

## **Relational databases :-**

### **1. Oracle :**

Oracle Database (commonly referred to as Oracle RDBMS or simply as Oracle) is a multi-model database management system produced and marketed by Oracle Corporation.

### **2. MySQL :**

MySQL is an open-source relational database management system (RDBMS) based on Structured Query Language (SQL). MySQL runs on virtually all platforms, including Linux, UNIX, and Windows.

### **3. Microsoft SQL Server :**

Microsoft SQL Server is an RDBMS that supports a wide variety of transaction processing, business intelligence, and analytics applications in corporate IT environments.

### **4. PostgreSQL :**

PostgreSQL, often simply Postgres, is an object-relational database management system (ORDBMS) with an emphasis on extensibility and standards compliance.

### **5. DB2 :**

DB2 is an RDBMS designed to store, analyze, and retrieve data efficiently.

# **Advantages of Relational Database :-**

## **1. Speed**

Even though a relational database is poor in terms of performance, still its speed is considerably higher because of its ease and simplicity. And also various optimizations that is included in a relational database further increases its speed. So all the applications will run with appropriate speed when used in a relational database.

## **2. Security**

Since there are several tables in a relational database, certain tables can be made to be confidential. These tables are protected with username and password such that only authorized users will be able to access them. The users are only allowed to work on that specific table.

## **3. Simplicity**

Compared to other types of network models, a relational database model is much simpler. It is free from query processing and complex structuring. As a result, it does not require any complex queries. A simple SQL query is sufficient enough for handling.

## **4. Accessibility**

Unlike other types of databases, a relational database does not require any specific path for accessing the data. Even modifying data in the relevant column is made easy. So whatever the outcome shown is appropriate to the user.

## **5. Accuracy**

As mentioned earlier, relational database uses primary keys and foreign keys to make the tables interrelated to each other. Thus, all the data which is stored is non-repetitive. Which means that the data does not duplicate. Therefore, the data stored can be guaranteed to be accurate.

## **6. Multi User**

Multiple users will be able to access a relational database at the same time. Even if the data is updated, the users can access them conveniently. Hence, the crashes happening from multi access is possibly prevented.

# **Disadvantages of Relational Database :-**

## **1. Cost**

The underlying cost involved in a relational database is quite expensive. For setting up a relational database, there must be separate software which needs to be purchased. And a professional technician should be hired to maintain the system. All these can be costly, especially for businesses with small budget.

## **2. Performance**

Always the performance of the relational database depends on the number of tables. If there are more number of tables, the response given to the queries will be slower. Additionally, more data presence not only slows down the machine, it eventually makes it complex to find information. Thus, a relational database is known to be a slower database.

## **3. Physical Storage**

A relational database also requires tremendous amount of physical memory since it is with rows and columns. Each of the operations depend on separate physical storage. Only through proper optimization, the targeted applications can be made to have maximum physical memory.

## **4. Complexity**

Although a relational database is free from complex structuring, occasionally it may become complex too. When the amount of data in a relational database increases, it eventually makes the system more complicated. Each and every data is been complex since the data is arranged using common characteristics.

## **5. Information Loss**

Large organizations tends to use more number of number of database systems with more tables. These information can be used to be transferred from one system to another. This could pose a risk of data loss.

## **6. Structure Limitations**

The fields that is present on a relational database is with limitations. Limitations in essence means that it cannot accommodate more information. Despite if more information are provided, it may lead to data loss. Therefore, it is necessary to describe the exact amount of data volume which the field will be given.

## **NoSQL/Non-Relational Databases :-**

- NoSQL databases emerged as a popular alternative to relational databases as web applications became increasingly complex. NoSQL/non-relational databases can take a variety of forms. However, the critical difference between NoSQL and relational databases is that RDBMS schemas rigidly define how all data inserted into the database must be typed and composed, whereas NoSQL databases can be schema-agnostic, allowing unstructured and semi-structured data to be stored and manipulated.

- **Types :-**

- NOTE : some products may fall into more than one category. For example, Couchbase is both a document database and a key-value store.

### **1. Key-value stores :**

- such as Redis and Amazon DynamoDB, are extremely simple database management systems that store only key-value pairs and provide basic functionality for retrieving the value associated with a known key.
- The simplicity of key-value stores makes these database management systems particularly well-suited to embedded databases, where the stored data is not particularly complex and speed is of paramount importance.

### **2. Wide column stores :**

- such as Cassandra, Scylla, and HBase, are schema-agnostic systems that enable users to store data in column families or tables, a single row of which can be thought of as a record — a multi-dimensional key-value store.
- These solutions are designed with the goal of scaling well enough to manage petabytes of data across as many as thousands of commodity servers in a massive, distributed system. Although technically schema-free, wide column stores like Scylla and Cassandra use an SQL variant called CQL for data definition and manipulation, making them straightforward to those already familiar with RDBMS.

### **3. Search engines :**

- such as Elasticsearch, Splunk, and Solr, store data using schema-free JSON documents.
- They are similar to document stores, but with a greater emphasis on making your unstructured or semi-structured data easily accessible via text-based searches with strings of varying complexity.

### **4. Document stores :**

- including MongoDB and Couchbase, are schema-free systems that store data in the form of JSON documents.
- Document stores are similar to key-value or wide column stores, but the document name is the key and the contents of the document, whatever they are, are the value.
- In a document store, individual records do not require a uniform structure, can contain many different value types, and can be nested. This flexibility makes them particularly well-suited to manage semi-structured data across distributed systems.

### **5. Graph databases :**

- such as Neo4J and Datastax Enterprise Graph, represent data as a network of related nodes or objects in order to facilitate data visualizations and graph analytics.
- A node or object in a graph database contains free-form data that is connected by relationships and grouped according to labels. Graph-oriented database management systems (DBMS) software is designed with an emphasis on illustrating connections between data points.
- As a result, graph databases are typically used when analysis of the relationships between heterogeneous data points is the end goal of the system, such as in fraud prevention, advanced enterprise operations, or Facebook's original friend's graph.

## Advantages :-

- Since there are so many types and varied applications of NoSQL databases, it's hard to nail these down, but generally :
  1. Schema-free data models are more flexible and easier to administer.
  2. NoSQL databases are generally more horizontally scalable and fault-tolerant.
  3. Data can easily be distributed across different nodes. To improve availability and/or partition tolerance, you can choose that data on some nodes be eventually consistent.

## Disadvantages :-

- These are also dependent on the database type. Principally :
  1. NoSQL databases are generally less widely adopted and mature than RDBMS solutions, so specific expertise is often required.
  2. There is a range of formats and constraints specific to each database type.

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**Relational**  
Tend to be larger,  
monolithic



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**Non-relational**  
Newer field, lots  
of players

