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CSC-207: Database Systems

Lab # 13: 1. Database Backup & Recovery
2. Generating Schema via ER-Diagram

Objectives

- Perform a full database backup using MySQL Workbench.
- Restore a database from a backup file.
- Design an **Entity-Relationship (ER) Diagram** for a given problem statement.
- Convert the ER diagram into a **MySQL schema** with proper tables, keys, and relationships.
- Implement the schema in **MySQL Workbench**.

Lab Tasks for Backup and Recovery

Task 1: Performing a Full Database Backup (Export)

1. **Open MySQL Workbench** and connect to your MySQL server.
2. **Navigate to the "Administration"** tab in the bottom-left panel.
3. **Click on "Data Export"** under the "Management" section.
4. **Select the database(s)** you want to back up from the list.
5. **Choose export options:**
    - **Export to Self-Contained File**: Saves the entire database as a single .sql file.
    - **Dump Structure and Data**: Ensures both schema and data are included.
    - (Optional) **Export to a project folder** for better organization.
    -

6. **Click "Start Export"** and wait for the process to complete.
7. **Verify the backup file** in the specified location.

Task 2: Restoring a Database from Backup (Import)

1. **Open MySQL Workbench** and connect to your MySQL server.
2. **Navigate to the "Administration"** tab.
3. **Click on "Data Import/Restore"** under the "Management" section.
4. **Select "Import from Self-Contained File"** and browse to your backup file (.sql).
5. **Choose the target database:**
    - **New Schema**: Create a new database for the restored data.
    - **Existing Schema**: Overwrite an existing database (ensure no critical data is lost).
6. **Click "Start Import"** and wait for the process to complete.
7. **Verify the restored data** by querying tables in the SQL editor.

Lab Steps for Generating Schema

Step 1: Problem Statement Analysis

Scenario: Design a database for a **Library Management System** with:

- **Books** (ID, Title, Author, Published Year)
- **Members** (ID, Name, Email, Join Date)
- **Loans** (Loan ID, Book ID, Member ID, Due Date)

Step 2: Draw the ER Diagram

Use a tool like **draw.io** or **MySQL Workbench EER**: (Click here)

1. Goto File -> New Model and add followings:
2. **Entities**: Represented as **rectangles**.
    - Book, Member, Loan
3. **Attributes**: Listed as **ovals** connected to entities.
    - Book: book_id (PK), title, author
4. **Relationships**: Shown as **diamonds** with cardinality.
    - Member → Loan (1:M)
    - Book → Loan (1:M)

Step 3: Convert ER Diagram to MySQL Schema

Create SQL script via:

- Goto Database -> Forward Engineer.
- **Run the SQL Script**: Paste and execute the CREATE TABLE statements.

Step 5: Verify the Schema

1. **Check Tables**:

   SHOW TABLES;

2. **View Table Structure**:

   DESCRIBE Book;

   DESCRIBE Loan;

Step 6: Test with Sample Data

Insert sample records and query relationships:

```
-- Insert a Member
INSERT INTO Member (name, email) VALUES ('Alice', 'alice@example.com');

-- Insert a Book
INSERT INTO Book (title, author) VALUES ('Database 101', 'John Doe');

-- Record a Loan
INSERT INTO Loan (member_id, book_id, due_date)
VALUES (1, 1, DATE_ADD(NOW(), INTERVAL 14 DAY));

-- Query Active Loans
SELECT m.name, b.title, l.due_date
FROM Loan l
JOIN Member m ON l.member_id = m.member_id
JOIN Book b ON l.book_id = b.book_id;
```

Exercises (Class)

Add here all the tasks performed in lab.

Exercises (Weekly)

1. Write step-by-step procedure for Backup and recovery of your database (with screenshot).
2. **Design an ER diagram** for a **University Database** (Students, Courses, Enrollments).
3. **Write SQL** to create the schema.
4. **Insert sample data** and run queries.