UNIVERSITY OF BOLTON

WESTERN INTERNATIONAL COLLEGE FZE

BSc (HONS) COMPUTING

SEMESTER ONE EXAMINATION 2018/2019

ADVANCED DATABASE SYSTEMS

MODULE NO: CPU6007

Date: Saturday 12th January 2019   Time: 2:00 PM – 4:00 PM

INSTRUCTIONS TO CANDIDATES:

There are **FIVE** questions on this paper.

Answer ANY FOUR questions.

All questions carry equal marks.

Marks for parts of questions are shown in brackets.

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Question 1.

KLTP Foods is a company which produces bread, cookies and cakes as products with production centre in Sharjah, UAE. These products are sold out through retail outlets all over the world. They have sales centres at UAE, India, UK and Germany. Now, the CEO of the company needs sales information as reports. Sales reports need to be generated based on number of items sold and income in each region for each product with time.

    a. Find the dimensions of data warehouse for given problem statement and justify the same.

(4 marks)

    b. Use the four-step dimensional modelling process to design a star schema for the data warehouse. So that the Star schema developed will help the higher management to generate the sales report and make decisions.

(9 marks)

    c. Draw the data cube for the KLTP foods with description.

(6 marks)

    d. Demonstrate the Roll-up and Drill-down operations for the KLTP Foods data warehouse.

(6 marks)

Total 25 marks

Question 2.
    a. Analyse the ETL process of data warehouse. (7 marks)
    b. Compare and contrast OLTP and OLAP. (8 marks)
    c. Critically analyse four data mining operations with examples. (10 marks)

Total 25 marks

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Question 3.

Fredsta Construction Company is a civil construction company located in UAE.

a. The HR department needs to keep track of the company's employees efficiently to reduce retention. So, write a trigger for the Employee table when the resigned employees' record is deleted from the Employee table then add the detail to Old_Employee table with Empid, designation and salary from the Employee table. Also, they want to track the updations based on designation for employees. When there is a change in designation for an employee, their details need to be added to Change_Employee table with the Empid, old_designation, new_designation and dateofChange as attributes.

(9 marks)

b. Compare and contrast horizontal and Vertical Fragmentation of distributed database with a suitable example of Fredsta Employee table.

(8 marks)

c. The CEO of Fredsta construction company heard about advancement in Object Oriented technology and wants to know more about OODBMS for future enhancement of their database. Hence, discuss about OODBMS and its features.

(8 marks)

Total 25 Marks

Question 4.

a. The integrity of database transactions must be maintained in a highly concurrent multi-user online transaction processing environment. For a database transaction (such as bank account transfer to another bank account), how the A.C.I.D. properties of database transactions assist in database integrity.

(9 marks)

b. Database management systems have to make provision to recover from situations such as system crashes.

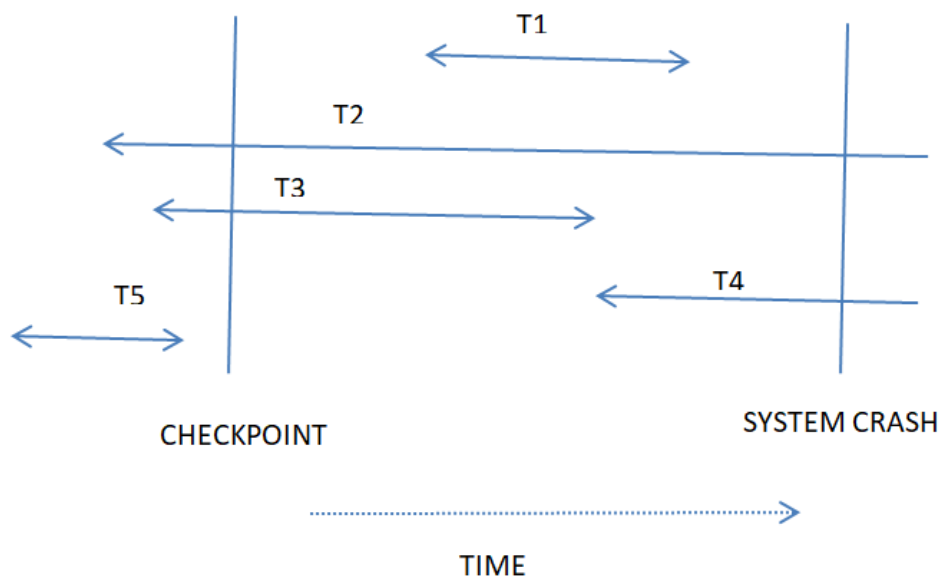(i)   How a log file in a database helps for database recovery.

(2 marks)

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Question 4 continued.

(ii) Consider the following series of transactions (T1 – T5), which you may assume took place based on time. The arrowheads represent the start and end points of the transactions. For each transaction, explain how the recovery process deals with that transaction using the deferred update recovery and immediate update recovery protocol with description.

(10 marks)

(iii) Critically analyse differential and Incremental backup

(4 marks)

Total 25 Marks

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Question 5.

a. State the purpose of two-phase commit protocol and discuss the two phases of the protocol.

(4 marks)

b. Differentiate between a shared and an exclusive lock and give an example depicting how they are used.

(2 marks)

c. With the aid of a suitable example, describe serializability in schedules.

(5 marks)

d. With the aid of a suitable example, describe the uncommitted dependency (dirty read) problem and recommend a solution.

(8 marks)

e. A major problem for locking mechanism is the issue of Deadlock. Give an example of deadlock occurring in two transactions T3 and T4. Describe a range of techniques that can be used to reduce the impact of deadlocks in a highly concurrent system.

(6 marks)

Total 25 marks

END OF QUESTIONS