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20240045

Introduction to database

1.An Entity-Relationship (ER) model can be used to design a database for a library system, ensuring efficient management of books, members, and borrowing transactions. The library keeps track of books, each identified by a unique ISBN. Every book entity contains attributes such as title, author, publisher, genre, and year of publication. Books may have multiple copies, and each copy can be loaned to members. The member entity includes attributes like member ID, name, contact information, and membership type.

A borrowing relationship is established between members and books, allowing the library to track which member has borrowed a particular copy, the date of issue, and the due date. To manage fines, the system can include an attribute in the borrowing relationship that records overdue penalties. Additionally, a staff entity may be included to represent librarians, with details such as staff ID, name, and role. Librarians are responsible for issuing and returning books, linking them to the borrowing process.

This ER model helps the library organize its data, reducing redundancy, and ensure accurate records. It provides the foundation for implementing a relational database that supports day-to-day operations like searching books, managing loans, and monitoring member activity.

2.A Many-to-Many (M:N) relationship occurs when multiple entities from one set can be associated with multiple entities from another. For example, in a university database, a student can enroll in many courses, and each course can have many students. M:N relationships cannot be directly implemented in a relational database, so they are resolved using bridge entity. This new entity holds the primary keys for both related entities, converting the M:N into two 1:M relationships. This process eliminates redundancy and maintains data integrity. M:N relationships are important because they represent real-world complexity, allowing database to capture interconnected activities, such as book loans, product orders or employee projects, in a structured and efficient way.

3.Creating an E diagram in Canva helped me visualize the structure of a database before implementation. I designed entities such as Book, member, and borrowing, with their attributes and relationships. Mapping the ER diagram to tables in MySQL reinforced the importance of primary keys and foreign keys. Each entity became a table, and the relationships were represented using keys to maintain data integrity. For example, MemberID served as a foreign

key in the Borrowing table. This exercise showed how ER diagrams provide a clear blueprint, making database design more efficient and reducing errors during actual implementation.

4.I designed an ER diagram for a Library Management System using Canva. The diagram includes four main entities: Book, Members, Staff, and Borrowing. Each entity contains relevant attributes such as BookID, Title, Author for books and MemberID, Name, Contact for members. Relationships were defined as follows: a member can borrow many books, while each Book copy can only be borrowed by one Member at a time. A staff entity was linked to the Borrowing process, showing responsibility for issuing and returning books. The diagram demonstrates how entities interact to ensure smooth responsibility for issuing and returning books. The diagram demonstrates how entities interact to ensure smooth library operating.