CS 370: Problem Set 2

Section: TR 10-11:50 am

Total: 150pts Due: 03/01/2016

Instructions:
1. I leave plenty of space on each page for you. If you need more sheet, please attach your work right behind the corresponding problem. Most of the problems are designed for you to think about the models and the principles.

2. The first assignment has two parts, written part (15pts each question) and programming part (45pts).

3. Submission:
(a) If you are doing the homework as a pair, please inform me in advance and dsesignate one person as the contact window
(b) On the due day, please submit a hard copy of the written part at the beginning of the class and submit your code through blackboard.

First Name:

Last Name:

Group ID:

Score: /

Problem 1 System Requirement

Discover ambiguities or omissions in the following statement of requirements for part of a ticket-issuing system:
An automated ticket machine sells rail tickets. Users select their destination and input a credit card and a personal identification number. The rail ticket is issued and their credit card account charged. When the user presses the start button, a menu display of potential destinations is activated, along with a message to the user to select a destination and the type of ticket required. Once a destination has been selected, the ticket price is displayed and customers are asked to input their credit card. Its validity is checked and the user is then asked to input their personal identifier (PIN). When the credit transaction has been validated, the ticket is issued.

Problem 2 System Modeling: activity diagram

Based on your experience with a bank ATM, draw an activity diagram that models the data processing involved when a customer withdraws cash from the machine.

Problem 3 System Requirement

When emergency changes have to be made to systems, the system software may have to be modified before changes to the requirements have been approved. Suggest a model of a process for making these modifications that will ensure that the requirements document and the system implementation do not become inconsistent.

Problem 4 System Modeling: object identification

Look carefully at how **messages** and **mailboxes** are represented in the email system that you use. Model the object classes that might be used in the system implementation to represent a mailbox and an e-mail message. Recall that in a single email message, you have infomation of routing information, sender, information, mailer server, message, attachment, signature, cc, bcc, subject line, etc. And in addtion, you have functions associated with this object, such as $reply(), forward(), send()$, and some other functions you have been using when sending emails. Similarly, for Mailbox, you have name, deleted messages, and so on. You also have $move\_message(), fetch\_mail()$, $rename(), delete(), delete\_message()$ functions (and more). Please be as complete as possible.

Problem 5 System Modeling: sequence diagram

Develop a sequence diagram showing the interactions involved when a student registers for a course in a university. Courses may have limited enrolment, so the registration process must include checks that places are available. Assume that the student accesses an electronic course catalog to find out about available courses

Problem 6 Architecture Pattern: layered pattern

An information system is to be developed to maintain information about assets owned by a utility company such as buildings, vehicles, equipment, etc. It is intended that this will be updatable by staff working in the field using mobile devices as new asset information becomes available.The company has several existing asset databases that should be integrated through this system. Design a layered architecture for this asset management system (follow the example for the layer pattern of the ILearn case).

Problem 7 Strategy: open source

A small company has developed a specialized product that it configures specially for each customer. New customers usually have specific requirements to be incorporated into their system, and they pay for these to be developed. The company has an opportunity to bid for a new contract, which would more than double its customer base. The new customer also wishes to have some involvement in the configuration of the system. Explain why, in these circumstances, it might be a good idea for the company owning the software to make it open source

Problem 8 Programming: SQL

Import the two attached SQL files (DDL.sql, which creates the tables; smallRelationsInsertFile.sql, which inserts the data into the tables) into your database. Write the following queries:

(a) Find the names of courses in Computer science department which have 3 credits

(b) For the student with ID 12345 (or any other value), show all *course_id* and title of all courses registered for by the student

(c) As above, but show the total number of credits for such courses (taken by that student). Don't display the *tot_creds* value from the student table, you should use SQL aggregation (sum) on courses taken by the student.