University of Swaziland

Department of Computer Science

Supplementary Examination

July 2008

Title of paper   : Software Engineering II

Course number : CS452

Time Allowed : Three(3) hours

Instructions   :

- *Each question is worth 25 marks*

- *Answer question 1*

- *Answer any three (3) questions from questions 2 to 6*

This paper may not be opened until permission has been granted by the invigilator

Question 1 and 2 are based on the following Case study
Good People Video Library Club

The Good People Video Library Club (GVLC) specializes in obscure videos that are not readily available from other sources. GVLC lends only to members of the Video Society, part of an exclusive and very desirable Good People's Club. Any member of the club is automatically a member of the library club. Club membership is for one year; a few new members are admitted on 1 January each year. New members are not admitted during the year. A club membership secretary is responsible for admitting new members and corresponding with the membership in general.

The library is set up along conventional lines, though members are not restricted as to the number of videos they may borrow at any one time. Videos are requested for return only if required by another member. Most active users of the library club regularly change their videos. Two (2) or three (3) copies of popular titles are available.

In order to borrow a video, a member selects it, takes it to the issue desk and gives the video and his club membership card to the librarian. The librarian takes the video card, from the video sleeve, and adds the membership number to the card. The librarian then places the video card into the loans file and the member leaves with the video.

When a member returns a video, he or she presents the video to the librarian. The librarian finds the video card in the loans file and places the card in the video sleeve before returning the video to the library shelves.

To reserve a video that is on loan, a member asks the librarian and leaves his/her membership number. The librarian finds the relevant video card in the loans files and adds the member's number on the reservation column on the video card. The librarian also makes a note of the member who has the video on loan and completes a return request card addressed to that member. The address is taken from the library copy of the club membership book. When the reserved video is returned, the librarian puts the video on the reservations shelf and completes a reservation ready card addressed to the first member who requested the reservation, again taking the address from the membership book.

Members make many inquiries of the librarian. Typical questions include: Is the video entitled The Gods must be crazy available? Which videos did actor Tom Cruise appear in? Do we have a video entitled Dead man walking? Do we have any videos on the subject of Human rights?

The librarian is able to answer these queries by inspecting the loans file, the actor index, the title index and subject index. In addition to the above duties, the librarian receives new videos from the social committee of the club whose chairperson is the club membership secretary. On receipt of a new video, the librarian has to make out a video card for insertion into the video sleeve and make the relevant entries into the indexes. The librarians are also responsible for house keeping: Like amending the library copy of the club membership with changes of address and, at the end of each year, collecting the new membership book from the Club membership secretary. Occasionally the librarian also takes out damaged videos and sells off very old videos to interested members or non-members.

Question 1
(Compulsory)

(a) Using UML notation, draw a USE CASE diagram for GVLC. *10 marks*

(b) Draw a sequence diagram for the scenario described in paragraph 5, describing the procedure for reserving a video. *15 marks*

Question 2

Using UML notation, draw an object-oriented (OOA) model for Good People Video Library Club (GVLC). Show suitable classes, structures, attributes, services, instance and message connections. *25 marks*

Question 3

a) *"Software design is a wicked problem"*. Briefly explain this assertion, stating whether it is true or false. *6 marks*

b) Explain/describe the meaning of the following terms

      (i)   Complexity *3 marks*

      (ii)   Complexity metric *3 marks*

c) Explain how information hiding, coupling and cohesion are inter-related design principles. *4 marks*

d) Explain how enforcing the principles of good design (information hiding, loose coupling and high cohesion) contribute towards achieving the following desirable design features

      (i) Modifiability *3 marks*

      (ii) Reusability *3 mars*

      (iii) Structural simplicity *3 marks*

Question 4

a) Explain/describe the meaning of the following terms/phrases

    (i)   Unit Testing   *1 marks*

    (ii)   Integration Testing   *1 marks*

    (iii)   System Testing   *1 marks*

b) Distinguish between an error, a fault and a failure.   *2 marks*

c) What is a test adequacy criterion?   *2 marks*

d) Briefly describe the following of test techniques.

    (i)   Coverage-based testing   *2 marks*

    (ii)   Fault-based testing   *2 marks*

    (iii)   Error-based testing   *2 marks*

e) What is a test objective? Briefly explain the three categories of test objectives.

                                                 3 marks

f) Briefly explain each of the following test techniques and state the test objective that it satisfies.

    (i)   Reading   *3 marks*

    (ii)   Inspection   *3 marks*

    (iii)   Stepwise abstraction   *3 marks*

Question 5

a) Discuss the main advantages of Object-Oriented software development methods versus traditional structured methods   *5 marks*

b) Explain/describe how the following design principles are enforced in object-oriented modeling

    (i)   Information Hiding   *3 marks*

    (ii)   Modularity   *3 marks*

c) Explain the major contribution of Object-Oriented modeling in improving the following aspects of software development.

    (i) Managing the software development process   *7 marks*

    (ii) Prototyping   *7 marks*

Question 6

(a) Explain the importance of having a well-designed user interface. *5 marks*

(b) Discuss the role of the following techniques in the design of a user interface

     (i) User profiling.   *3 marks*

     (ii) Task profiling.   *3 marks*

     (iii)Prototyping.   *4 marks*

(c) What is the major contribution of object oriented methods in the design of user-interface.   *10 marks*