



UNIVERSITY OF COLOMBO, SRI LANKA

UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)
Academic Year 2007/2008 – 2nd Year Examination – Semester 3

IT3103: Object Oriented Analysis and Design
PART 2 – Structured Question Paper

15th March, 2008
(ONE HOUR)

To be completed by the candidate

BIT Examination Index No:

Important Instructions:

- The duration of the paper is **1 (one) hour**.
- The medium of instruction and questions is English.
- This paper has **2 questions** and **06 pages**.
- **Answer All questions.**
- All questions will carry equal marks.
- **Write your answers** in English using the space provided **in this question paper**.
- Do not tear off any part of this answer book.
- Under no circumstances may this book, used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper.
If a page is not printed, please inform the supervisor immediately.
- **Non-programmable Calculators may be used.**

Questions Answered

Indicate by a cross (X), (e.g. X) the numbers of the questions answered.

To be completed by the candidate by marking a cross (x).	Question numbers	
	1	2
To be completed by the examiners:		

- 1) Based on the following case study answer question 1.

Ware House Management System

Case Study

ACMA Company is in need of a warehouse management system to control movement and storage of materials within its warehouses.

This company offers the services of its warehouses and container yards to customers all over the country. It offers transport services to transport customers' goods. The operations include order redistribution within warehouses, Freight forwarding between origin and destination warehouses and handling transport services. All kinds of items can be stored in warehouses. Each item can be classified in to various categories according to the storage type. The warehouse is divided into cubicles based on the storage requirements. It is important that the location of certain items should be separated from others. e.g. chemicals and food items.

The following people will be connected with the warehouse system:

Foreman, Warehouse worker, Container yard Supervisor, Truck driver and assistant, Office personnel and Customers.

Office personnel receive and accept orders from customers. The foreman in the warehouse is responsible for accepting the distribution order. Customers own their items in the warehouses and give instructions on where and when they want them to be transported. All items should be entered into a database before they are taken in to the warehouse. Container yard Supervisor handles the operations inside a container yard, such as security of the trucks parked within the yard where the Driver and the assistant break journey.

Order Distribution Scenario

A customer approaches the office of the Company with a list of items to be dispatched to various destinations in the country. The office personnel check the list, note the destinations and identify the storage type corresponding to each item by referring to an item type classification book.

Before a transit, all the items are expected to be at a specific location belonging to the customer. Thus, the original location of all the items for a specific transit is the same. The items in the order, which should be transported to the same destination, should arrive on the same date.

For a particular transit from the origin, a pre-defined route is obtained from a reference book. A route is a set of intermediate container yards between the origin and destination warehouses. The expected period that is allowed to be spent at each intermediate container yard is also specified. Another duration specifying the period to be spent on the road between successive container yards or container yards and warehouse as the case may be is also given.

After deciding the route, the office personnel phone the origin and destination warehouses to inquire about the space availability to store the items. The foremen at such warehouses check their logs for the availability of space for those items and determine whether there is sufficient space. If space is available, he makes a reservation of the space for the expected period at that time. If any of the two warehouses faces a difficulty of handling the storage, the reservations in respect of the customer order is not done and the order is not accepted.

However, if space can be reserved in both warehouses, the order is accepted and the customer is given an order number. Thereafter, the customer is free to arrange for his own transport of the consignment to the warehouse at the origin. In the alternative, the company is prepared to undertake the assignment. Order form contains order number and details of each item including item_ number, item_name, quantity, unit of measure (Weight, volume, etc.), original location, destination of the item and expected date of final arrival. The form also contains a provision for the customer to indicate any special requirements under remarks.

Freight forwarding scenario

A freight is the movement of items between any 2 warehouses. All items in a given freight go to the same warehouse. When freight is forwarded, a Freight forwarding form is filled at the origin warehouse. Each Freight forwarding form consists of the name of the foreman, freight no, current location of freight , destination of freight, intermediate container yards, and also for each item its order number, item number, name, quantity, weight, container id, truck registration number, expected date and the Remarks of the customer.

A freight is created at the origin warehouse on the route. After selecting the items for dispatching, they are stored in containers. The number of containers used depends on the requirements and whether items can be stored together or not. A single truck can carry only one container. The number of trucks is then assigned accordingly to the number of containers. The location of the freight in transit should also be tracked. Even though there is a pool of trucks available at each warehouse, there may be some trucks under repair at anytime and others may be in transit. Once dispatched, the space allocated in a specific warehouse becomes available.

