

UNIVERSITY OF BOLTON

**SCHOOL OF BUSINESS & CREATIVE
TECHNOLOGIES**

MSc INFORMATION TECHNOLOGY

SEMESTER 2 EXAMINATION 2009/2010

MODERN DATABASE SYSTEMS

MODULE NO: MIT4100

Date: Wednesday 2nd June 2010

Time: 10.00 am – 12.00 pm

INSTRUCTIONS TO CANDIDATES:

There are SIX questions

Answer FOUR questions

Calculators may be used for
this examination.

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Question 1

The table below shows the results, stored in a database, from a viral marketing campaign of a social networking site.

Number	Age	Number of friends	Average visits / day	Responded ?
1	17	27	6	No
2	14	41	8	No
3	52	28	3	No
4	27	31	4	No
5	29	11	2	Yes
6	32	16	3	Yes
7	57	7	2	No
8	18	21	11	No
9	12	14	3	Yes
10	21	6	1	Yes

- (a) Using the table above, and the Euclidean Square Distance, (ESD), formulae given below, calculate the expected classification response for a 47 year old person with 6 friends and 3 average visits / day, using the k-nearest neighbour algorithm. Use k=1 and k=3. [14 marks]

$$ESD(x, y) = \sum_{a=1}^{a=n} (x_a - y_a)^2$$

where a = attribute value and n = number of attributes
 and x is a stored instance and y the instance to be checked.

- (b) Explain, with the aid of a diagram, why opposite classifications / responses can be output, for different k values used within the k-nearest neighbour algorithm. [6 marks]
- (c) How could the above calculation be amended so that each attribute has equal weighting for the ESD calculation? [5 marks]

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Question 2

Compare and contrast performance management issues related to operational database systems and data warehouses. [25 marks]

Question 3

Discuss why many companies have chosen to build data marts rather than company-wide data warehouses. [25 marks]

Question 4

“Multimedia databases will become important for most businesses over the next decade.”

Discuss this statement in relation to current database technologies. [25 marks]

Question 5

“Exchanging data between database systems is best achieved using the same database management systems.”

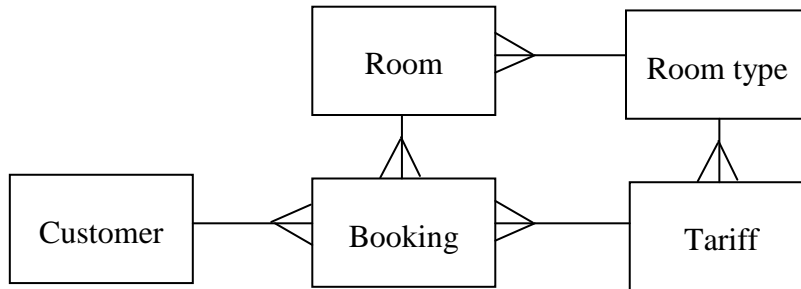
Discuss this statement with particular regard to Business to Business, (B2B), data exchange. [25 marks]

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Question 6

A Hotel booking system has a simplified Entity-Relationship Diagram, (ERD), and entity model as shown below.

Simplified ERD model for a hotel booking system.



The entity types in the E-R model are as follows: -

Customer(CustNum, name, addr1, addr2, addr3, postCode, county, telNum, email, creditCard);
 Room(roomNum, floor, wing, roomType);
 RoomType(roomType, numOfBeds, facilities);
 Tariff(tarrifNum, roomPricePerDay, roomType);
 Booking(bookingNum, custNum, roomNum, numStaying, startDate, endDate, totalCost, paymentMethod, paid);

The directors of a Hotel business wish to answer tactical / strategic questions relating to their business, such as finding:

- the most valuable customers;
- the location(s) of the best customers;
- the most / least popular room type;
- the most / least used tariffs;
- the most / least popular weeks / months.

(a) A data mart / warehouse is to be created, from the operational system, for such tactical / strategic questions to be answered. Using a Star schema approach, identify with reasons, potential facts and dimensions.

[6 marks]

(b) Draw an ERD, (star schema), for the data mart / warehouse, and give details of the entities, and their attributes, that would be stored in the data mart / warehouse, including primary and foreign keys.

[10 marks]

Question 6 continued over page

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Question 6 continued

- (c) Suggest additional attributes / tables that could prove useful for the data mart / warehouse. [4 marks]
- (d) Outline how such a data mart / warehouse could be initially populated and updated. [5 marks]

END OF QUESTIONS