

University of Swaziland

Department of Computer Science

Final Examination

2016/17

Title of Paper: Software Engineering I

Course Number: CS451

Time Allowed: Three (3) hours

Instructions: ANSWER ALL QUESTIONS

You are not allowed to open this paper until you have been told to do so by the invigilator.

Question 1

Good People Video Library Club (GVLC)

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.

a) Draw a context diagram for the GVLC. [5 marks]

b) Draw a top-level (level 1) logical data flow diagram (DFD) for GVLC.

[20 marks]

Question 2

a) What is the role and importance of proper project planning in software development? [9 marks]

b) Consider the following project schedule.

Task	Duration (weeks)	Dependency
T1	4	NONE
T2	3	T1
T3	2	T1
T4	4	T2
T5	4	T2
T6	2	T2
T7	2	T3
T8	6	T4, T5
T9	8	T5, T6
T10	4	T7
T11	1	T8, T9
T12	2	T10, T11
T13	2	T12
T14	2	T13
T15	1	T13

- i) Draw the PERT diagram for the above project. [10 marks]
- ii) Assuming that all tasks are completed in the allocated time, what is the earliest completion time (ECT) for this project? [3 marks]
- iii) How will the project be affected if T3 is delayed until week 14? [3 marks]

Question 3

- a) Draw a decision table and a decision tree for the following commission policy problem and explain which method is most appropriate for this problem. [15 marks]

Shady Dealers operate a graded commission policy for its sales staff. The company makes rough distinction between items selling at or more than E10000 and items selling at under E10000. Items at least E10000 are subjected to a commission of 16% if more than 500 items are sold and the salesperson's salary is below E12000. Salaries in the region E12000 to E20000 gain 14% and salaries above E20000 gain 12% commission. If less than 500 items are sold then the commission is 8%, 7% and 6% for the same classification of sales staff as above. For items having a value under E10000 the situation changes. Sales over 1000 items gain a 12% commission for salesperson on salaries under E12000. Those on E12000 to E20000 salaries get 11% and those above E20000 get 8% commission. Under 1000 items gain 6%, 5% and 4% respectively.

- b) Discuss the waterfall model, giving its advantages and disadvantages. [5 marks]
- c) Discuss the sequential model, giving its advantages and disadvantages. [5 marks]

Question 4

- a) Develop an Entity-Relationship Model for Good People's Video Library Club (GVLC) (see GVLC description in question 1, Section A) [9 marks]
- b) What is the general purpose of normalizing data stores? [2 marks]

c) A company sells its kitchenware products by means of a team of salespersons who organize kitchenware parties in their customer's houses. Products are supplied to customers from the nearest warehouse. A salesperson may have several warehouses in their sales area. The company keeps records of the total value of sales for each salesperson. For example

Salesperson #: 245

Name: Gule

Telephone: 55100

Sales Area: Manzini

Customer #	Customer Name	Warehouse Number	Warehouse Location	Total Sales
101456	Mamba	12	Matsapa	5000
256366	Zulu	26	Siteki	300.13

Describe this data in un-normalized form, first normal form, second normal form and in third normal form tables. [14 marks]
