **ii).** Give an example of when inheritance is better and when composition is better

Question 3: i). What are some of the advantages and disadvantages of waterfall method of development, and spiral model over each other? **ii).** Describe development circumstances under which you would prefer to follow waterfall method of development, instead of spiral model?

Question 4: Draw a class diagram for the case of our course. We assume that there are at least the following classes: Person, Student, Instructor and Assistant (you can add as many additional classes as you would like). You should draw associations between them, possible attributes and operations.

Question 5: Prepare a class diagram for the following case:

"For each insurance policy, it will be necessary to know the policy number, the start date of the policy, when it is due for renewal and the commission rate due to the premium for that policy. The start date is when the policy was first take out. The renewal date is when the policy next expires. We also need to know how much money has been paid in total as payments against the policy (in the current year of the policy). The current year of the policy is defined as the renewal date minus one."

Identify any attributes and operations here. Allocate them to appropriate classes. Suggest suitable types for the attributes, operations, and any parameters for the operations. Add all these to your class diagram showing the visibility of both attributes and operations.

Question 6: Draw a class diagram for a part of a Car Sharing System, based on a personal interview transcript. Identify any aggregation associations.

> ***Andres:*** *Just remind me, what kind of things do you need to know about the start and the destination of each journey?*
>
> ***Mihhail:*** *We'd want to know the building name and number, the apartment number, the street, town or city, county and postal code or zip code. We'd also want to hold similar information for the home adress of the sharer as well.*
>
> ***Andres:*** *OK. Didn't you say that the journey start and destination address will be used to match up possible shared journeys?*
>
> ***Mihhail:*** *Yes -interesting point that. I'm not quite sure how you'll do this. We want to be able to establish whether two addresses are close enough to each other to be able to consider them a match for a shared journey. For example, two people may want to get from a start destination on adjacent corners of two different blocks to destination addresses in different floors of the same building. A person looking at the addresses would know that the addresses are similar enough to be a match, but in terms of just text of the addresses, they look completely different.*

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Question 7: Draw the Publish/Subscribe protocol as sequence diagrams (publisher, subscriber and subscription consumer).

"Subscriber subscribes consumer at a publisher to receive notification message and publisher sends confirmation to subscriber and notification to consumer (who may be the same or different)."

Question 8: Draw a sequence diagram of scenario “WarehouseOnFire” given in figure 2-15 in Book. Include Objects bob, Alice, john, FRIEND and instances of other classes you may need.

Question 9: i). Draw a Collaboration diagram of the similar scenario as of Question 8. **ii).** Analyse which type of Interaction diagram you would prefer. **iii).** If you are given a scenario with numerous concurrent flows of control then which Interaction diagram will you opt for.

Question 10: Draw an activity:

"Opening account, deposit/withdraw iterations (with conditions checking) and closing account” as state chart diagram(s).

Question 11: Consider the process of ordering a pizza over the phone. Draw an activity diagram representing each step of the process, from the moment you pick up the phone to the point where you start eating the pizza.

Question 12: Draw activity diagram of Boehm’s Spiral Model in Figure 15-10. **(01 Bonus Point)**

Question 13: Give a scenario in which you would prefer to use Entity-Centred models over Activity-Centred Models. **(01 Bonus Point)**