

CITY UNIVERSITY OF HONG KONG

Course code & title : CS3342 Software Design (for Sections CA1 & C61, students
of BSc Computer Science,
Session : Semester A 2007/08 BSc Computer Studies and
BSc Applied Physics)
Time allowed : Two hours

This paper has TEN pages (including this cover page).

1. This paper consists of 3 questions.
 2. Answer ALL questions in the space provided.
 3. Make necessary assumptions, and state them if any.
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Student ID: _____

Seat no.: _____

**NOT TO BE
TAKEN AWAY**

**NOT TO BE
TAKEN AWAY BUT
FORWARD TO LIB**

Attempt ALL questions from this Section

1. (Professional Ethics) [10 marks]

Study the following paragraph:

"You work for a bookstore (Stone Age Press) as a programmer. On 10 Dec 2007 morning, you are fired by the company, and at the same time, you identify a critical bug in the program that compiles the list of the best-selling books to be posted in the bookstore for book lovers to reference. It makes some popular books unpopular, and mixes up the comment (book reviews) of a book with another. "

What will you do if you are very satisfied with the employment termination package offered by the company? (3 marks)

What will you do if you are fired because you are told that you perform poorly in the job, but you do not think so? (3 marks)

Why do you give the same answer or different answers in the above two scenarios? (4 marks)

Study the following experience when you purchase a book to answer Questions (2) and (3):

- In the bookstore outlet of Stone Age Press (SAP), you (as a customer) browse the list of top-10 bestselling books, and find the book title and the comments of *The Complete Idiot's Guide to Software Design* interesting. However, the book is out of stock at the bookstore. Thus, you leave your name and contact phone number to Janice (a bookstore salesperson).
- Janice keys in your information into the computer system as a book request, but surprisingly need you to wait for a while. In the warehouse of the bookstore, Tom, bookstore consultant, is responsible to serve all book requests. Tom reads from the printout of your book request, and searches *The Complete Idiot's Guide to Software Design* in the warehouse. Tom considers that the printing is slow, and should be avoided so as to be environmental friendly. He also considers that if he can set up a centralized inventory showing whether a book is available and its amount in stock, then he needs not to move around in the warehouse to look for the book.
- If Tom cannot find the book, he simply proceeds to serve other book requests without informing Janice about the book search result. Thus, if Janice does not receive Tom's phone call about the book after a while, she will release you. It is because Janice does not know whether Tom is still searching the book in the warehouse, or Tom cannot find the book and hence does not reply to her. Janice considers that if she can always know the latest status of a book request, she can make a better decision to request you to wait for a bit longer or not.
- On the other hand, if Tom finds the book, he will call back Janice about the book's availability so that Janice will inform you to pick up the book later. Also surprisingly, Janice marks the book as "sold" in the computer system before you actually order for the book. She explains that "If I do not do this, other salespersons will sell the book to other customers. You know, it is a bestselling book." Since you observe that the above top-10 list is printed by the computer system, you wonder whether the list will be more accurate if the calculation is based on the actual sales of the books.
- Of course, you may have already left the bookstore when Janice finally receives any call from Tom. Yet, the computer system is so buggy that, sometimes, Janice cannot find out your contact number, and thus, cannot contact you. You had better visit the bookstore every now and then to check whether or not *The Complete Idiot's Guide to Software Design* is available.

2. (Requirements Capture) [35 marks]

- (A) What are the *four* major problems described in the above bookstore operations? (5 marks)
- (B) What are the causes of these problems? (5 marks)
- (C) If you develop a new system for the bookstore, what are the objectives of the new system to solve these problems? (5 marks)

Problem	Cause of the Problem	System Objectives

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(D) The new system is further required to be *paperless*. Find the set of use cases of the new systems. (10 marks)

Use Case	Use Case Description	Primary Actor of the Use Case

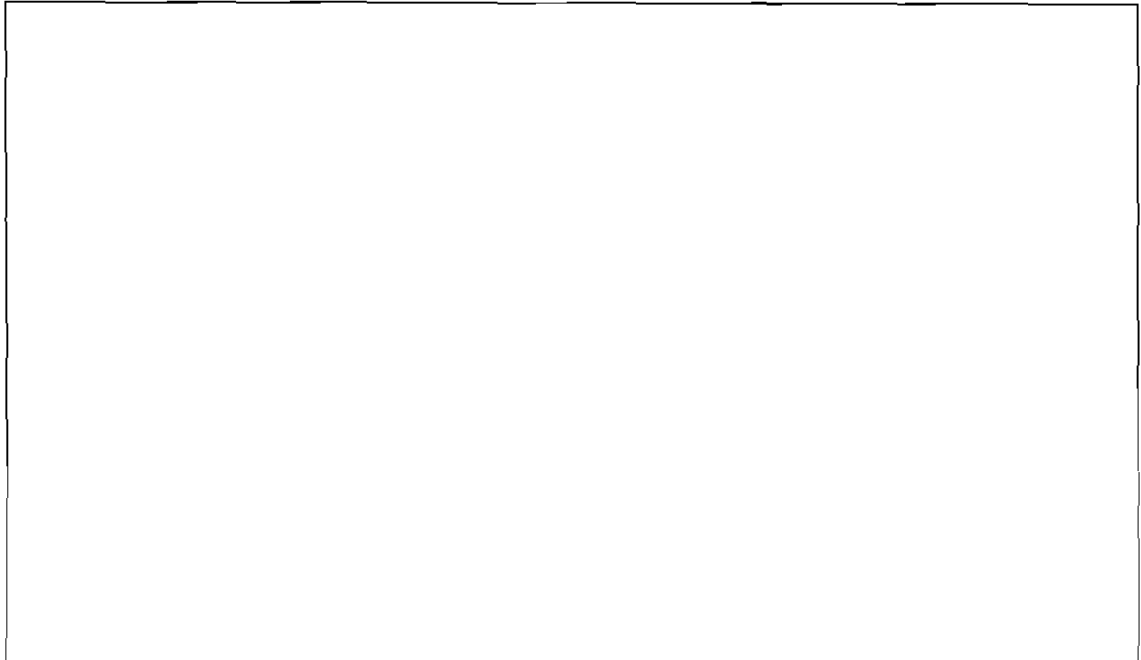
Use Case	Use Case Description	Primary Actor of the Use Case

