

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

SEMESTER II, SUMMER 2000 EXAMINATION

**SECOND UNIVERSITY EXAMINATION IN INFORMATION
TECHNOLOGY**

CT230: DATABASE SYSTEMS I

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Time allowed: 3 hours

Answer any five questions

1. Describe the objectives of the 3-level DBMS architecture. Detail the components of a DBMS, explaining the functions of the different modules.
2. The Network Data Model and the Hierarchical Data Model are two different approaches by which a DBMS may be classified. Compare these two models, indicating the relative advantages and disadvantages of each.
3. (a) Explain what is meant by the following terms:
 - Relation
 - Attribute
 - Domain
 - Tuple
 - Degree
 - Cardinality

(b) Choose any four relational algebra operators and explain using examples how each one functions.

4. A translation company database contains the following tables:

| | |
|------------|------------------------------------|
| Translator | (trans_no, name, dept, lang_code) |
| Language | (lang_code, language, rate) |
| Project | (project_no, start_date, end_date) |
| Work_Done | (trans_no, project_no, no_pages) |

Where

| | |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Translator | contains translation staff details and trans_no is the key |
| Language | contains descriptions of language translation codes (e.g. French, German) and the translation charge rate per page for that language. Key is lang_code |
| Project | contains project details and project_no is the key |
| Work_Done | contains details of the number of pages that a translator translated for a project and the key is (trans_no, project_no) |

Formulate the following using SQL:

- List all languages with a charge rate greater than £10 per page, in alphabetical order of description.
- List all translators with the language "Czech" who work in the "Technical Translation" department.
- How many translators have the language "French" ?
- List the average translation charge rate.
- List all translators with a charge rate greater than the average charge rate.
- Create a view of translator details giving only the translator number, translator name and language code.

5. (a) Discuss the functionality and importance of Integrity Enhancement Features

(b) Given the following tables

| | |
|---------|---------------------------------------------------|
| Hotel | (Hotel_No, Name, Address) |
| Room | (Room_No, Hotel_No, Type, Price) |
| Booking | (Hotel_No, Guest_No, Date_From, Date_To, Room_No) |
| Guest | (Guest_No, Name, Address) |

Where

| | |
|---------|------------------------------------------------------------------------------------------------|
| Hotel | contains hotel details and Hotel_No is the primary key |
| Room | contains room details for each hotel and (Hotel_No, Room_No) is the primary key |
| Booking | contains details of the bookings and the primary key comprises (Hotel_No, Guest_No, Date_From) |
| Guest | contains guest details and Guest_No is the primary key |

Formulate the following using SQL:

- i. Give the users Manager and Deputy full access to Hotel and Booking with the privilege to pass the access on to others.
 - ii. Revoke the user Accounts SELECT access to the table Booking.
 - iii. Create the Hotel table using the integrity enhancement features of SQL.
 - iv. Create the Room table using Hotel_No as a foreign key such that all deletes and updates in the Hotel table are automatically reflected in the Room table. Specify that the default for type is "T".
6. (a) Discuss the advantages and disadvantages of the following file organisation methods:
 - Unordered file
 - Ordered file
 - Static hash files
 - Dynamic hash files

(b) Discuss the various techniques used to manage collisions in hash files. Use examples to illustrate your answers.
7. (a) Discuss the difference between interactive SQL, static embedded SQL and dynamic embedded SQL. Use examples to illustrate your answers.

(b) Describe using examples the use of cursors in embedded SQL.
8. (a) Describe the difference between using embedded SQL and using ODBC to access a database. What are the advantages in using ODBC?

(b) Describe using diagrams the ODBC architecture and its components.

(c) Use a simple example to show the sequence of statements used to connect to an ODBC data source and execute a SELECT statement.