**Md Yaseen**

**DAY 9 Assignment**

**Assignment-1:**

**Analyse a given business scenario and create an ER diagram that includes entities, relationships, attributes, and cardinality. Ensure that the diagram reflects proper normalization up to the third normal form.**

**SOLUTION:-**

Let us analyse a business scenario for an University Course Registration System:

**Entities:**

1. **Course (Course\_ID, Course\_Name, Dept\_ID, Credits)**

Attributes:

* + Course\_ID (primary key, unique identifier for a course)
  + Course\_Name (name of the course)
  + Dept\_ID (foreign key referencing the department that offers the course)
  + Credits (number of credits associated with the course)

1. **Department (Dept\_ID, Dept\_Name)**

Attributes:

* + Dept\_ID (primary key, unique identifier for a department)
  + Dept\_Name (name of the department)

1. **Student (Stud\_ID, Stud\_Name, Major)**

Attributes:

* + Stud\_ID (primary key, unique identifier for a student)
  + Stud\_Name (name of the student)
  + Major (student's major field of study)

1. **Registration (Registration\_ID, Stud\_ID, Course\_ID, Semester)**

Attributes:

* + Registration\_ID (primary key, unique identifier for a registration)
  + Stud\_ID (foreign key referencing the student enrolled in the course)
  + Course\_ID (foreign key referencing the course taken by the student)
  + Semester (semester in which the student is registered for the course)

**Relationships:**

1. **A Department offers many Courses (one-to-many)**
2. **A Student can register for many Courses (one-to-many)**
3. **A Course can have many Students registered (one-to-many)**

**Normalization (Third Normal Form):**

* The Registration entity depends on both Stud\_ID and Course\_ID, which are both part of the primary key. This satisfies the definition of 3NF.
* There are no transitive dependencies (where the value of an attribute depends on another non-key attribute) in any of the entities.

ER-Diagram for above schema design:

A diagram of a course

Description automatically generated

**Assignment-2:**

**Design a database schema for a library system, including tables, fields, and constraints like NOT NULL, UNIQUE, and CHECK. Include primary and foreign keys to establish relationships between tables.**

**SOLUTION:-**

Library System Database Schema:

**Tables and Fields:**

* **Books:** bookId (PK), title, author, publisher, yearPublished, ISBN (UNIQUE)
* **Members:** membID (PK), name, address, mobile, email (UNIQUE)
* **Borrow:** borrowID (PK), bookID (FK), membID (FK), borrowDate, returnDate
* **Authors:** authorID (PK), name, Bio
* **BookAuthors:** bookID (FK), authorID (FK)

**Constraints:**

* **NOT NULL :** Ensures necessary fields are not left empty.
* **Unique:** Ensure uniqueness where necessary.
* **CHECK:** Enforce rules (e.g., CHECK (YearPublished > 2000)).

**Assignment-3:**

**Explain the ACID properties of a transaction in your own words. Write SQL statements to simulate a transaction that includes locking and demonstrate different isolation levels to show concurrency control.**

**SOLUTION:**

**ACID Properties and Transaction Simulation**

**ACID Properties:**

* **Atomicity:** Ensures that all operations in a transaction are completed; if not, the transaction is aborted.
* **Consistency:** Ensures the database remains in a consistent state before and after the transaction.
* **Isolation:** Ensures that transactions are executed independently.
* **Durability:** Ensures that once a transaction is committed, it remains in the system even in case of a failure.

A screenshot of a computer program

Description automatically generated

A screenshot of a computer

Description automatically generated

**Assignment-4:**

**Write SQL statements to CREATE a new database and tables that reflect the library schema you designed earlier. Use ALTER statements to modify the table structures and DROP statements to remove a redundant table.**

**SOLUTION:**

**SQL Commands for Database and Table Creation.**

* **Creating Database**

**A screen shot of a computer

Description automatically generated**

* **Creating Table Books**

**A screenshot of a computer program

Description automatically generated**

* **Creating Table Members**

**A screenshot of a computer

Description automatically generated**

* **Creating Table Borrower:**

**A screenshot of a computer program

Description automatically generated**

* **Creating Table Authors:**

**A screenshot of a computer program

Description automatically generated**

* **Creating Table BookAuthors**

**A screenshot of a computer program

Description automatically generated**

* **Alter Table**

**A screenshot of a computer

Description automatically generated**

**Assignment-5:**

**Demonstrate the creation of an index on a table and discuss how it improves query performance. Use a DROP INDEX statement to remove the index and analyse the impact on query execution.**

**SOLUTION:**

**Creating and Dropping Index**

* **Creating Index**

**A screenshot of a computer

Description automatically generated**

--Query to search for employee by eid

SELECT \* FROM Employee WHERE eid = 102;

**Query without Index:**

Without an index, the database performs a full table scan to find rows where eid matches ‘eid'. This is inefficient, especially for large tables, because each row must be checked.

**Query with Index:**

With the index idx\_employee\_eid in place, the database uses the index to directly locate the rows where Title matches ‘edi'. This drastically reduces the number of rows that need to be examined and speeds up the query execution.

* **Drop Index:**

**A screen shot of a computer

Description automatically generated**

**Assignment-6:**

**Create a new database user with specific privileges using the CREATE USER and GRANT commands. Then, write a script to REVOKE certain privileges and DROP the user.**

**SOLUTION:**

**Creating and Managing Database Users**

**A screenshot of a computer screen

Description automatically generated**

**Assignment-7:**

**Prepare a series of SQL statements to INSERT new records into the library tables, UPDATE existing records with new information, and DELETE records based on specific criteria. Include BULK INSERT operations to load data from an external source.**

**SOLUTION:**

* **SQL Statements for Data Manipulation:**

**A screenshot of a computer

Description automatically generated**

* **Update Existing Records**

**A screenshot of a computer

Description automatically generated**

* **Delete Records**

**A screenshot of a computer

Description automatically generated**

* **Books.csv File**

**A screenshot of a computer

Description automatically generated**

* **Bulk Insert from a file**

**LOAD DATA LOCAL INFILE ‘C:\Users\yaseen\Desktop\Assignment\Book1.csv’ INTO TABLE Books Fields TERMINATED BY ‘,’ LINES TERMINATED BY ‘\n’ IGNORE 1 LINES;**