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University Examinations 2013/2014

FOURTH YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE IN BACHELOR OF
COMPUTER SCIENCE

ICS 2415 – ADVANCED DATABASE SYSTEMS

DATE: APRIL 2014

TIME: 2 HOURS

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE – 30 MARKS

- (a) Discuss any four challenges encountered in development of commercial database. Briefly outline how most of the challenges can be tackled. (8 marks)
- (b) Study the following scenario and answer questions that follow

The department of Mathematics and Computer Sciences of BIDII COLLEGE has a set of courses provided for the undergraduate level. For each course a well defined set of admission criteria is specified; for instance, for the “Computer Science” course, 3 A-levels are required, minimum B for each, an A level in Mathematics being compulsory. Each course has a name and duration; certain courses can allow industrial placements. Each course consists of a set of modules, some compulsory and some optional. A certain module is described by its name, a short syllabus, type (lectured, seminar-like, project) and year of study for which it was intended. Each student enrolled with the department, is registered for one particular course. The student must attend the compulsory modules. For every year of study, from the set of optional modules, the student must attend a certain number which is specified in the course’s description. Each module is taught by a single lecturer. However, there might be modules, from the optional ones, that are taught by a single lecturer.

However, there might be modules, from the optional ones, that are not taught at all (for instance, because no students have actually registered for them). There also can exist lecturers who do not teach at all, being only involved in research. Contact information (address, telephone,..)Plus personal details (date of birth, male/female...) is needed for both lecturers and students.

- (i) Develop and ER diagram for the college (8 marks)
- (ii) Write SQL statement to create course table (2 marks)
- (iii) Write SQL command to display all student courses and will proceed for industrial attachment. (4 marks)
- (iv) Suppose various courses are offered at different campuses. Discuss how data will be
 - Distributed (4 marks)
 - Secured (4 marks)

QUESTION TWO –20 MARKS

- (a) Define the relational model. What is a relational database management system? (4 marks)
- (b) Explain the two types of program-data independence on the basis of the three levels ANSI/SPARC architecture of a database system. (4 marks)
- (c) Describe one of the possible problems generated by concurrent access to the same data(the lost update problem, the uncommitted dependency problem, the inconsistent analysis problem) and illustrates how the problem can be resolved by using the locking mechanism. (6 marks)
- (d) Differentiate between data warehousing and data mining? (6 marks)

QUESTION THREE – 20MARKS

- (a) List advantages of object oriented database as compared to relational databases. (4 marks)
- (b) What is OLAP? Who uses OLAP? (4 marks)
- (c) A well established bank in Kenya wishes to migrate to a distributed database. As an expert in databases explain to the institution aspect of distributed database using the following format:
 - i. Advantages and disadvantages of distributed databases (4 marks)
 - ii. How to distribute and secure the database (4 marks)
 - iii. Hardware and software requirements for a distributed database (4 marks)

QUESTION FOUR – 20MARKS

- (a) Discuss any four mechanisms for ensuring continuous availability of distributed database in an insecure multi user environment. (8 marks)
- (b) Using the narrative in question 1 (b) above design a relational database for BIDII COLLEGE (12 marks)

QUESTION FIVE – 20MARKS

- (a) Briefly outline main role of database administrator. (4 marks)
- (b) Discuss any two tools used by database administrator to perform above roles. (4 marks)
- (c) Using the narrative in question 1(b) above design an object oriented database for BIDII COLLEGE (12 marks)