**ASSIGNMENT -2**

**Advanced Database Management Systems**

**SUBMITTED TO:  Sr. Elsin Chakkalackal S.H**

**SUBMITTED BY: SREELEKSHMI ANILKUMAR**

**RMCA S2-B**

**ROLL NO:42**

**MongoDB**

MongoDB **is an open source**[**NoSQL**](https://www.techtarget.com/searchdatamanagement/definition/NoSQL-Not-Only-SQL)**database management program. NoSQL is used as an alternative to traditional relational databases. NoSQL databases are quite useful for working with large sets of distributed data. MongoDB is a tool that can manage document-oriented information, store or retrieve information.**

MongoDB supports various forms of data. It is one of the many nonrelational [database](https://searchsqlserver.techtarget.com/definition/database) technologies that arose in the mid-2000s [under the NoSQL banner](https://www.techtarget.com/searchdatamanagement/infographic/NoSQL-database-comparison-to-help-you-choose-the-right-store) -- normally, for use in big data applications and other processing jobs involving data that doesn't fit well in a rigid relational model. Instead of using tables and rows as in [relational databases](https://www.techtarget.com/searchdatamanagement/definition/relational-database), the MongoDB architecture is made up of collections and documents.

Organizations can use Mongo DB for its ad-hoc queries, indexing, load balancing, aggregation, server-side JavaScript execution and other features.

## **Important MongoDB Features**

* **Queries**: It supports ad-hoc queries and document-based queries.
* **Index Support**: Any field in the document can be indexed.
* **Replication**: It supports Master-Slave replication. MongoDB uses the native applications to maintain multiple copies of data. Preventing database downtime is one of the replica set’s features as it has a self-healing shard.
* **Multiple Servers:** The database can run over multiple servers. Data is duplicated to foolproof the system in the case of hardware failure.
* **Auto-sharding:** This process distributes data across multiple physical partitions called shards. Due to sharding, MongoDB has an automatic load balancing feature.
* **MapReduce:** It supports MapReduce and flexible aggregation tools.
* **Failure Handling:** In MongoDB, it’s easy to cope with cases of failures. Huge numbers of replicas give out increased protection and data availability against database downtimes like rack failures, multiple machine failures, and data center failures, or even network partitions.
* **GridFS:** Without complicating your stack, any size of files can be stored. GridFS feature divides files into smaller parts and stores them as separate documents.
* **Schema-less Database:** It is a schema-less database written in C++.
* **Document-oriented Storage:** It uses the BSON format which is a JSON-like format.
* **Procedures:** MongoDB JavaScript works well as the database uses the language instead of procedures.

**Why do you need MongoDB technology?**

This technology overcame one of the biggest pitfalls of the traditional database systems, that is, scalability. With the ever-evolving needs of businesses, their database systems also needed to be upgraded. MongoDB has exceptional scalability. It makes it easy to fetch the data and provides continuous and automatic integration. Along with these benefits, there are multiple reasons why you need MongoDB:

* No downtime while the application is being scaled
* Performs in-memory processing
* Text search
* Graph processing
* Global replication
* Economical

Moreover, businesses are increasingly finding out that MongoDB is ticking all the right boxes when it comes to meeting the business requirements. Here is how:

* MongoDB provides the right mix of technology and data for competitive advantage.
* It is most suited for mission-critical applications since it considerably reduces risks.
* It increasingly accelerated the time to value (TTV) and lowered the total cost of ownership.
* It builds applications that are just not possible with traditional relational databases.

## **Advantages of MongoDB**

**. Distributed Data Platform**

* Throughout geographically distributed data centers and cloud regions, MongoDB can be run ensuring new levels of availability and scalability.
* With no downtime and without changing your application, MongoDB scales elastically in terms of data volume and throughput.
* The technology gives you enough flexibility across various data centers with good consistency.

**2. Fast and Iterative Development**

* Changing business requirements will no longer affect successful project delivery in your enterprise.
* A flexible data model with dynamic schema, and powerful GUI and command-line tools, makes it fast for developers to build and evolve applications.
* Automated provisioning enables continuous integration and delivery for productive operations.
* Static relational schemas and complex operations of RDBMS are now something from the past.

