NIELIT Gorakhpur

Course name: A level **SUBJECT: DATABASE TECHNOLOGIES**

Topic: Database Selection **DATE: 12/6/2020**

Relational vs. non-relational database cont'd

Advantages and the Disadvantages of Relational and Non-Relational Databases

Relational databases built around relational algebra and tuple relational calculus and are optimized for writes, consistency and availability.

Advantages:

- simplicity, ease of data retrieval, data integrity, and flexibility.
- single uniform language (DDL) for different roles (developer, user, DBA).
- single standardized language for different RDBMS.
- sticks to ACID principles (atomicity, consistency, isolation, durability), and thus ensures stability, security, and predictability both for the entire database and every individual transaction

Disadvantages:

- expensive to set up and maintain
- have limits to field lengths. This can be cumbersome for storing a large amount of information in one field.
- very difficult to scale as much as a database grows larger
- Multiple databases can easily become islands of information and difficult to connect the databases where they can talk to each other.

Non-relational databases are schema-free and built on distributed systems, which makes it easy to scale and shard. These are optimized for reads. They serve Availability and Partition Tolerance, or Consistency and Partition Tolerance needs.

Advantages:

- Flexible to store large volumes of structured, semi-structured, and unstructured data.
- can accommodate quick iterations of sprints and code pushes.

- can scale out architecture efficiently without expensive overhead.
- Available as open source and free of cost in many cases

Disadvantages:

- ACID transactions are not supported by non-relational databases. Instead, they rely on “eventual consistency”. The performance benefits of these databases mean there’s a cost of consistency.
- There are many types of NoSQL databases but there is almost no uniformity among them.
- No specific programming interface to the different databases. Each one varies in query language with another.
- Not all non-relational databases are good at automating the process of sharding, or spreading the database across multiple nodes.

Why Database is needed?

In our day to day life as an end user we discover online applications which try to make our lives more convenient. As we know about these just get ourselves register ourselves for that application. After the one-time registration, whenever we want to use that app again, we just need to log in with user name and password sometime just a mobile based OTP, on the other end the application system automatically stores all our data that was provided during the registration process and submitted subsequently. All this is possible because of the database in which all our information or data gets stored when we register for any application. It may be our Facebook, Whatsapp, Instagram, email services or airline or hospitality application etc etc. Not only this, when we browse various ecommerce websites and view millions of product items available on various online shopping applications like Amazon, Flipkart etc or post our status, photos videos on Facebook, twitter, youtube etc to let others view them, it is only possible because of the databases.

At present all the applications weather a desktop or mobile one, databases acts as a key component for collecting, storing and retrieving of these data in a safe and efficient manner with outmost security and privacy. The task of choosing the right option is tedious process.

Lets come to the physical world and go back and analyses the past, before the implementation of computers and databases, departments like electricity boards, insurance offices, Banks, Public health departments etc etc stores a large heaps of files containing the data of all of their users/ customers. It was a quite troublesome to get details pertaining to a customer, e.g. consumption of electricity, payments made or pending towards bills generated, etc, if the names were not listed alphabetically or data in any other order like in ascending order of account number. Even the management of the physical data was done is just like its done in computer databases but not in all cases. And if the data is not present or not in an organized form, then the getting any information from this physical data is taking so long time. The data stored in a computer database is organized in such a way that the stored data helps in easy retrieval of information along with storage and editing. The data stored in physical files can get lost when the papers of these files get older and, hence, get destroyed. But in a database, we can store as long as we want in a very very small space with security and this computer based Data will get lost only if the system crashes. To overcome this, we keep a backup that may be in form of backup data on external storage or in an online mode depending upon the application requirement as well as the budget.

Benefits of having the right database for your application

Choosing the right database for an application is a onetime decision as the same cannot be changed frequently as it is difficult as well as very expensive. Changing the database at a later state may hamper the application and its services using that data. So, it is advisable to choose the right database in the beginning itself. Some of the benefits if we choose the right database the first time itself:

1. It is easier to put data in a consistent form if we have the proper database as the relevant and the required information get stored in the database in the beginning itself.
2. Database design is normalized before implementing the database. Normalization helps to reduce data redundancy and even prevents duplication of data and finally leads to reducing the size of the database.
3. If we choose the correct database and database design is normalized, then the queries fired in order to fetch data, will be simple and will get executed faster and provide accurate results.

4. The proper database and its design will boost the overall performance of the application.

5. Choosing the right database for an application also helps in easy maintenance.

Assignment

1.What are advantages of NoSQL databases?

2.Why Databases are needed in the present world?