CSD310

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Basic Comparison of Relational vs. NoSQL Databases

In the context of relational databases, what are relationships? Provide an example.

* A relationship in the context of relational databases is when a table has information that references information from another table. An example of this is the Italian Serie A teams. The Serie A table has all 20 teams in a primary table. You can use this first table to access the database of each individual team to see specific information. The individual database of each team references that specific team from the original table creating a relationship between the two tables.

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

* Advantages of relational database include ACID compliance, data accuracy, and normalization. Atomicity, Consistency, Isolation, and Durability (ACID) ensures reliable transactions. If a transaction fails, the database reverts back to right before the transaction. Using relational tables guarantees that there is no duplicate information which increases its accuracy. With normalization, data is organized to eliminate anomalies which reduces costs.
* Advantages of NoSQL databases include using document databases, its scalability, and flexibility. You can store data in documents that support a multitude of data types. They are usually in a JSON structure making them easy to read. You can scale document databases horizontally which means duplicating them across multiple servers while keeping them in sync with each other. This is very useful for cloud-based databases. You can have different types of databases such as key-value, graph, and wide-column databases to suit whichever need you may have. Data is easily changeable making it more flexible than a relational database.

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

* Disadvantages of relational databases include its scalability, flexibility, and performance. These databases are intended to be run on one machine and if the requirements exceed the available hardware, upgrades are required, which can be expensive. The structure of the database is defined by the constraints put upon it. If you want to change something later, you have to change all the data and have the database go offline. The performance of the database is correlated to how complex the data is. The more data you have, the longer it takes for queries to be conducted.
* Disadvantages of NoSQL databases include less flexible queries, is newer, and cannot scale on its own. The database itself may be more flexible but cannot handle complex queries like SQL can. Since SQL has existed for far longer, it has way more support then NoSQL does. You may not always find the answer you are looking for. You can use database management systems designed for NoSQL but can only accommodate a certain limit of traffic on its own. Additional infrastructure can increase the cost of the database.

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

* MySQL:
  + **Stored Procedures** – run local subroutines stored in a local database. Allows for local data transactions without the need for a remote hosting device which reduces network traffic and faster operations.
  + **User Authentication and Privileges** – requires users to login with an id and password to access a database. Administrators can set privileges to different users to have either a higher or lower level of access while providing protection.
* MongoDB:
  + **Replication** – allows for databases to be duplicated across multiple servers to decrease the vulnerability of a server crash. Also helps with load balancing by distributing the load across all servers equally.
  + **Sharding** – known as the process of taking larger datasets and splitting them across multiple distributed collections. This helps the database better distribute and execute complex queries.

Websites used:

<https://www.mongodb.com/compare/relational-vs-non-relational-databases>

<https://www.adservio.fr/post/what-are-the-pros-and-cons-of-nosql#el8>

<https://www.mongodb.com/what-is-mongodb/features>