DUBLIN INSTITUTE OF TECHNOLOGY

DT265A/1 Higher Diploma in Computing

DT265C/1 Masters Qualifier for MSc in Computing

DT8900/1 International Pre Masters for MSc in Computing

WINTER EXAMINATIONS 2017/2018

INFORMATION SYSTEMS [CMPU4061]

MS. CINDY LIU
DR. DEIRDRE LILLIS
DR. MICHAEL O' MAHONY

WEDNESDAY 17TH JANUARY 2.00 P.M. – 4.00 P.M.

TWO HOURS

INSTRUCTIONS TO CANDIDATES

ANSWER **TWO** QUESTIONS OUT OF **THREE.**

ALL QUESTIONS CARRY EQUAL MARK

1. (a) A travel company provides a selection of Hotels that prospective customers can reserve prior to booking a room. A customer can select from a range of Accommodation Types that each hotel offers to suit their requirements. Details of the accommodation type include the catering facilities either Self Catering (SC); Half Board (HB); Full Board (FB). The bed type either Twin bed (T); Double bed (D); Suite (S). The price of the hotel is determined by the hotel and the type of accommodation offered. A Customer can reserve accommodation at a hotel possibly on different dates.

Assume that

- Each hotel is identified by a hotel code.
- The accommodation type is identified by a unique accommodation type code.

Using the details given in the above statement:

i. Create an Entity – Relationship (ER) diagram (Diamond notation) to represent the company data requirements described above. State any assumptions you made when creating the ER diagram. Be sure to include attributes as part of your ER design.

(15 Marks)

ii. Convert your Diamond notation diagram into a Crows feet notation diagram.

(15 Marks)

iii. Write SQL statements to create the tables for each entity

(10 Marks)

(b) *Entity Relational Diagrams* (ERDs) and *Database Normalisation* are two distinct approaches to database design. How in your opinion are they similar and how do they differ?

(10 Marks)

2. **(a)** Suppose we have the following relational schema

Person(pid:integer, name:string, street:string, postcode:string)

Car(cid:integer, year:integer, model:string)

OwnedBy(pid:integer, cid:integer)

AccidentReport(rid:integer, damage:integer, details:string)

ParticipatedIn(pid:integer, rid:integer, cid:integer)

The underlined attributes represent the primary keys of the associated relation. The table OwnedBy implements a relationship between persons and cars using foreign keys. The table ParticipatedIn implements a relationship between persons, accident reports, and cars, where tuple (p, r, c) indicates that the person p was the driver of the car c associated with the accident report r.

(i) Write a SQL query to return those pid's of persons driving in at least one accident, with no duplicates.

(5 marks)

(ii) Write a SQL query to return all tuples (rid, c), where c is the number of drivers involved in the accident reported in by rid (records where c = 0 do not have to be generated).

(5 marks)

(iii) Write a SQL query to return all tuples (rid, c), where c is the number of cars involved in the accident reported in by rid (records where c = 0 do not have to be generated).

(5 marks)

(iv) Do the functional dependencies implied by the schema imply that the results of queries (ii) and (iii) will always be the same? Explain.

(5 marks)

(v) Perhaps there is something wrong with this schema. How would you fix the schema to ensure that results of queries (ii) and (iii) would always be the same?

(5 marks)

(b) Explain the three phases involved in the development of the "Lifecycle of an Information System". Illustrate your answer with appropriate diagrams.

(15 Marks)

(c) List the *five* classes of DB users, and give a simple explanation of their roles.

(10 Marks)

3 **(a)** *Data*, *Information* and *Knowledge* are frequently used terms in relation to databases. Define each term and identify the relationships of these three terms. Provide two examples of each of the terms.

How do databases add "semantic richness" to data?

(20 Marks)

(b) *"In the near future, the availability of facial recognition software will be an access key to the databases of many organisations worldwide."*

In the context of MIS, discuss the above statement and assess its implications for business, governments and society in general.

(20 Marks)

(c) There are THREE main characteristics of information: Relevant, Timely and Accurate. Please discuss the nature and importance of these characteristics.

(10 Marks)