Database Era

Collecting and storing data is a very old ancient concept. Even after the evolution of computers and computing devices, data has been stored in various ways. Earlier databases had rather limited functionalities starting with plain text files called as **flat databases**. This means the data has to be of a textual format. Every new field is marked with a user defined delimiter – a special character, a comma or a colon etc. As there are no relations between the fields, a flat database is hard to search and navigate. Still,this works well for a small amount of data that only needs to be read and or slight modification. An example of such databasescan be CSV (Comma Separated Values) files.

IBM introduced **hierarchical databases**60's in which the records are connected by a tree structure, based on parent-child relationships. One item can only have one parent, while one parent can have multiple children. This can be said as the first step toward relational databases. It has its own disadvantages and does not work well for all types of records. N**etwork databases**comes after this and have a better organization of data**.**These have a tree structure, but children node may have multiple parents as well. Later the era of **relational database** has arrived followed by **non-relational** (**NoSQL**) databases.

Relational vs. non-relational database

Relational databases are the most prominent modern types of databases. Oracle, MySQL, PostgreSQL, or SQL Server are some examples of RDBMS. To access and manipulate the data in RDBMS, SQL (Structured Query Language) is required. SQL has well-established standards and allows your data to be easily portable. In relational database data is stored in **tables** consisting of columns and rows. Every row represents an individual record, and a column stands for a field with a data type assigned to it. Primary and foreign keys are used to link Tables having related information .

Now-a-days **non-relational** databases are also gaining popularity and being used so commonly. The main reason for this is the growing need for unstructured data storage like data from Social Media etc. In the era of big data, diversified information is used. diversity. Data now also mean images, videos, and even posts on social media networks and to work with non-tabular data, non-relational database is needed. These are also referred as as **NoSQL databases**as thesedo not support SQL queries.

Types of NoSQL databases

There are four types of databases which are non-relational model based.

Document-oriented databases

In a document oriented database or document store , the data is kept in document collections, usually using the JSON, XML, or BSON formats. A record can hold any amount of data we need, in any data type(s) as there is no constraint of data type and even data size. The every document has a definedstructure, however, it can differ from one document to the other. Not only this, we may nest these documents in single collection. These are the most popular databases and best example is MongoDB.

Key-value databases

In Key-value databases, each record in these databases have a key and a value very similar to a dictionary. The key can be used to identify the value. These key-value databases are used data is not too complex but speed is a priority. For example, storing configuration data. The most popular key-value database is Redis.

Graph databases

These are mainly used for storage of Social Media data, it has Nodes, which stand for the items in the database, and edges define their relationships. Graph databases looks like network databases, but Graph databases can manage abstraction in much more professionally in graph databases. Examples are Neo4J or Dgraph. However, graph databases needs a query language to access the data, you can use neither SQL, nor any

other universally adopted approach. The lack of standardization means most of the query languages can only be used in one or a few types of graph databases.

Column store databases

Column store database is a column family database, or a wide column store. This makes them a good option for handling big data is fast performance, efficient data compression, and great scalability.Column store databases uses the keyspace to store the column families. Similarly to a table, a column family contains columns and rows. In these databases, a column does not span across all the rows. Instead, it is contained in a row, which also means different rows may have different columns just like different documents in a collection in Document Oriented databases. Each row also has an identifier, called a key, and every column holds a name, a value, and a timestamp. Examples are Cassandra, Vertica, and Druid.

Assignment

1. How the difference between Relational and Non Relation Databases?

2. What are various types of Non-Relational databases? Explain.

3. Write a short note on Database era.