

Uva Wellassa University of Sri Lanka  
Faculty of Science and Technology  
Department of Computer Science and Technology  
200 level 1<sup>st</sup> Semester Examination – May/July 2017  
CST221-3 Object Oriented Analysis and Design



---

### Part C

**Number of questions:** Three (03) essay questions

**Mark allocation:** 40

---

1. Consider the following scenario about reservation of circuit bungalows and campsites in Department of Wildlife Conservation (DWC) and answer the given questions.

A system is going to be developed by the DWC for reservation of circuit bungalows and campsites which are located close to the national parks.

Currently, all the reservations are done manually by the Head Office located in Colombo. The proposed system should have the facility to make reservations from the Head Office and from seven (07) Regional Offices. There are ten (10) national parks each having several bungalows and campsites. In each circuit bungalow, there are two (02) rooms with attached toilets, a verandah and a kitchen.

Reservations by paying the full amount are done through the ticketing officers. There are several ticketing officers attached to the Head Office and the Regional Offices. Reservations are done from 9.00 am to 5.00 pm. Directors of DWC want the proposed system to have the facility for online payments, so that the visitors can reserve the bungalows and campsites using credit cards. Ticketing officers do not accept foreign currency. Rates will be the same for both foreigners and locals. Rates may change from time to time. Children under 5 years will not be charged and the children between 5 - 12 years will be charged half of the rate. Daily cash collections will be noted and are deposited to the bank at the end of each day. At the time of reservation, the ticketing officer will take the following particulars from the customer, if customer wishes to proceed with the reservation; customer name, contact number, NIC / passport number, country, sex, number of adults, number of children, type of accommodation, the period of stay, expected check-in date and the mode of payment.

A customer can cancel the reservation at any time thereafter, 10% will be charged if the cancellation is done 48 hours before the check-in date and otherwise 50% will be charged. It can be done at the Head Office and Regional Offices through the ticketing officers. Customers who have cancelled their reservation can only collect the refund from the same office they made the reservation. It is not possible to cancel the reservations online. 2% discount will be applied for the credit card payments, but not for cash payments.

If the customer wishes to extend the accommodation period, they need to send the request to the person in-charge of the bungalow or the campsite. According to the availability, the person in-charge will collect the additional payments if any.

Reservations of campsites may be cancelled due to bad weather (flood, landscapes, etc.). In such situations, the person in-charge of the campsite will inform the Head Office or the Regional Office. The ticketing officers will publish a message regarding the cancellation on the web site and inform the customers who have already made reservations and all the other ticketing officers. In such case, they can collect the refund from the Head Office or the relevant Regional Office.

a. "Among the relationship types in use-case diagrams, 'extend' relationship is the most mandatory type".

Do you agree with the above statement? Justify your answer by giving examples from the above scenario.

(3 mark)