- (a) For the above case study, Office Personnel can be identified as *Actors*. Identify the Use cases which are responsible for the business actors ‘Office Personnel’.

ANSWER IN THIS BOX

Use cases: Receive Order, Confirm Order, Route Setting, Reject Order, Accept Order

(20 Marks)

- (b) In addition to the actor Office Personnel, name other *Actors* one should identify for the system at the design stage.

ANSWER IN THIS BOX

Actors: Customer, Foreman, ContainerYardSupervisor

(20 Marks)

(c) Identify SIX (06) potential classes for the above system.

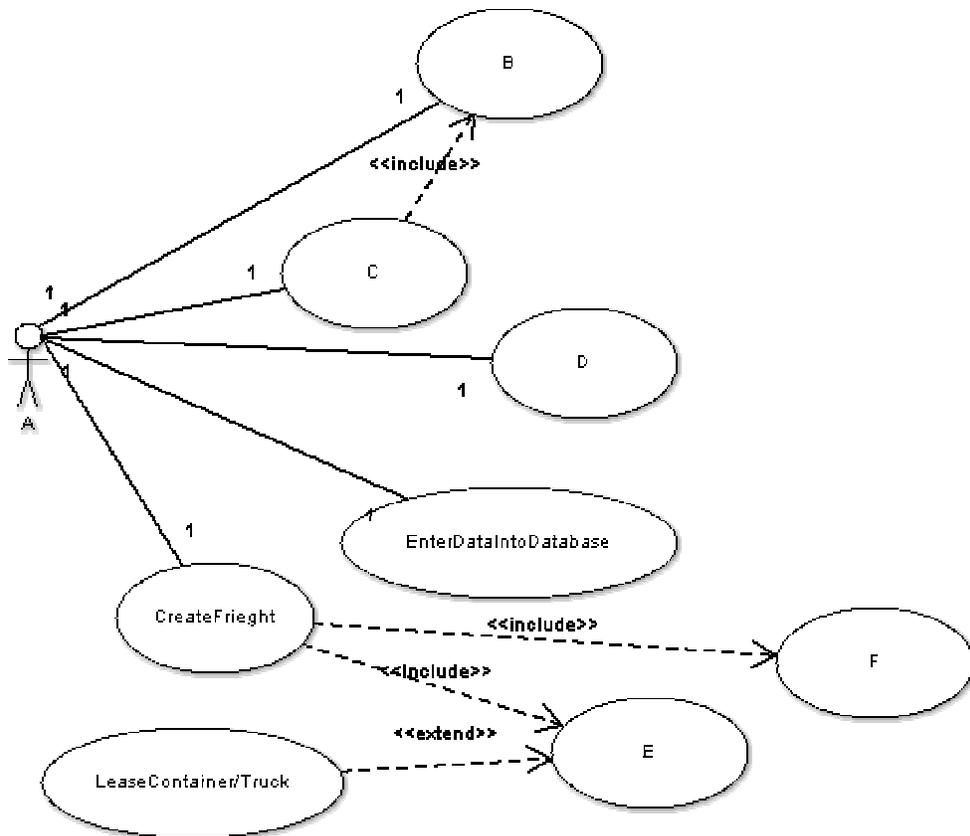
ANSWER IN THIS BOX

WareHouse, Customer, Order, Freight, Truck, Container, Foreman,
WarehouseWorker, ContainerYardSupervisor.

(30 Marks)

(d) Following is a Use case diagram for the given system. Identify the Actors / Use cases for labels A-F from the given list.

Customer, WarehouseWorker, Foreman, CheckSpaceAvailability, CancelReservedSpace, ReserveSpace, CheckTruckAvailability, AssignContainers, RejectOrder, AcceptOrder.



