THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING
BACHELOR OF SOFTWARE ENGINEERING

ECI4262 - OBJECT ORIENTED DESIGN AND PROGRAMMING

FINAL EXAMINATION – 2013/2014 **CLOSE BOOK TEST**

Date: 23 August 2014 **Time: 09:30 – 12:30 hrs**

INSTRUCTIONS TO CANDIDATE:

- This paper consists of two (2) sections SECTION A and SECTION B in four (4) pages.
- SECTION A has one (1) mandatory question.
- SECTION B has five (5) questions, the total marks allocated to each question is equal in this section. Answer any three (3) questions.
- Assume reasonable values or any suitable assumptions for any data not given in or if any doubt as to the interpretation of the wording of a question. Clearly state such assumptions made on the script.
- You are NOT allowed to use any study material or any other electronic resource during the examination.

SECTION A

Answer **Q1** in this section.

[Q1] (Compulsory Question) [40 Marks]

A take-out pizza restaurant wants to set up an online ordering system. A customer must have an account to use the system. When the customer creates his or her account, the following information is stored: Email address (which becomes the user id), contact phone number, password, name, address, preferred credit card number, and credit card expiry date. When the customer creates an order the following information is stored: The time the order was placed, the address for delivery, the contact phone number, the total price, the credit card number, the expiry date of the credit card, the items ordered and the total price. An item can be pizza or drinks. For each pizza item, the information stored will include the kind of pizza (thin crust, thick crust or gluten-free crust), the size (small, medium, large), the list of toppings (e.g. cheese, bacon, vegetables, etc.), the number of items like this (e.g. 10 would mean 10 identical pizzas) and the total price for this pizza item. For each drink item, the information stored is type, size, number, and total price. The system also records each delivery: Associated with each delivery is the name of the delivery driver; the time the driver picked up the order(s) and the time each order was delivered. A driver may take more than one order on a delivery run.

Clearly state if you make any assumptions when answering the following questions.

a) Draw a use case diagram for the given scenario. (8 marks)

b) Create a class diagram for the above system showing classes, associations and generalizations. (12 Marks)

c) Draw the sequence diagram for the basic flow of the scenario, *Create an order*. (20 Marks)

SECTION B

Answer **any three (3)** questions in this section.

[Q2] [20 Marks]

a) What is Java Virtual Machine? (4 Marks)

b) Explain why Java is considered as a platform independent language (2 Marks)

c) Name and explain two kinds of java data types. (6 Marks)

d) Briefly explain the following concepts (8 Marks)

- Class
- Object
- Super class
- Subclass

[Q3] [20 Marks]

a) Write a Java program called ***CheckOddEven*** which prints ***"Odd Number"*** if the ***int*** variable ***"number"*** is odd or ***"Even Number"*** otherwise. (6 Marks)

b) Explain the reason for each keyword of the given Java statement;

public static void main(String args[])

(8 Marks)

c) State three (3) **Object Oriented Principals** and explain those using Java code snippets.

(6 Marks)

[Q4] [20 Marks]

a) Name and describe 3 differences between an interface and an abstract class?

(6 Marks)

b) What is Garbage Collection in java? (4 Marks)

c) Explain the usage of "final" keyword in java. (6 Marks)

d) Explain the result of adding a double value to a String in java (4 Marks)

[Q5] [20 Marks]

a) Briefly explain what is a software design pattern? (2 marks)

b) State the two design patterns have been used in *Figure 1* and *Figure 2*. Briefly explain how the two design patterns differ. (10 marks)

