NoSQL Databases

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November 2020

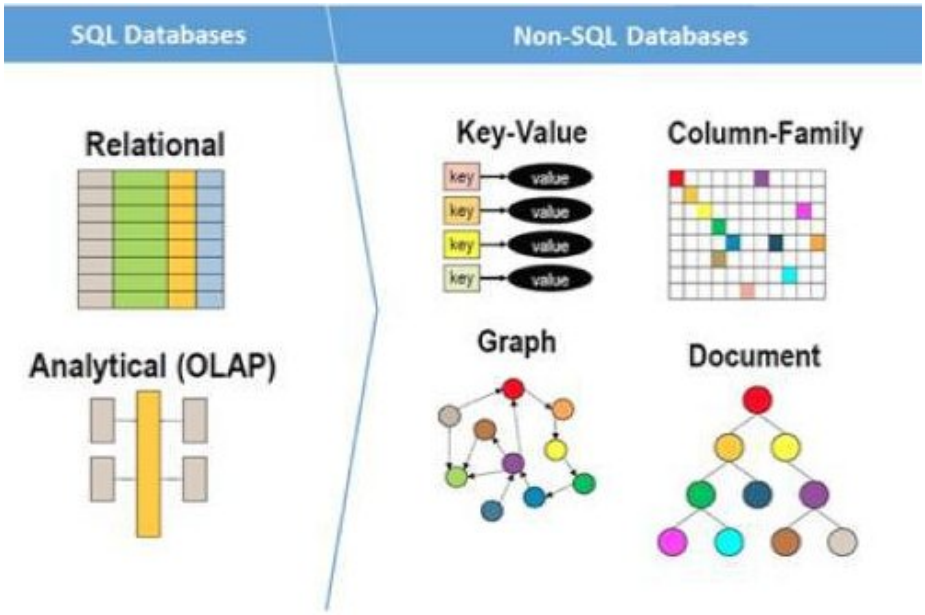
1 Introduction

"NoSQL" databases are commonly attributed to databses that store information differently than a traditional relational database. Their schemas are used easily for large scaling of large amounts of data and high user loads. NoSQL databases are still able to store relationship data, however it is done in a different format- oftentimes being able to be modelled easier when it is nested in one data structure.

1.1 Types of NoSQL Databases

- **Document**: Data is represented often as an object or JSON-like document. Document content contains pairs of fields and values, in varieties of data types, and their structures typically align with objects developers are working with in code. This wide variety of field types allows these types of datbases to be used for many use cases. One example of this is MongoDB.
- **Key-Value**: Key value databases are easily partitionable and allow for more horizontal scaling in comparison to other databases, and also makes querying for a specific key-value pair very simple. You might want to use these types of databases if you are storing large amount of data, but instead of making long and complex queries to retrieve this data, you can simply query for a key-value pair. One example is storing user preferences and/or caching data. AWS DynamoDB is a common use for key-value databases.
- **Wide Column**: Wide-Column databases are able to efficiently store data and query for data across tables, rows, and dynamic columns. Compared to relational databases, wide column databases have more flexibility since you don't need the same column for a specific row. Oftentimes, some people refer to them as two dimensional key-value databases. If you are storing lots of data, these databases are useful if you already have a known pattern of queries and can predict that they will be like.

- **Graph**: Graph databases store their data in a model based off of nodes and edges, to represent connected data. This makes it easy to build and run applications that work with highly connected datasets. Graph databases useful when traversing relationships to look for patterns in a networks.

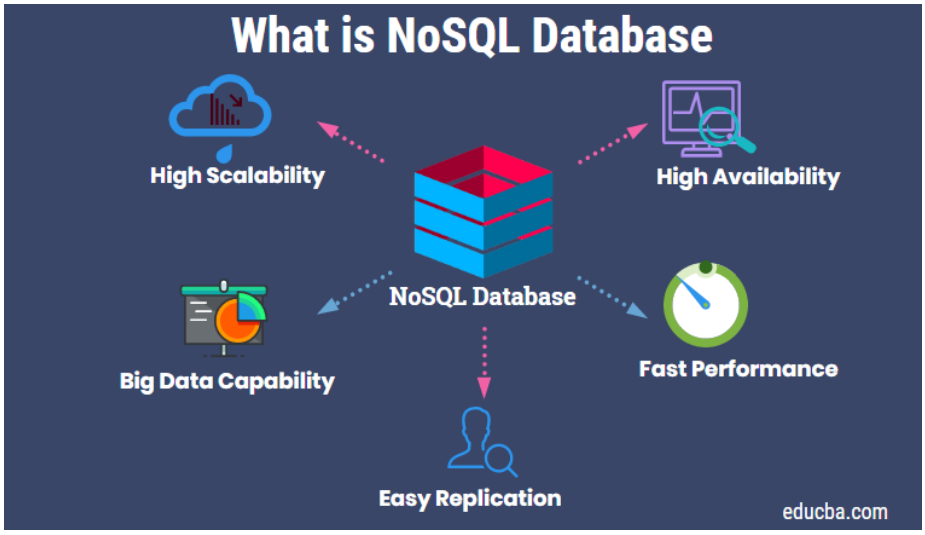


2 Benefits of NoSQL in the Cloud

- **Speed and Scaling Architecture**: NoSQL databases are centered in environments of the cloud, which makes it wasier to scale its architecture on a larger scale. In this structure, storage of data can be easily spread and makes data processing over a large cluster of computers much easier. When more computers are added to the cluster, the capacity increases.
- **Cloud and Downtime**: As previously discussed, NoSQL can be used for scale-out architecture, which helps to accommodate huge data sets and high volumes of traffic. Using a database of computers also allows for databases to modify their capacity automatically when delivering. This structure can easily change with minimal downtime.
- **Updating Schema**: Unlike data models in SQL datases, NoSQL databases are notable for storing data in much more concises and straightfoward

forms, which are easier to understand. They are much more flexible and have better structure for this data, as previoulsy discussed.

- **Developer Friendly**: Compared to relational databases, developers find it much easier to create various types of applications using NoSQL. The storage of data in NoSQL databases are in forms that are similar to data obejcts in most applications, meaning it is much easier to move in data and move it out of applications.



3 Uses

- **Serverless Web Applications**: NoSQL is perfect for storing web application session information that tends to be large. You can create powerful web applications that automatically scale up and down, without maintaining servers yourself.
- **Mobile Applications**: With mobile application development, NoSQL databases can start off small, and can be easily expanded as users increase, this is very hard to do with traditional relational databases. Developers can update the apps without having to do major modification in database, as the schema is flexible.
- **IoT**: With many things being connected to the Internet, large volume and data variety is essential. The structure of NoSQL enables expansion of data access across millions of systems that are connected, leading to higher performance.

4 NoSQL services

- **AWS DynamoDB**: DynamoDB utilizes key-value and document databases that allows for millisecond fast performances at all scales.
- **MongoDB**: MongoDB is a cross-platform document-oriented database program, using a similar JSON type schema.
- **Azure CosmosDB**: Offers many types of databases, including NoSQL databases which offer similar features as AWS DynamoDB.

5 Demo

Here is the link for the demo on Qwiklabs: **DEMO**