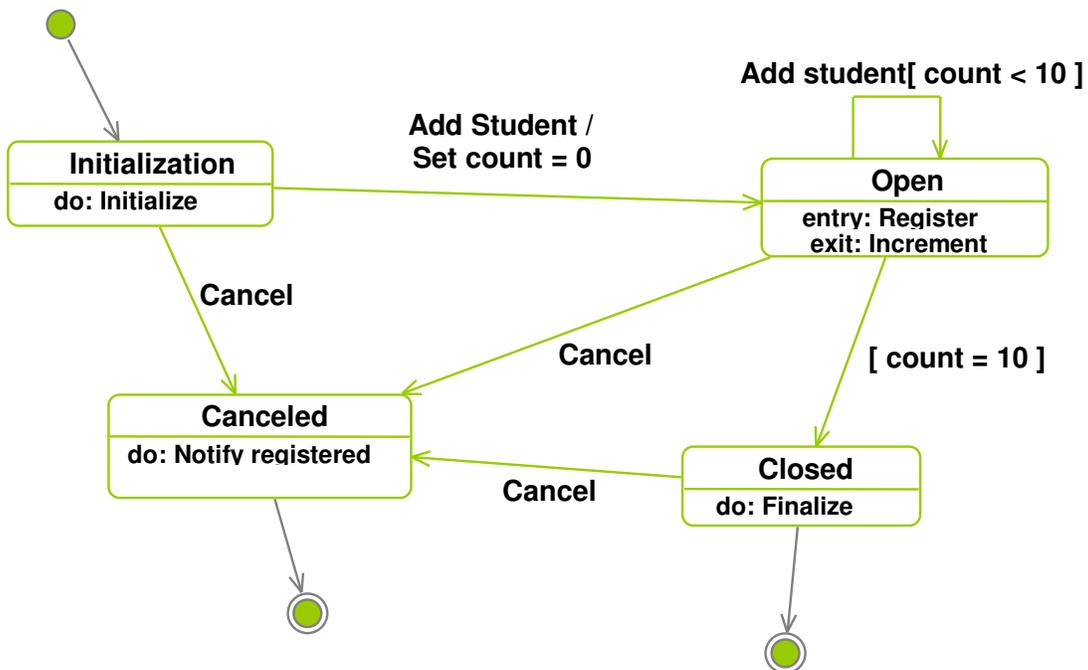
ANSWER IN THIS BOX

- A- Foreman
- B- ChecksSpaceAvailability
- C- ReserveSpace
- D- CancelReservedSpace
- E- CheckTruckAvailability
- F- AssignContainers

(30 Marks)

(2)

Consider the following UML diagram drawn for a student registration system.



(a) Using the above diagram, fill in the blanks with appropriate words/phrases.

- (i) The above UML diagram is called a ... **State diagram**
- (ii) For which object is the above diagram drawn? ... **Course**
- (iii) **do:initialize/do: Notify registered/do:finalize** is an example of an activity in the above diagram.
- (iv) Action **Entry**.....is an example for a behaviour that occurs while the object is transitioning into the state.
Register..... is an example for such an action.

(30 Marks)

(b) The behaviour in an activity can include an event sent to some other object. How do you represent such an activity in UML?

ANSWER IN THIS BOX

In this case, the activity, entry action, or exit action is preceded by a **Do:Target.Event(Arguments)**
Target - object receiving the event
Event - message being sent
Arguments – parameters of the message being sent

(30 marks)

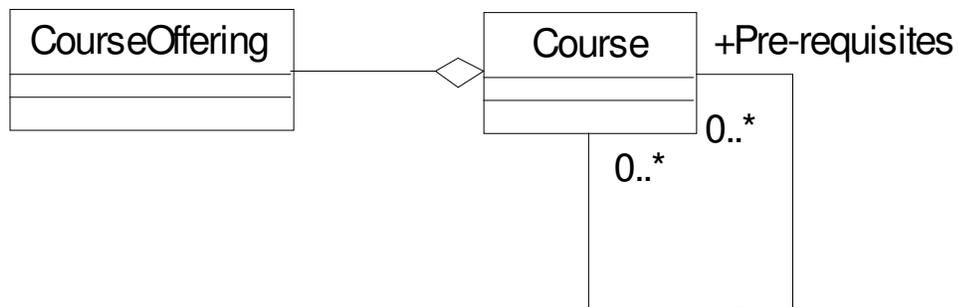
(c) Give an example of an activity that includes an event sent to some other object.

ANSWER IN THIS BOX

CourseRoster.Create

(10 marks)

(d) Sometimes a class is in an association with itself. This can happen when a class has objects which can play a variety of roles. This is shown on a class diagram as a reflexive association or aggregation. Give an example using UML notation for a reflexive relationship that exists between course objects. Briefly explain the relationship.



One Course object playing the role of Prerequisite is related to zero or more course objects.

One Course object is related to zero or more course objects playing the role of Prerequisite

(30 marks)
