

OLLSCOIL NA hÉIREANN, GAILLIMH
THE NATIONAL UNIVERSITY OF IRELAND, GALWAY

SEMESTER I, WINTER 2000 EXAMINATION

MASTERS DEGREE IN INFORMATION TECHNOLOGY AT THE IMI

CT511: DATABASES

Prof. D. Bell
Dr. G. Lyons
Dr. O. Molloy

Time allowed: 2 hours

Answer any three questions

All questions carry equal marks

1. (a) Describe the limitations of the file-based approach to data management and the relative advantages of the Data Base Management System approach.

(b) Describe the objectives of the 3-level (ANSI_SPARC) DBMS architecture.

(c) Describe the major components of a DBMS, explaining the functions of the different modules.
2. (a) Explain what is meant by the following terms:
 - Relation
 - Attribute
 - Domain
 - Tuple
 - Degree
 - Cardinality
(b) Describe using suitable examples what is meant by the terms “entity integrity” and “referential integrity”

[Continued]

3. A company database contains the following tables:

STAFF (staff_number, first_name, last_name, address, position, salary, department_number)

DEPARTMENTS (department_number, department_name, manager_staff_number)

Where

STAFF contains staff details and *staff_number* is the primary key. The *position* field may contain one of the values "Manager", "Assistant Manager" or "Clerical".

DEPARTMENTS contains descriptions (*department_name*) of each department and the staff number of the manager (*manager_staff_number*). The primary key is *department_number*. The *manager_staff_number* field may contain a NULL where a Manager is not currently appointed.

Formulate the following using SQL:

- a) List all staff with a salary greater than £30,000.
- b) List the staff numbers of all staff whose address contains the word "Galway".
- c) List the first name, last name and position of all staff who are either Managers or Assistant Managers
- d) List all departments (in ascending order of department name) which do not have a manager currently appointed.
- e) List the salaries for all Managers in descending order of salary.
- f) Count the number of staff whose salaries are greater than £15,000.
- g) List all the staff who work in the department "Wages"

4. (a) With respect to Entity-Relationship Modelling, discuss the following – giving examples where appropriate:

- Cardinality
- Weak entities
- Associative entities

[Continued]

(b) With respect to Enhanced Entity-Relationship Modelling, discuss the following – giving examples where appropriate:

- Partial specialisation
- Disjointness constraints (disjoint rule)
- Mapping supertype-subtype relationships to relations

5. (a) Discuss the difference between interactive SQL and embedded SQL. Use examples to illustrate your answers.

(b) Describe using examples the use of cursors in embedded SQL

(c) With respect to Distributed Databases, discuss the following:

- Data replication
- Horizontal Partitioning
- Location transparency

6. (a) Describe, using a diagram, the generic data warehouse architecture and the basic steps required in building this architecture.

(b) Discuss the role of the enterprise model in designing a data warehouse

(c) Describe, using a diagram, the three-layer data architecture for data warehousing and explain the role of metadata