**3. Flexible Data Model**

* MongoDB stores data in flexible JSON-like documents, which makes data persistence and combining easy.
* The objects in your application code are mapped to the document model, due to which working with data becomes easy.
* Needless to say, schema governance controls, data access, complex aggregations, and rich indexing functionality are not compromised in any way.
* Without downtime, one can modify the schema dynamically.
* Due to this flexibility, a developer needs to worry less about data manipulation.

**4. Reduced TCO (Total Cost of Ownership)**

* Application developers can do their job way better when MongoDB is used.
* The operations team also can perform their job well, thanks to the Atlas Cloud service.
* Costs are significantly lowered as MongoDB runs on commodity hardware.
* The technology gives out on-demand, pay-as-you-go pricing with annual subscriptions, along with 24/7 global support.

**5. Integrated Feature Set**

* One can get a variety of real-time applications because of analytics and data visualization, event-driven streaming data pipelines, text, and geospatial search, graph processing, in-memory performance.
* For RDBMS to accomplish this, they require additional complex technologies, along with separate integration requirements.

**6. Long-term Commitment**

* You would be staggered to know about the development of this technology.
* It has garnered over 30 million downloads, 4,900 customers, and over 1,000 partners.
* If you include this technology in your firm, then you can be sure that your investment is in the right place.

MongoDB cannot support the SQL language for obvious reasons. MongoDB querying style is dynamic on documents as it is a document-based query language that can be as utilitarian as SQL. MongoDB is easy to scale, and there is no need to convert or map application objects to database objects. It deploys the internal memory for providing faster access to data and storing the working set.

**MongoDB pros and cons**

* Like other NoSQL databases, MongoDB doesn't require predefined schemas. It stores any type of data. This gives users the flexibility to create any number of fields in a document, making it easier to scale MongoDB databases compared to relational databases.
* One of the advantages of using documents is that these objects map to native data types in a number of programming languages. Also, having embedded documents reduces the need for database joins, which can reduce costs.
* A core function of MongoDB is its horizontal scalability, which makes it a useful database for companies running big data applications. In addition, sharding allows the database to distribute data across a cluster of machines. Newer versions of MongoDB also support the creation of zones of data based on a shard key.
* MongoDB supports a number of storage engines and provides pluggable storage engine APIs that allow third parties to develop their own storage engines for MongoDB.
* The DBMS also has built-in aggregation capabilities, which allow users to run MapReduce code directly on the database, rather than running MapReduce on Hadoop. MongoDB also includes its own file system called GridFS, akin to the Hadoop Distributed File System (HDFS). The use of the file system is primarily for storing files larger than BSON's size limit of 16 MB per document. These similarities allow MongoDB to be used instead of Hadoop, though the database software does integrate with Hadoop, Spark and other data processing frameworks.
* Though there are some valuable benefits to MongoDB, there are some downsides to it as well. With its automatic failover strategy, a user sets up just one master node in a MongoDB cluster. If the master fails, another node will automatically convert to the new master. This switch promises continuity, but it isn't instantaneous -- it can take up to a minute. By comparison, the Cassandra NoSQL database supports multiple master nodes so that if one master goes down, another is standing by for a highly available database infrastructure.
* MongoDB's single master node also limits how fast data can be written to the database. Data writes must be recorded on the master, and writing new information to the database is limited by the capacity of that master node.
* Another potential issue is that MongoDB doesn't provide full referential integrity through the use of foreign-key constraints, which could affect data consistency. In addition, user authentication isn't enabled by default in MongoDB databases, a nod to the technology's popularity with developers. However, malicious hackers have targeted large numbers of unsecured MongoDB systems in ransom attacks, which led to the addition of a default setting that blocks networked connections to databases if they haven't been configured by a database administrator.

**MongoDB platforms**

MongoDB is available in community and commercial versions through vendor MongoDB Inc. MongoDB Community Edition is the open source release, while MongoDB Enterprise Server brings added security features, an in-memory storage engine, administration and authentication features, and monitoring capabilities through Ops Manager.

A graphical user interface (GUI) called MongoDB Compass gives users a way to work with document structure, conduct queries, index data and more. The MongoDB Connector for BI allows users to connect the NoSQL database to their business intelligence tools to visualize data and create reports using SQL queries.

Following in the footsteps of other NoSQL database providers, MongoDB Inc. launched a cloud database as a service called MongoDB Atlas in 2016. Atlas runs on AWS, Microsoft Azure and Google Cloud Platform. Later, MongoDB released a platform called Stitch for application development on MongoDB Atlas, with plans to extend it to on-premises databases.