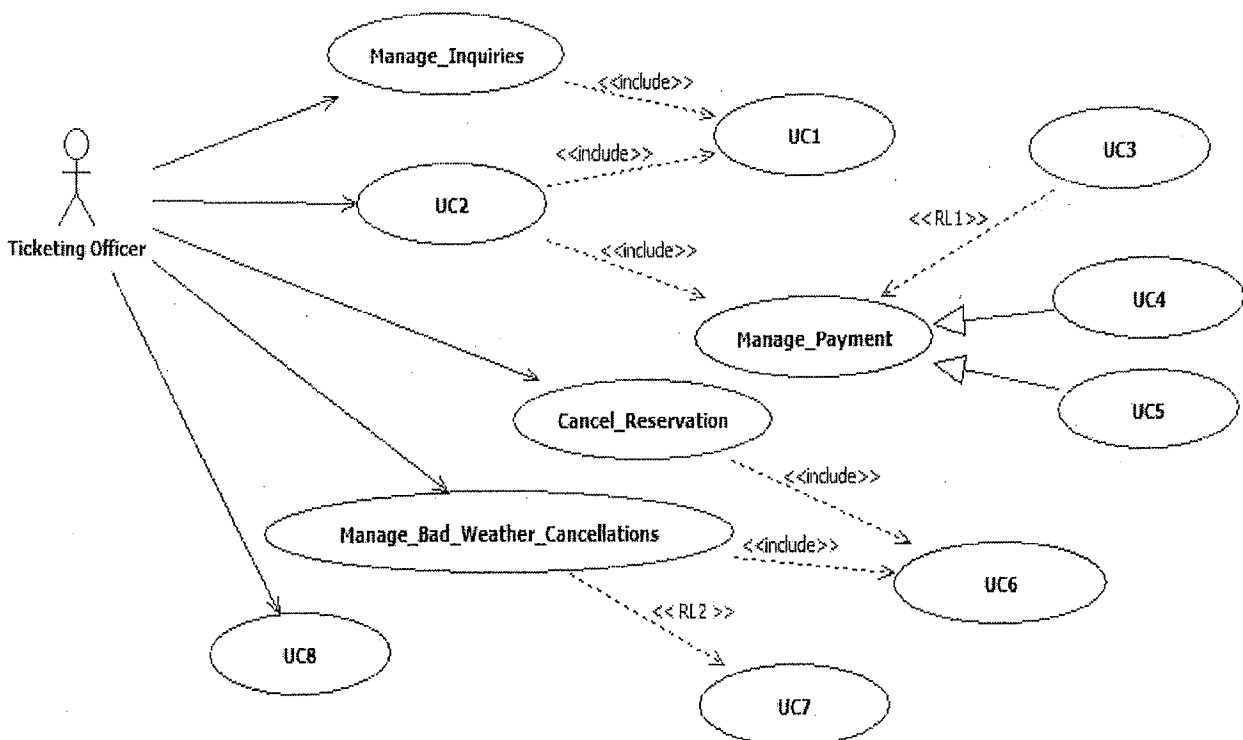
b. 'Ticketing officer' is one (01) of the actors in the given scenario. List the other actors in the above scenario.

(2 mark)

c. Consider the following use-case diagram drawn for the actor 'Ticketing officer' and the list of use-cases identified by a student for the above case study. But in the diagram some use-case names are missing. Identify the missing use-cases (UC1 - UC8) from the below list and re-draw the correct diagram.

Suggest the most suitable relationship type for <<RL1>> and <<RL2>> in the diagram.

(10 mark)



**List of use-cases**

- |                       |                       |
|-----------------------|-----------------------|
| A. Pay_by_Cash        | F. Publish_Message    |
| B. Calculate_Refund   | G. Pay_by_Credit_Card |
| C. Check_Availability | H. Collect_Daily_Cash |
| D. Send_Bill          | I. Send_Email         |
| E. Get_Discount       | J. Make_Reservation   |



2.

- a. Explain the term "Reflexive relationships" with regard to class diagrams. Give an example for that in UML notation.

(3 mark)

- b. Consider the following scenario about a supermarket.

XYZ supermarket is going to purchase a system in order to handle their transactions easily. Through this system, a customer can place several orders in the supermarket. For each order, order details need to be recorded. In one (01) order there can be several items and sometimes the same item can be appeared in more than one (01) order. Payment is associated with each and every order and the payment can be made by either through credit card, cash or cheque.

- i. What are the classes that you can identify in the given scenario?

(2 mark)

- ii. Draw the high level class diagram using the identified classes. Specify all the relationships and multiplicities related to classes and relationships.

*(Hint: It is not mandatory to mention the attributes and methods in the classes.)*

(10 mark)

3. A public library 'Ready to Read' located in Badulla, wants to implement a library management system. Following are the requirements they have given to a software development company.

The people have to register with the library in order to borrow books. Once they are registered, the library management system issues a user name to the person. When borrowing books, the user has to login to the library system. Then the user details have to be validated by the system. If the person is a valid user he can search and select books from the library by entering the book name. The availability of the books have to be checked with the library database. If the book is available, the library can issue the book and the transaction has to be reordered in the database.

Assuming that the user has successfully login to the system;

- a. Draw the activity diagram for 'borrowing a book' process.

(5 mark)

- b. Draw the sequence diagram for 'selecting a book' process.

(5 mark)