Assignment 1
CS300-ON
Database Management Systems

Non-Relational Data Storage and Retrieval Systems (100 points)

What does NoSQL mean?

NoSQL literally means “Not only SQL”. This means that instead of just columns and rows are used for relational databases, meaning they storing information as documents in the databases, as well as store key values in collections with different records that are identified by key type to be easily accessable. They have just enough storagr structure to copy or mirror the value of a relational database and preserve the benefit of not just file systems with specific data types. For example, unstructured and structured data types can be viewed using NoSQL, because it is capable of identifying patterns in the graphing structure. This helps define the relationships between the storage of the structured and unstructured data points (Kim, 2016).

What types of problems were NoSQL databases designed to solve?

NoSQL does have several benefits to SQL as it is faster, and more efficient in that it looks to address business problems not just a method to address data wrangling, or structure efficiencies. They store data differently which allows more flexibility and options to address an array of data challenges. For example, Key Value Data bases map keys to values, in which they is the identifier and the values is the object in which is decoded by the application. Key Values enable the data to be quickly accessed but does not have a direct relationship with the storage data, or it does not have a direct relationship (Kim, 2016).

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

Document Databases in which storage of data can be used in different formatting such as XML or JSON, as they include descriptive labeling that describes the type of data used.

Wide Column storage has a similarity to the relational database model in that it does store data in tables but has more flexibility in that it allows you to add new columns easily where relational databases do not, as this can create integrity issues with the data and environment, which allows Wide Column to be more efficient for storing records safely and create less work in trying to deconstruct or verify data accuracy or integrity for use. The third was mentioned originally as a Key Value Database which allows quick access and efficient storage of objects in a non-relational database system.

What are the advantages and disadvantages of NoSQL databases?

There are many advantages to using NoSQL, but to name a few include speed efficiency and accuracy of data base in a large workload that can be handled by the system operating it. This allows a single access point rather than having to jump around on different entry points to get into and retrieve accurate and efficient information all at one place for everyone that has access to the system in the organization.

The disadvantages include not having full sequence query language support that are more easily usable accessible in other support database systems. There is also no API standards for NoSQL which means that no application can be easily ported from one NoSQL system to another one without having transferability and data structure issues. That means NoSQL really has to be a one stop shop for all users who need access versus multiuser with different database systems using different applications.

What is a graph database?

A graph database is a method that stems from Graph theory math which represents vertexes and edges. Edges show the relationship between the entity, and the vertexes connects to the edges and the relationship of each entity that connects or chains together in some form of relationship.

What types of problems were graph databases designed to solve?

Graph databases are diverse in solving problems in that they can establish a connection between different links in the organizational structure and ensure the data connected from one place when inputted is able to be accessed in real time at another location from someone that has access to that connection. You could have a person accessing a system that is now formalized and verified the entry from one point to the other in able to track changes and accuracy of that information from each level that has permissions. Metadata across the organization can be applied to modern technology and agile methods that allow for the database to be more easilty maintainable by engineering teams. Detecting fraud, verifying accuracy of data, mapping connectivity in the network accesses and permissions to data, as well as the framework that is right for the organization are all benefits to solving organizational problems (Smith, 2022).

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

Amazon Neptune is an example of a graph database product that is fast and reliable that is able to take applications that are highly connected and provide a way to connect billions of different relationships, which makes it ideal in that it is able to provide capabilities to smaller and mid-size markets at a reasonable price point, to allow completive

capabilities that is secure and encrypted offerings from a large company known for providing high quality services and products (g2, 2022).

Apache Giraph is another one that was built to service small and large enterprises with high scalability among a connective network that offers the capability to process large amounts of data graphically and interactively. The advantages to this is the high efficiency of accuracy in the interactive settings, and real time data viewing (g2, 2022).

What are the advantages and disadvantages of graph databases?

Advantages of Graph is that you have a system that allows for users with access the capability to have real time viewing capability on a secure network that tracks entries and enters of the data from each access point. This makes reliability and efficiency, as well as accountability much easier for the organization. The limitations include the lack of access and process for ensuring that everyone always has the correct updates at the correct time, with limited capability of implementing different application features that can prevent flexibility and a wide range of communication capabilities outside the set access user base. The userbase can be large or small, and the connection has to establish the needs of the organization, so having a narrow scope userbase might not be the best for graph database, or it could be great depending on the structure of the organization. It is ultimately the responsibility of the organization to know what will fit and how things should fit to maximize the capabilities in a secure and responsible way.

Citations

1) Dale Kim, February 3, 2016. https://www.oreilly.com/content/nosql-technologies-are-built-to-solve-business-problems-not-just-wrangle-big-data/. O'Reilly Copyright 2022
2) Alex Smith, 2022. https://6point6.co.uk/insights/solving-business-problems-with-graphs/.
3) 06/22/2022. https://www.g2.com/categories/graph-databases.