MULUNGUSHI UNIVERSITY

Pursing the frontiers of knowledge

School of Science Engineering and Technology

ICT 271 Databases

Final Exam Paper

April 2016

Duration: 3 hours

INSTRUCTIONS

You MUST ALL Questions
Write your Student Number and NRC# on the answer sheet

Section A

Question 1

(a) Describe Conceptual and Logical Modelling Phases. Your description should be very detailed and must include concepts used as well as activities carried out in each of phases. **[10 marks]**

(b) Read the following case study, which describes the data requirements for a video rental company. The video rental company has several branches throughout the USA. The data held on each branch is the branch address made up of street, city, state, and zip code, and the telephone number. Each branch is given a branch number, which is unique throughout the company. Each branch is allocated staff, which includes a Manager. The Manager is responsible for the day-to-day running of a given branch. The data held on a member of staff is his or her name, position, and salary. Each member of staff is given a staff number, which is unique throughout the company. Each branch has a stock of videos. The data held on a video is the catalog number, video number, title, category, daily rental, cost, status, and the names of the main actors and the director. The catalog number uniquely identifies each video. However, in most cases, there are several copies of each video at a branch, and the individual copies are identified using the video number. A video is given a category such as Action, Adult, Children, Drama, Horror, or Sci-Fi. The status indicates whether a specific copy of a video is available for rent. Before hiring a video from the company, a customer must first register as a member of a local branch. The data held on a member is the first and last name, address, and the date that the member registered at a branch. Each member is given a member number, which is unique throughout all branches of the company. Once registered, a member is free to rent videos, up to a maximum of ten at any one time. The data held on each video rented is the rental number, the full name and number of the member, the video number, title, and daily rental, and the dates the video is rented out and returned. The rental number is unique throughout the company.

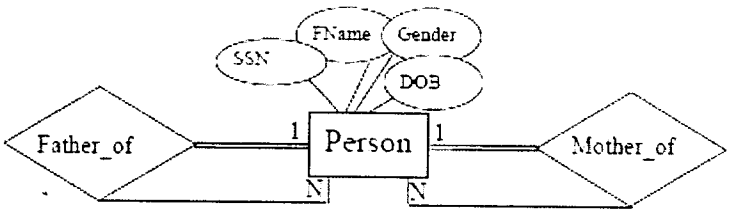
Task :

a) Draw the ERD **[15 Marks]**

b) Derive the Relational Schema **[15 Marks]**

Question 2

a) The ERD below represents a simple family model where a record of a person and his father and mother is stored. A person is allocated a unique social security number (SSN), his/her full name (FName), Gender, Date of Birth (DoB),and a unique identifier of his/her father and his//her mother. A person may have children but must have a father and a mother.



(i)Map the above ERD to a Relational Schema.Do not add additional attributes to the list. Underline the primary key and identify any foreign keys by drawing an arrow from each foreign key pointing to the referenced primary key. Do not add any additional attributes. **[8 marks]**

(ii) Modify the diagram to present a marriage scenario. A person may marry one person of the other opposite sex at one time. For each person a record of the marital status must be maintained. These include Single, Married, Divorced, or a Widowed. A widow is single person whose spouse has deceased. A person with a married status cannot marry again until he/she gets a divorce. Historical records of previous marriages or divorces must be maintained by recording the

relevant date (e.g. one can retrieve partners' identities and date of previous marriages of any given person). Reproduce the diagram above to include this scenario.**[6 marks]**

(iii) Map your diagram into a relational schema. Underline the primary key and identify any foreign keys by drawing an arrow from each foreign key pointing to the referenced primary key. Do not add any additional attributes. **[6 marks]**
(b) Describe the three level ANSI SPARC architecture **[10 marks]**

Questions 3

Keeping and maintaining data electronically becomes an essential factor to the success for even small business ventures. However, small business often faces the dilemma of either:
(i) building a simple file system using a spreadsheet tool such as Microsoft Excel
or
(ii) building a database using affordable and relatively easy to use DBMS such as Microsoft Access.
Write a report comparing and contrasting the above two options. Your discussion should give a high-level overview of how various factors influence your choice between using the different tools. In your answer, give relevant examples using suitable applications to support your argument for each the above options.
[30 marks]

The End