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CSD-310

Professor Osier

Assignment 1-3

1/12/2025

**1. In the context of relational databases, what are relationships? Describe at least two, and provide an example of their use.**

In relational databases, relationships are associations between tables based on shared data. There are three main types of relationships:

1. One-to-one: Each entry in Table A is connected to a single record in Table B. For example, a "Users" database and a "UserProfiles" table could have a one-to-one relationship, with each user having just one profile.
2. One-to-Many: Each entry in Table A can be connected to several records in Table B. For example, a "Customers" database may link to a "Orders" table, allowing a single customer to place several orders.

**Source**: [Luzmo Blog - Database Relationships](https://www.luzmo.com/blog/database-relationships)

**2. What are the advantages of relational databases? What are the advantages of NoSQL databases?**

Advantages of Relational Databases:

1. Structured Data: Relational databases are extremely organized, making them suitable for structured data that fits neatly into preset schemas.
2. ACID Compliance: They give strong assurances of atomicity, consistency, isolation, and durability, resulting in dependable transactions.

Source: [LinkedIn Discussion](https://www.linkedin.com/advice/3/what-benefits-drawbacks-using-relational-database-skills-databases)

Advantages of NoSQL Databases:

1. Flexibility: NoSQL databases can manage both unstructured and semi-structured data, making them excellent for applications with a variety of data types.
2. Scalability: They are built for horizontal scaling, so they can manage huge amounts of data across distributed systems.

Source: [Adservio Blog - Pros and Cons of NoSQL](https://www.adservio.fr/post/what-are-the-pros-and-cons-of-nosql)

**3. What are the disadvantages of relational databases? What are the disadvantages of NoSQL databases?**

Disadvantages of Relational Databases:

1. Rigid Schema: Changes to the schema can be difficult and time-consuming.
2. Scalability Issues: Relational databases are less suitable to horizontal scaling than NoSQL databases.

Source: [LinkedIn Discussion](https://www.linkedin.com/advice/3/what-benefits-drawbacks-using-relational-database-skills-databases)

Disadvantages of NoSQL Databases:

1. Lack of Standardization: NoSQL databases lack a standard query language, which can make development more difficult.
2. Weaker Consistency Guarantees: NoSQL databases frequently favor scalability above consistency, which may result in eventual consistency rather than immediate accuracy.

Source: [Adservio Blog - Pros and Cons of NoSQL](https://www.adservio.fr/post/what-are-the-pros-and-cons-of-nosql)

**4. Identify at least two features of MySQL and two features of MongoDB, and describe what they are and how they are used.**

Features of MySQL:

1. Relational Schema: MySQL is a relational database with organized tables and joins, making it perfect for applications that require complicated queries.
2. ACID Compliance: It guarantees reliable transaction handling, which is important for financial and critical systems.

Source: [OpenLogic Blog - MySQL Overview](https://www.openlogic.com/blog/mysql-overview)

Features of MongoDB:

1. Document-Oriented: MongoDB stores data in JSON-like documents, enabling flexible and dynamic schemas. This is important for applications that have dynamic data structures.
2. Horizontal Scalability: It uses “sharding” to distribute data across multiple servers, helping with large-scale data storage and availability.

Source: [GeeksforGeeks - MongoDB Features](https://www.geeksforgeeks.org/what-is-mongodb-working-and-features/)