# UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2004/2005

October 2004

## CIT503 - Databases and E-Commerce Rapid Application Development

Duration : 2 hours

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**INSTRUCTION TO CANDIDATES:**

• Please ensure that this examination paper contains **FOUR** questions in **FIVE** printed pages before you start the examination.

• Answer any **THREE** questions.

• You can choose to answer either in Bahasa Malaysia or English.

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ENGLISH VERSION OF THE QUESTION PAPER

1.  (a)  Compare and contrast hierarchical model and the network model.

(25 marks)

(b)  Discuss the importance of data modeling.

(15 marks)

(c)  Describe the basic features of the relational data model, and discuss their importance to the end user and the designer.

(20 marks)

(d)  This question is based on the following information:

- Manufacturers have a name, which we may assume is unique, an address, and a phone number.

- Products have a model number and a type (e.g., "television set"). Each product is made by one manufacturer, and different manufacturers may have different products with the same model number. However, you may assume that no manufacturer would have two products with the same model number.

- Customers are identified by their unique Identity Card number. They have email addresses and physical addresses. Several customers may live at the same (physical) address, but we assume that no two customers have the same email.

- An order has a unique order number, and a date. An order is placed by one customer. For each order, there are one or more products ordered, and there is a quantity for each product on the order.

Draw an ER diagram that represents the above information. Indicate keys by underlining.

(30 marks)

(e)  Explain the differences between internal model and external model.

(10 marks)

2. (a) Why are entity integrity and referential integrity important in a database?

(10 marks)

(b) Suppose a student registration database has a table for student grades:

Grades: (studentId, lastName, firstName, courseId, courseTitle, sectionNumber, semester, numHours, meetingTime, meetingRoom, grade)

(i) Give a sample table for the Grades schema that shows redundancy.

(5 marks)

(ii) Identify appropriate functional dependencies for the Grades schema.

(15 marks)

(iii) Identify and remove any 3NF violations resulting from 2(b)(ii). Show the resulting schemas and tables.

(20 marks)

(c) Describe the **three (3)** most common concurrent transaction execution problems. Explain how concurrency control can be used to avoid such problems.

(25 marks)

(d) Discuss the distinction between centralized and decentralized conceptual database design.

(25 marks)

3. (a) Explain how the GROUP BY clause works. What is the difference between the WHERE and HAVING clauses?

(15 marks)

(b) What is embedded SQL and how is it used?

(15 marks)

(c)   This question revolves around the following two relations:

Articles (<u>ID</u>, datewritten, headline, author, text)
Keywords(<u>ID</u>, <u>keyword</u>)

The intent of the first is that each tuple represents a news article: a unique ID for that article, the day written, the headline of the article, the author, and the text of the article.  The second relation gives zero or more keywords for each article.

(i)   If we declare a schema for Articles, we might want to enforce the constraint that {datewritten, author} → {ID}; that is, no one can write more than one article in one day.  Show how to write this constraint in SQL as a tuple-based check.

(15 marks)

(ii)   Find the headlines of articles for which "Arafat" is a keyword.  Write in SQL.

(15 marks)

(iii)   Print a table giving, for each author and for each keyword of three or more of that author's articles, the earliest date written among this set of articles (i.e., the set of articles by this author and with this keyword).  Write in SQL.

(15 marks)

(iv)   Modify the Articles relation so that any article with a NULL text is given the headline of that article as its text.  Write in SQL.

(15 marks)

(v)   Find the IDs of articles in which "Pol pot" appears somewhere in the text field, write in SQL.

(10 marks)

4.   (a)   What does the statement "the Web is a stateless system" mean?  What implications does a stateless system have for database applications developers?

(20 marks)

(b)   What is XML and why it is important?

(15 marks)

(c)   Define and contrast B2B and B2C e-commerce styles.

(20 marks)

(d)  Discuss what issues must be addressed by Web-to-database interfaces in terms of data-types, security, data-based transaction management, and denormalization of database tables.

(30 marks)

(e)  What is Web application server and how does it work from a database perspective?

(15 marks)

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