NATIONAL UNIVERSITY OF SINGAPORE

SCHOOL OF COMPUTING

EXAMINATION FOR
Semester 2 AY2013/2014

CS2103/T – SOFTWARE ENGINEERING

April 2014   **Time Allowed: 2 Hours**

INSTRUCTIONS TO CANDIDATES

1. This assessment paper contains **THREE (3)** questions and comprises of **NINE (9)** printed pages, including this page.

2. Answer **ALL** questions within the space in this booklet.

3. This is an Open Book examination.

4. All questions are interlinked. Please answer sequentially. Informally-drawn UML sketches with just enough information are acceptable. Answers may be written using a pencil.

5. Please write your Matriculation Number below.

MATRICULATION NO: _____

This portion is for examiner's use only

Question	Marks	Remarks
Q1	/8	
Q2	/20	
Q3	/12	
Total	/40	

Here is the scenario used for all questions in this assessment paper:

Jim (the target user of your module project) has requested your team to build another product for him. In his workplace, Jim is the caretaker of a collection of items that are available for employees to borrow for short periods (e.g. to use during business trips). Some frequently borrowed items in the collection are: 20 thumb drives, 12 iPads, 10 laser pointers, and 15 laptop carriers. He wants your team to build a '**LoanTracker**' system to keep track of loaning of these items. Currently, Jim maintains loan records in a spreadsheet, which has grown too big for his liking. He hopes the new system can help him keep track of past and current loans more easily. Furthermore, he hopes the new system will allow him to record requests by colleagues to reserve an item for a period in the future, a facility not currently available. In addition, you are free to add more features that may be useful to Jim.

The system is to be used by Jim only. It is not meant to be a multiuser system. Other employees still come to Jim for borrowing items.

The new system can use a barcode scanner that Jim has. The scanner can be connected to Jim's computer. The API provided by the scanner software allows you to retrieve the most recent n values the scanner has read where n is a parameter to be specified by the caller. The plan is to assign a unique number to each item in the collection, print those numbers as barcodes, and stick them on each of the items. Similarly, the barcode scanner can be used to scan employee ID cards to get the Employee ID of the borrower (a 12 digit number). Jim thinks the new system will allow him to record a loan by scanning the employee ID card and the item to be borrowed, followed by typing some more information if required (e.g. expected return date). Returning of items is expected to be recorded similarly.

Yes, Jim still likes typing more than using the mouse. As before, Jim wants data to be stored in a human editable text file.

Your team has six weeks (fulltime) to complete the project.
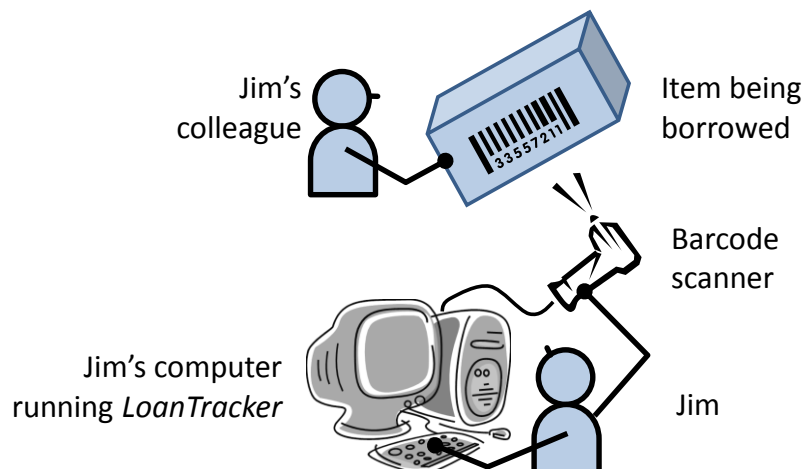
Q1 [8 marks]:
Propose an iterative delivery schedule for the project. Include three versions of the software delivered to Jim at various points of the project. Use *user stories* to specify the functionality delivered in each version. You may omit the *role* segment of the user story. You may also omit the *benefit* segment of the user story for basic features where the benefit is obvious.

Q2 [20 marks]:

Propose a design for the product (internal design, not UI design). In your design, try to keep the *data* classes decoupled from classes that deal with *data persistence* so that you can change the persistency strategy (from text file, to something else) in the future without affecting the data classes.

The target audience for this description is your former CS2103/T lecturer who will be evaluating the quality of your design based on this description.

[Answer for **Q2** continued]

[Extra space for **Q2** answer, **if required**]

Q3 [3x4=12 marks]:
Give one concrete examples each from your proposed implementation of the *Loan Tracker* system for (a) – (d).

(a) An example of <u>not</u> following the *Liscov Substitution Principle (LSP)*.

(b) An example where the implementation can be less/more *defensive*.

(c) An example where *Boundary Value Analysis* is useful in improving the efficiency and effectiveness of testing.

(d) An example where a feature passes *system testing* but fails *acceptance testing*, illustrating the difference between the two.

[Extra space for answers, if required]

--- End of Paper---