

Non-Relational Data Storage and Retrieval Systems

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CS300-ON

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Oct. 29th, 2023

What does NoSQL mean?

According to International Business Machines (IBM) NoSQL refers to “not only SQL” or “non-SQL”. NoSQL is a database design approach that allows for storage and querying of data by using nontraditional structures found in other relational databases. (IBM What are NoSQL databases?) NoSQL databases are used for high-capacity distributed data stores. In 1998 Carl Strozzi created the term NoSQL to differentiate his open-source relational database from other databases at the time. NoSQL does not use SQL to organize data but rather it uses JSON, YAML, XML and others for faster the faster processing of unstructured data that was required of early web data. (Foote) There are a few main differences between SQL and NoSQL. Some of the differences are how the databases are built, how the data is stored/located and lastly how the structures and formats are used by the databases.

Whether the correct term for a NoSQL is not only SQL or non-SQL it is agreed upon that NoSQL databases are used to store data in formats different from those in other relational databases.

What types of problems were NoSQL databases designed to solve?

NoSQL databases were aimed to solve various problems such as SQL databases being slow and harder to scale with larger data sets. Since NoSQL databases are non-relational it allows them to be great at scaling out, which means it is better at adding or removing databases to adjust their capacity or

performance. Another problem solved by NoSQL databases is that it allows data from different structures to be grouped into the same system. NoSQL databases do not require atomicity, consistency, isolation, and durability also known as ACID instead they use elasticity and performance. (Alexandre)

What are three examples of NoSQL database products and how do each of them work?

According to IBM Apache CouchDB is an opensource NoSQL document database that collects and stores data using JSON documentation formats. JSON stands for JavaScript Object Notation and is often used for sending data from a server to a webpage. (w3schools) Created in 2005, CouchDB is worked on by a large group of developers who are continually working on the database to improve performance and ease of use. Amazon SimpleDB is another example of a NoSQL database. Released in 2007, Amazon SimpleDB is an Amazon Web Service (AWS) that uses the Erlang language. Amazon SimpleDB uses multiple replicas of data across different locations to ensure availability and durability. (Educative) Riak is a NoSQL that was founded in 2008 and was one of the first distributed systems that simplified critical data management challenges. Riak automatically distributes the data from clusters to create faster performance. Riak also has fast reads and writes that help make it easier to store and analyze location and time data. Riak is written in Erlang and based on Amazon Dynamo paper. (Sarmah)

What are the advantages and disadvantages of NoSQL databases?

There are many advantages and disadvantages to NoSQL databases. An advantage of NoSQL databases is that they allow for more flexible data models. These flexible data models allow for the ease of change to databases. Another advantage is that NoSQL databases allow for better horizontal scaling. Where SQL only allows for vertical scaling (where you can only go to a larger server) NoSQL databases allow for the addition of smaller servers when needed. While there are many advantages there are also some disadvantages to NoSQL databases. A major disadvantage is NoSQL does not support ACID transactions across multiple documents. (MongoDB) Another disadvantage is that there is no standardization between

the different NoSQL's. With no true standardization it allows for each company to implement a wide range of different schema.

What is a graph database?

A graph database is a type of NoSQL database that stores nodes and relationships not tables or documents. This allows data to be stored without restricting it to a predefined model. (Neo4j) Another way to think about graph databases is that they are a systematic collection of data that emphasizes the relationship between the different data types.

What types of problems were graph databases designed to solve?

Graph databases are designed to retrieve and store data quickly and effectively while maintaining good protection from data leaks.

What are two examples of graph database products and how do each work?

Two examples of a graph database are Neo4j and Azure Cosmos DB.

What are the advantages and disadvantages of graph databases?

The advantages of a graph database are that they are custom built to manage highly connected data. This allows the volume of data to increase. This will create more flexibility for developers to modify the structures without hindering the performance of the database. Disadvantages to graph databases are not suited for data that is not highly connected. For cases where the developer only needs very few information for the data then a graph database would not be needed. (MENEGASSO)

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