NoSQL & MongoDB

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NoSQL Databases

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Introduction

- Non-relational databases
- Flexible Structure
- Highly scalable systems
- Robust architecture
- Stores unstructured, semi-structured, or structured data
- Priority to Performance
- Supports Load Balancing

Examples of NoSQL databases provided by different tech companies are:

- DynamoDB by Amazon
- CosmosDB by Microsoft
- Cassandra by Facebook

Classification: Key-Value databases:

- Simplest type of NoSQL database.
- Stores data in the form of key-value pair

Applications: shopping carts, user preferences, and user profiles

Example: Redis, Memcached, and Couchbase

KEY	VALUE
Name	"Thompson, Rich"
Employee_ID	"78784903"
Department	"Sales"
Team	"NYC"
BandLevel	"5C"
CostCenter	"8789"
Supervisor	"Bill, Chen"

Classification: Column-oriented databases

- Stores data in the form of columns
- Useful in real time analytics

Applications: Data warehouses, Business Intelligence, CRM and real-time analytics.

Example: HBase, Cassandra, Hypertable, Amazon DynamoDB

Row Oriented

Airport_Code	City	State	Name	No_of_Terminals
JFK	New York	NY	John F. Kennedy International Airport	8
EWR	Newark	NJ	Newark Liberty International Airport	3
LGA	New York	NY	LaGuardia Airport	4

Column Oriented

Airport_Code	City
JFK	New York
EWR	Newark
LGA	New York

Airport_Code	State
JFK	NY
EWR	NJ
LGA	NY

Airport_Code	Name
JFK	John F. Kennedy International Airport
EWR	Newark Liberty International Airport
LGA	LaGuardia Airport

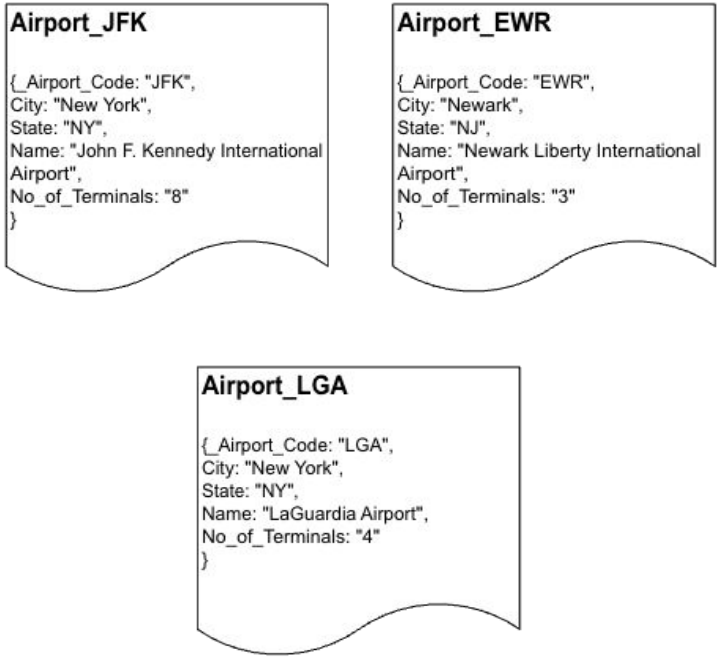
Airport_Code	No_of_Terminals
JFK	8
EWR	3
LGA	4

Classification: Document-oriented databases:

- Stores data in the form of documents
- Useful in real time analytics

Applications: CMS systems, blogging platforms, and E-commerce web applications

Example: CouchDB, MongoDB, OrientDB

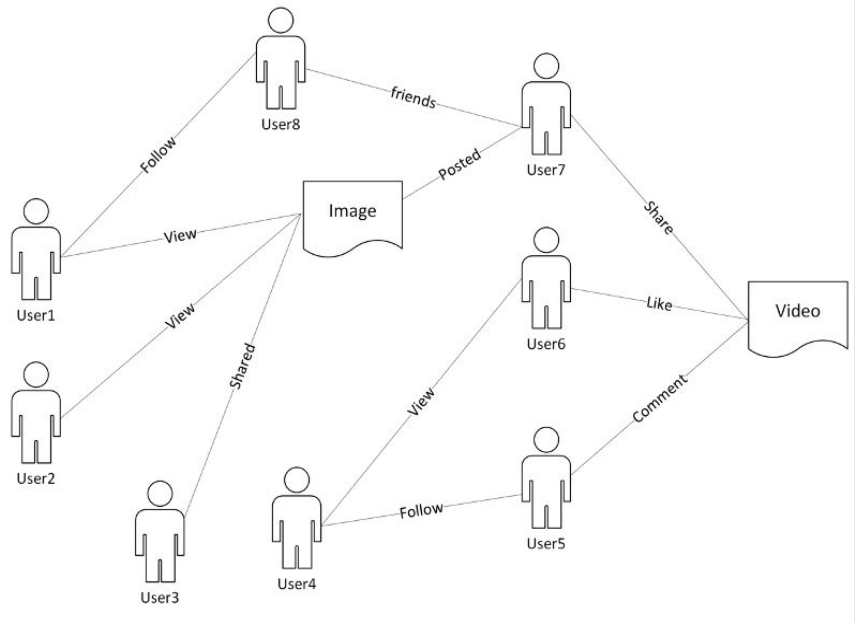


Classification: Graph-Oriented Database

- Stores data in the form of nodes and edges
- Useful in storing relationships

Applications: Fraud detection, social networks, and knowledge graphs

Example: Neo4J, InfiniteGraph, OrientDB, or FlockDB



Characteristics

- Supports horizontal scaling
- Flexible Data models
- High-performance
- Faster Query execution
- Distributed system
- Large data storage
- Developer friendly

