14/1/2019

14.00 - 16.00pm

Basement 1, Kevin Street

DUBLIN INSTITUTE OF TECHNOLOGY

DT265A/1 Higher Diploma in Computing

DT265C/1Masters Qualifier for MSc in Computing

DT8900/1 International Pre Masters for MSc in Computing

WINTER EXAMINATIONS 2018/2019

INFORMATION SYSTEMS [CMPU4061]

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

DATE & TIME TBA

TWO HOURS

MONDAY 14TH JANUARY 2.00 P.M. – 4.00 P.M.

INSTRUCTIONS TO CANDIDATES

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

ALL QUESTIONS CARRY EQUAL MARKS.

1. (a) The requirements collection and analysis phase of a database design process has provided the following data requirements for a company called Cars for Hire, which rents out vehicles (cars and vans). The Company has various outlets (garage/offices) throughout the city. Each outlet has a number, address, phone number and fax number.

Each outlet is allocated a stock of vehicles for hire; however, individual vehicles may be moved between outlets, as required. Only the current location for each vehicle is stored. The registration number uniquely identifies each vehicle for hire and is used when hiring a vehicle to a client. Each individual hire agreement between a client and the Company is uniquely identified using a hire number. Information stored on the vehicles for hire includes: the vehicle registration number, model, engine size, capacity, current mileage, daily hire rate, and the current location (outlet) of each vehicle.

The data stored on a hire agreement includes the hire number, the client's number, name, address and phone number, date the client started the hire period, date the client wishes to terminate the hire period, the vehicle registration number, model and make, the mileage before and after the hire period. After each hire a member of staff checks the vehicle and notes any fault(s).

The data stored on clients includes the client number, name (of the person), address, phone number, date of birth and driving licence number. The client number uniquely identifies each client and the information stored relates to all clients who have hired in the past and those currently hiring a vehicle.

Information that is stored on the staff based at various outlets includes: staff number, name (first and last name), home address, date of birth (DOB), sex, PPS number, job title and salary. Each staff member is associated with a single outlet but may be moved to an alternative outlet as required, although only the current location for each member of staff is stored

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) Describe the relevant factors needed to be examined when choosing a DBMS.

(10 Marks)

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

Tables

Tour (TourId, TourName, TourPrice, TourStartTime, GuideId)
foreign key (GuideId) references Guide(GuideId)

TourLocations (TourId, LocationName)
foreign key (TourId) references Tour (TourId)
foreign key (LocationName) references Location (LocationName)

Location (LocationName)
Guide (GuideId, GivenName, FamilyName, MobileNo)

The underlined attributes represent the primary keys of the associated relation.

Write SQL queries to answer the information requests:

(i) All tour names and tour prices in ascending order of tour name.

(5 marks)

(ii) For each tour, display tour name and location names. Display the results in ascending order of tour name and location name.

(5 marks)

(iii) Display the details of tour(s) in which more than one location is being visited. Display tour name and the number of locations visited in each of those tours.

(5 marks)

(iv) Display location name(s) which contain(s) the word "caves".

(5 marks)

(v) List the details of tour guides who have been not allocated any tours.

(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) Explain the terms candidate key, primary key and foreign key with suitable examples.

(10 Marks)

3 **(a)** A medium-size company with small branches in Dublin and New York is determining the best way to manage its customer and sales data requirements. Both sites have local customers with whom they will be generating sales. The Chief Technology Officer (CTO) for the organisation is assessing the following options:

(i) Local file storage of customer and sales data at each site.
(ii) Local database of customer and sales data at each site.
(iii) Central database of customer and sales data at one of the sites, holding data from both sites.
(iv) Outsourcing of data management to the cloud (i.e. a third party)

Discuss the points that the CTO may raise both for and against each of the above choices.

(20 Marks)

(b) Data stored in a public cloud is often seen as one way small businesses can afford current technology. Discuss the advantages and disadvantages of a small business using a cloud database.

(20 Marks)

(c) There are THREE main characteristics of information: Relevance, Timeliness and Accuracy. Please discuss the nature and importance of these characteristics.

(10 Marks)