(E) Propose the new system in a use case model based on the above description. (10 marks)

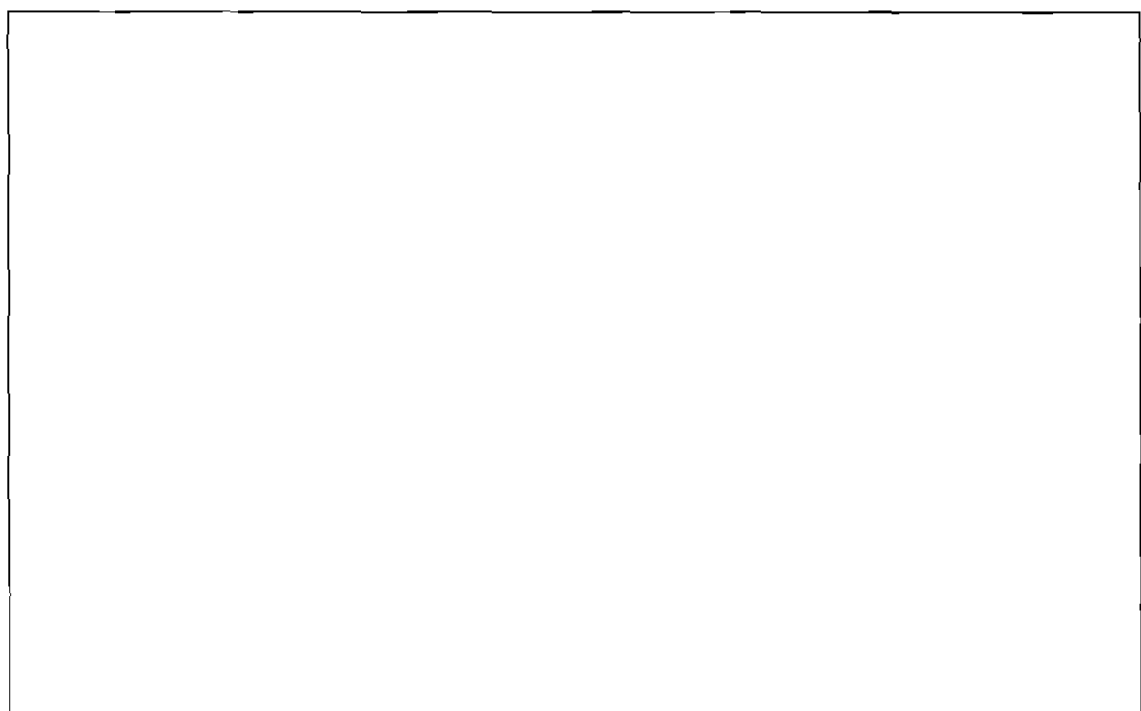
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3. (Object-oriented Analysis and Design) [55 marks]

(A) (Domain Model) Based on the description, propose a domain model. Show both classes and attributes.(10 marks)



(B) Based on your domain model, show a sequence diagram or communication diagram that describes the typical course of actions from a customer reading an interesting book title to knowing successfully that the book has stock in the warehouse. Your diagram should include entity objects and actors. (10 marks)



(C) Update your answer in 3(B) by adding necessary boundary objects and controller objects to show how a book request made by a salesperson reaches a consultant. (5 marks)

(D) Explain in detail the reasons on why you propose to design the solution in 3(C). (5 marks)

- (E) Suppose that the role of a bookstore consultant may be computerized in the future (i.e., an e-consultant). After you analyze the scenario, you find out that Tom needs Graphical User Interface for communication, but if his role is replaced by a computer object, then the software application may use the other approach to communicate with the computer object. Explain what changes that you may make in the solution in (C) in order to support the potential changes. (10 marks)

- (F) You have been told by Janice that the book is not available, so you want to place an order. Based on the following paragraph, describe the life of an order form in a state machine diagram. [15 marks]

Janice firstly gets a blank order form from the drawer. She then fill in your name and contact number, the date of the order on the order form. Next, for each book that you want to order, she fills in the book entry on the order form one by one with the book title, ISBN number, the ordered quantity and the amount. Now, an order is produced, so, she verifies the contents of the order and stamps the order as “verified”. Of course, an order form without any ordered item should not be stamped. If there is any error, she will correct the error on the order form immediately. If everything is alright, she will ask you to pay for the order at the cashier counter. You pay by cash, and the cashier further stamps the order form as “paid”. It is SAP’s policy to destroy any order form after 10 years.

