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Module 1.3 Assignment

**Basic Comparison of Relational vs. NoSQL Databases**

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

In a relational database, relationships describe how data in one table relates to data in another table. One example is a one-to-one relationship, where one attribute (record) in an entity (table) relates to one attribute in another entity. Another example is a one-to-many relationship, where one attribute in an entity relates to more than one attribute in another entity.

An example of a One-to-One relationship (1:1) would be an ‘EmployeeID’ entity and an ‘EmployeeProfile’ entity. An EmployeeID can belong to one EmployeeProfile and an EmployeeProfile can belong to one EmployeeID.

An example of a One-to-Many (1:N) relationship would be a ‘Customers’ entity and an ‘Orders’ entity. One Customer can have many Orders, but an Order can only have one Customer.

1. What are the advantages of relational databases? What are the advantages of NoSQL databases?

Some of the advantages of a relational database are that they can be designed to order related data, consistency and accuracy as the data must follow the rules of the database design, and a well-designed relational database reduces data duplication.

Some of the advantages of a NoSQL database are they are flexible as they typically don’t have a predefined schema. They have flexibility when scaling as they scale horizontally (adding more nodes, or machines) instead of vertically (improving the machine the server runs on). They are well-suited for handling large amounts of unstructured data.

1. What are the disadvantages of relational databases? What are the disadvantages of NoSQL databases?

Some of the disadvantages of relational databases are they don’t deal well with changing or unstructured data because they have a well-defined schema. Performance of large relational databases can be slow, and they can quickly become complex requiring expertise to manage that complexity.

The disadvantages of a NoSQL database is a lack of standardization meaning that each NoSQL database could have it’s own query language and require learning a new technology. The lack of structure in the schema design can lead to data consistency issues and can grow to be complex.

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

Two features of MySQL are datatypes and statement functions. Datatypes allow you to define what type of data should be stored in a specific attribute within an entity. If data of another type is added, it won’t work. Built in functions help with easy querying and data manipulation. Some of the built in functions include COUNT(), SUM(), AVG(), MIN(), and MAX().

Two features of MongoDB are Sharding and Replication. Sharding is how it scales horizontally, allowing large databases to be split up into ‘shards’ and distributed across different computers. Replication means that instead of the data being stored on one server, which has risks of data loss and service disruption, the data can easily be replicated across multiple servers for backup and scaling.

Sources:

* <https://dsstream.com/what-is-a-relational-database/>
* <https://www.adservio.fr/post/what-are-the-pros-and-cons-of-nosql#:~:text=The%20top%20advantages%20of%20NoSQL,less%20mature%2C%20less%20flexible%20queries.&text=Queries%20are%20less%20flexible>.
* MySQL Explained textbook
* <https://dev.mysql.com/doc/refman/8.0/en/features.html>
* <https://www.mongodb.com/resources/products/capabilities/features>