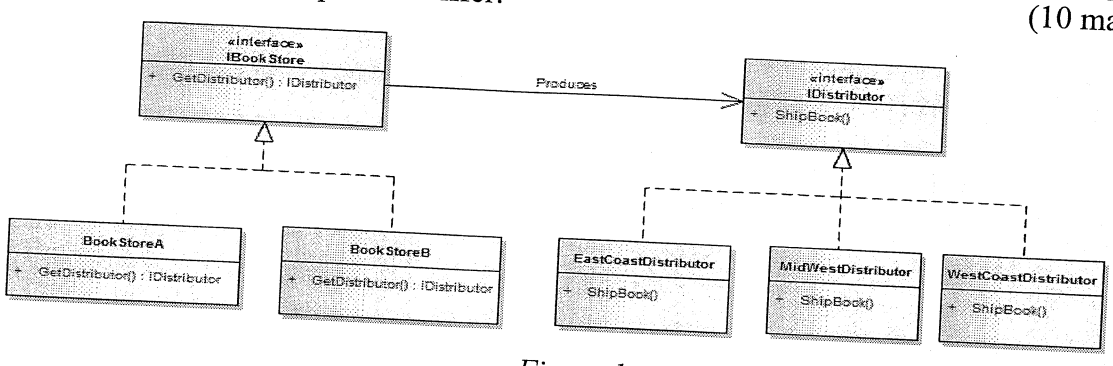

Figure 1

Both *BookStoreA* and *BookStoreB* choose which distributor (*EastCoastDistributor* or *MidWestDistributor* or *WestCoastDistributor*) to use based on the location of the customer. This logic is in each bookstore's *GetDistributor* method.

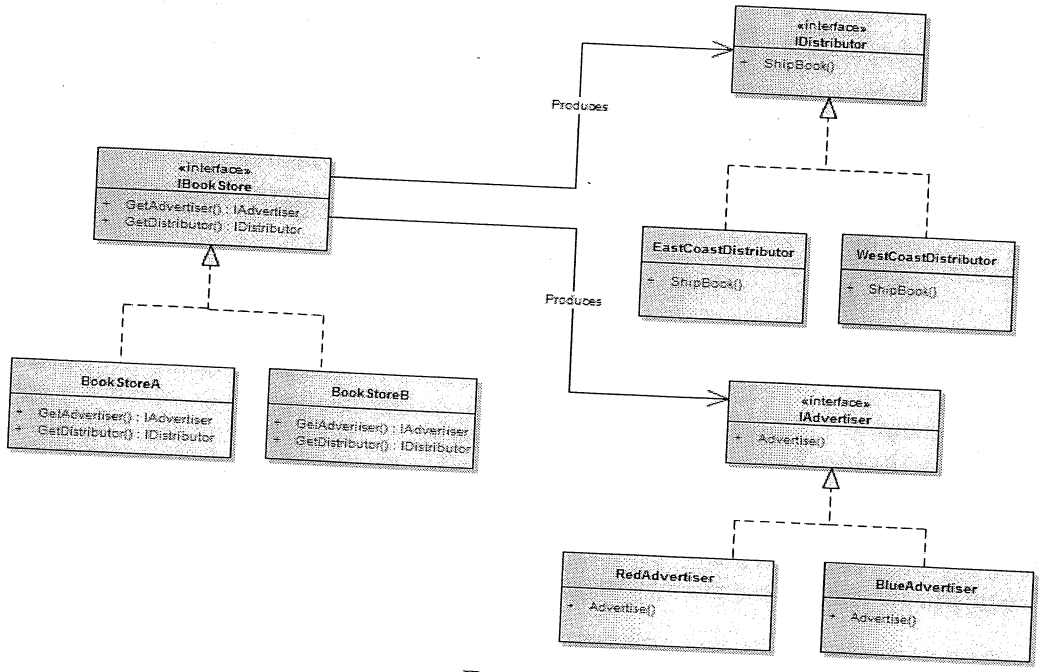

Figure 2

Another product that the factories can produce is added and *advertisers* are added that would help the bookstores to advertise their stores online. Each bookstore can then choose its own distributors and advertisers inside its own *GetDistributor* and *GetAdvertiser* method.

c) Explain the usage of **singleton design pattern** using an example java code (8 Marks)

[Q6] [20 Marks]

a) State two types of modeling in UML and to which **Type** does the following UML Diagrams belong. (5 Marks)

- Use case diagram
- Class diagram
- Sequence diagram
- Activity diagram
- Deployment diagram

b) Consider the following user story given in a Software Requirements Specification (SRS) document.

> A user can request a quiz for the system. The system picks a set of questions from its database, and composes them together to make a quiz. It rates the user's answers, and gives hints if the user requests it. In addition to users, we also have tutors who provide questions and hints. And also examiners who must certify questions to make sure they are not trivial. Whatever the actions tutor does can also be done by the examiner.

Briefly explain the following in UML by selecting appropriate examples from the given scenario. Draw suitable diagrams whenever required.

(15 Marks)

- Use Case
- Actor
- Generalization
- Extend
- Include