MongoDB

CO226 – Database Systems

Lab - 09

Kalani Udayanthi
kalaniu@eng.pdn.ac.lk

NoSQL vs SQL Databases

- NoSQL (“non SQL” or “not only SQL”) databases were developed in the late 2000s.
- Focus on scaling, fast queries, allowing for frequent application changes, and making programming simpler for developers.

- Relational databases accessed with SQL (Structured Query Language) were developed in the 1970s with a focus on reducing data duplication as storage was much more costly than developer time.
- SQL databases tend to have rigid, complex, tabular schemas and typically require expensive vertical scaling.

Difference between SQL and NoSQL

	SQL Databases	NoSQL Databases
Data Storage Model	Tables with fixed rows and columns	Document: JSON documents, Key-value: key-value pairs, Wide-column: tables with rows and dynamic columns, Graph: nodes and edges
Examples	Oracle, MySQL, Microsoft SQL Server, and PostgreSQL	Document: MongoDB and CouchDB, Key-value: Redis and DynamoDB, Wide-column: Cassandra and HBase, Graph: Neo4j and Amazon Neptune
Primary Purpose	General purpose	Document: general purpose, Key-value: large amounts of data with simple lookup queries, Wide-column: large amounts of data with predictable query patterns, Graph: analyzing and traversing relationships between connected data

Benefits and Drawbacks of NoSQL Databases

- Benefits :
  - Flexible data models
  - Scale horizontally
  - Fast queries
  - Easy for developers to work with

- Drawbacks :
  - Data Consistency
  - Lack of Security
  - Lack of Standardization


mongoDB

What is MongoDB ?

- MongoDB is a document-oriented NoSQL database used for high volume data storage.
- MongoDB allows you to change the structure of records, which we call documents by adding new fields or deleting existing ones.
- Open-source database.
- MongoDB stores data in JSON-like documents that can vary in structure.

Why use MongoDB ?

- MongoDB is very flexible and adaptable to real business world situations and requirements.
- Queries can be made to return certain fields within documents.
- Supports field, range-based query, regular expression, etc. for searching the data from the stored data.
- Very easy DBMS system that can easily scale up or down.
- Indexes can be created to improve the performance of searches within MongoDB. Any field in a MongoDB document can be indexed.
- MongoDB can run over multiple servers, balancing the load and/or duplicating data to keep the system up and running in case of hardware failure.
- MongoDB allows you to represent hierarchical relationships, to store arrays, and other more complex structures more easily.

Where do we use MongoDB ?

MongoDB is preferred over RDBMS in the following scenarios:

- Big Data
- Unstable Schema
- Distributed data

How Data is Stored ?

MongoDB	MySQL
In MongoDB, each individual records are stored as '**documents**'.	In MySQL, each individual records are stored as '**rows**' in a table.

A MongoDB **Database** can be called as the container for all the collections.

- **Document** is made of fields. It is similar to a tuple in RDBMS, but it has dynamic schema here. Documents of the same collection need not have the same set of fields

Hierarchical Upper of a Record

MongoDB	MySQL
Documents belonging to a particular class or group as stored in a '**collection**'. • **Collection** is a bunch of MongoDB documents Example: collection of users.	A '**table**' is used to store rows (records) of similar type.

Difference in Terminology

There are differences based on terminology between MongoDB and MySQL.

MySQL	MongoDB
Table	Collection
Row	Document
Column	Field
Joins	Embedded documents, Linking

Data Representation

- The difference between the way data is represented and stored in both the databases is quite different.
- MongoDB stores data in form of JSON-like documents and MySQL stores data in form of rows of table as mentioned earlier.

Example: To show how data is stored and represented in MongoDB and MySQL.

A Record in MySQL

name	age	contact-mobile	home-address
Sam	45	0754852568	Peradeniya rd, Kandy

Data Representation cont.

A Document in MongoDB

```
{
name: ”Sam”,
age: 45,
contact: {
mobile: “0754852568”,
}
home-address: ”Peradeniya rd, Kandy”
}
```

Language Support by MongoDB

MongoDB currently provides official driver support for all popular programming languages like;

- C, C++, C#
- Java
- Node.js
- Perl
- PHP
- Python
- Ruby
- Scala
- Go
- Erlang

How to Install MongoDB ?

Go to http://www.mongodb.org/downloads and select your operating system out of Windows, Linux, Mac OS X and Solaris. Detailed explanation about the installation of MongoDB is given on their site.

- Getting Started :

  https://www.geeksforgeeks.org/mongodb-getting-started/

Summary

- NoSQL vs. SQL Databases
- Difference between SQL and NoSQL
- Benefits and Drawbacks of NoSQL Databases
- MongoDB basics