Applications

- Real-Time Big data processing
- Internet of Things (IOT)
- E-commerce
- Social media websites

MongoDb

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Introduction

- Provides Cross platform Integration
- Open-source
- Provide support for large volume of data
- Stores data in the form of collections and documents
- Represented by JSON (Key-value pair)
- Supports nested storage of data
- Efficient retrieval of data

MongoDB representation in JSON

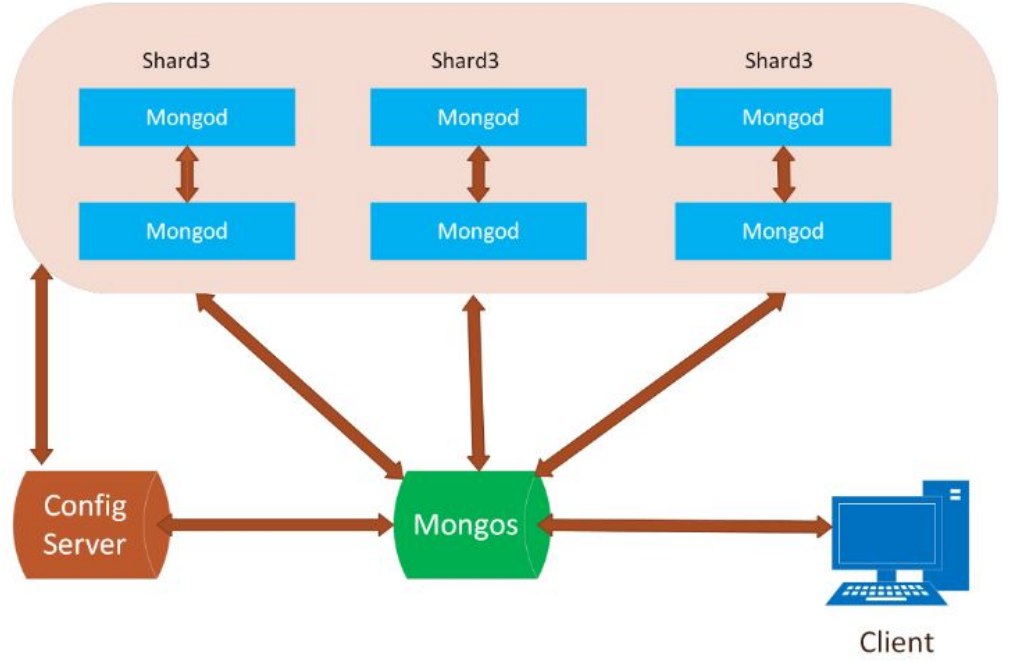
Example of JSON representation for an Employee Object:

{
“_id”: “”,
“name”: ”John Denver”,
“dateOfBirth”: “19-04-1990”,
“age”: “35”,
“designation”: ”Software Developer”
}

Datatypes supported by MongoDB

- Number
- Array
- Boolean
- String
- Date
- Hash
- Timestamp

Key Components of MongoDB Architecture



Comparison of concepts used in MySQL and MongoDB

MySQL	MongoDB
Database Instance	MongoDB Instance
Schema	Database
Table	Collection
Row	Document
Column	Field
RowId	_id
Join	Embedded documents

Comparison of Relational and MongoDB Database based on Queries

Query	Relational Database	MongoDB database
Create	CREATE TABLE table_name (col1, col2....)	db.createCollection(collection_name)
Insert	INSERT INTO(table_name) VALUES (val1, val2...)	db.collection_name.insert({key1:val1, key2:val2})
Select	SELECT col1,col2... FROM table_name WHERE (condition)	db.collection_name.find({condition})
Delete	DELETE FROM table_name WHERE (condition)	db.collection_name.remove({condition})

Features

- Schema less Database
- Replication
- Load-Balancing
- High performance
- Sharding
- Aggregation

Future Trends in NoSQL Databases

- Microservice Integration
- Updates in cloud Navigation
- Stitch means GraphQL
- Atlas search and Atlas Data Lake
- MongoDB realm

Security Features of MongoDB

- Queryable Encryption
- MongoDB Atlas Serverless
- Built-In security by MongoDB Atlas
- Authorization and Authentication

Conclusion

NoSQL databases' structures are adaptable. They have several benefits, such as being highly scalable, extremely robust, flexible data models, high performance, and developer friendly. NoSQL databases have various applications in social media, the internet of things (IoT), e-commerce, and data mining.

Furthermore, MongoDB is a powerful document-oriented database that can be used to store large amounts of data. Additionally, it appears that the security offered by MongoDB's built-in capabilities is adequate. It includes features like MongoDB Atlas Serverless, Queryable Encryption, Authentication, and Authorization.

Moreover, Understanding the ongoing innovations and the market predominance of this simple to utilize data set makes us understand that the future extent of MongoDB shows a great deal of commitment.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