

W265/104C, W265B/104C, W8900/104C



DUBLIN INSTITUTE OF TECHNOLOGY

DT265 Higher Diploma in Computing

DT265B Masters Qualifier for MSc in Computing

DT8900 International Pre Masters for MSc in Computing

WINTER EXAMINATIONS 2015/2016

INFORMATION SYSTEMS [CMPU4061]

[DT265, DT265B, DT8900-CF]

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TUESDAY 12TH JANUARY

1.00 P.M. – 3.00 P.M.

TWO HOURS

Answer *two* questions.

All questions carry equal marks.

1. 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 site 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 car hire 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.
(20 Marks)
- II. Convert your Diamond notation diagram into a Crows feet notation diagram.
(20 Marks)
- III. Write SQL statements to create the tables for each entity
(10 Marks)

2. (a) *Data*, *Information* and *Knowledge* are frequently used terms in relation to databases.

I. Define each term and identify the relationships of these three terms. Provide two examples to each of the terms.

II. How do databases add "semantic richness" to data?

(20 Marks)

(b) Discuss the strengths and limitations of the *relational data model*.

(20 Marks)

(c) Draw a diagram that represents a *system*, then comment on each of the activities associated with a system.

(10 Marks)

3. (a) A school has primary pupils, secondary pupils and teachers. Each teacher has a permanent classroom with unique number. Each primary pupil is taught by a single teacher, where each secondary pupil is taught by number of teachers. A unique exam code is allocated to each secondary pupil.

I. List the set of relations based on the description.

(10 marks)

II. Write a query in SQL to find the exam code of secondary pupil John Smith who is taught by David Copperfield.

(5 marks)

III. Write a query in SQL to find names of Primary teacher whose classroom number is greater than 200.

(5 marks)

IV. Write the query in SQL to find all details of primary pupils who have lessons in classroom 103 and age over ten.

(5 marks)

(b) Compare the terms, 'data', 'information' and 'knowledge'. Show how these are positioned on an *Information Pyramid*.

(10 Marks)

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

(15 Marks)