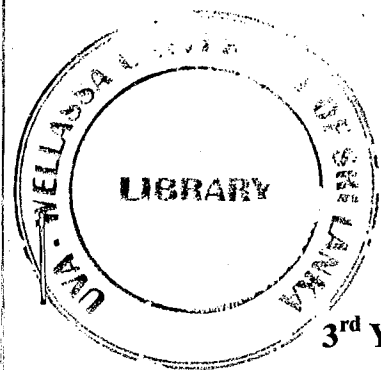




Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Science and Technology Degree Program



Uva Wellassa
University

3rd Year 2nd Semester Examination – August/September 2014

SCT 375-2 Database Management Systems

Number of questions: Four (04)

Answer all questions

Time allocation: Two (02) hours

Total mark: 100

1.

- a. What are the main characteristics of the database approach when comparing with the file processing approach? (4 mark)
- b. List four (4) actors behind the Databases Management Systems? (4 mark)
- c. State four (4) advantages of the Database Management System approach. (4 mark)
- d. Explain the Three-Schema Architecture using a diagram. (4 mark)
- e. List five (5) DBMS Interfaces with examples. (5 mark)
- f. Define Logical and Physical Data Independence. (4 mark)

2.

- a. List main three (3) categories of database constraints. (6 mark)
- b. What are the possible constraints when you insert data into the database? (4 mark)
- c. "SQL is both a Data Definition Language (DDL) and a Data Manipulation Language (DML)". Analyze above statement. (5 mark)
- d. Describe the following data types in SQL. (4 mark)
 - I. CHARACTER LARGE OBJECT or CLOB
 - II. BINARY LARGE OBJECT or BLOB
 - III. TIMESTAMP
 - IV. INTERVAL
- e. Write SQL commands to create tables called "DEPT_LOCATIONS" and "DEPENDENT" referring the following Figure 1. (6 mark)

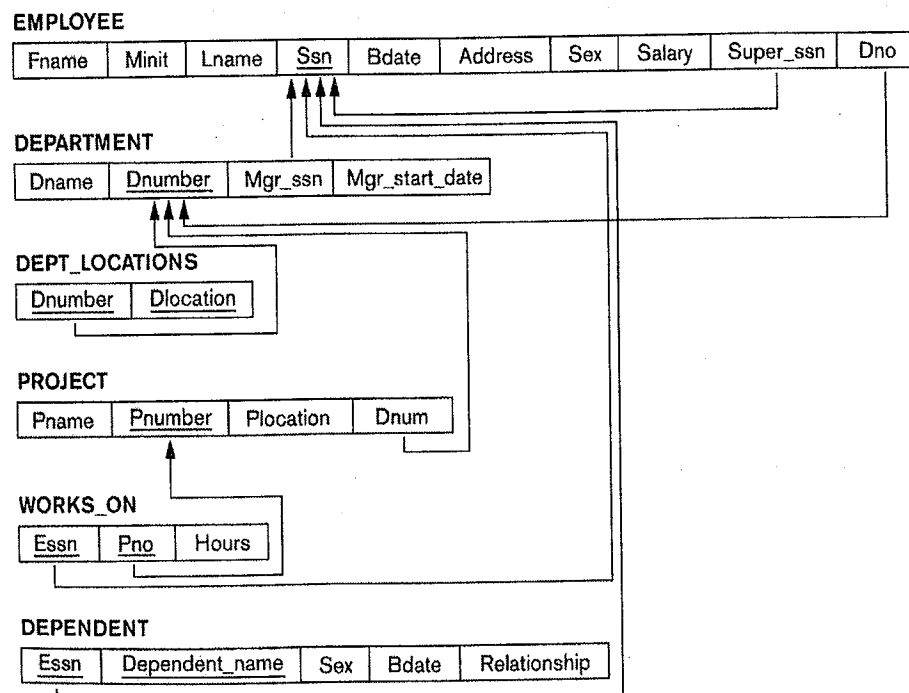


Figure 1: Company Database

3. Use the Figure 1 in question number two (2) for answer to the following questions.

a. Write the SQL queries for the following tasks.

- i. For each department, retrieve the department name, and the average salary of employees in the department. (2 mark)
- ii. Retrieve the average salary of all female employees. (2 mark)
- iii. Find the names and addresses of employees who work on at least one project located in Houston but whose department has no location in Houston.(3 mark)
- iv. List the last names of department managers who have no dependents. (3 mark)
- v. For each department whose average employee salary is greater than \$30000, retrieve the department name and the number of employees in that department. (3 mark)

b. Write relational algebra expressions for the following tasks.

- i. Retrieve the first name, last name, and salary of all employees who work in department number 5. (3 mark)
- ii. Retrieve the Social Security numbers of all employees who either work in department 5 or directly supervise an employee who works in department 5. (3 mark)
- iii. Retrieve the name of the manager of each department. (3 mark)

c. Explain the main difference between CARTESIAN PRODUCT and JOIN. (3 mark)

4.

- a. Consider the following set of requirements for a university database that is used to keep track of students' transcripts and design a ER diagram for that schema. Specify key attributes of each entity type and structural constraints on each relationship type. Note any unspecified requirements, and make appropriate assumptions to make the specification complete. (10 mark)

- i. The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, birthdate, sex, class (level 1, level 2, ..., level 4), major department, minor department (if any), and degree program (B.A., B.S., ..., Ph.D.). Some user applications need to refer to the city, province, and postal code of the student's permanent address, and to the student's last name. Both social security number and student number have unique values for each student.
- ii. Each department is described by a name, department code, office number, office phone, and college. Both name and code have unique values for each department.
- iii. Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of course number is unique for each course.
- iv. Each section has an instructor, semester, year, course, and section number. The section number distinguishes different sections of the same course that are taught during the same semester/year; its values are 1, 2, 3, ...; up to the number of sections taught during each semester.
- v. A grade report has a student, section, letter grade, and numeric grade (0, 1, 2, 3, 4 for F, D, C, B, A, respectively).

- b. List necessary steps that you follow when mapping ER schema diagram to relational database design. (7 mark)

- c. Draw a relational database schema structure corresponding to the above (in section 4.a) ER schema diagram. (8 mark)