Relational Database Management System(RDBMS):

It is one of the most popular database management systems. RDBMS is a software that performs all data-related operations on a relational database like a store, manage, query, and retrieve data. It is based on the relational model. The significant components of RDBMS are tables. Data is represented in the form of tables. The relationship between the two tables is represented by foreign keys.

<u>Example</u>: MYSQL, Oracle etc.

Advantages of Relational Database Management System over File System

1. <u>Data redundancy and inconsistency</u>

    Redundancy refers to the concept of data repetition, which means that any data item may have multiple copies. Because each user sets and maintains the files required for a specific application to execute, the file system is unable to control data redundancy. It's possible that two users are sharing the same files and data for different programmes. As a result, changes performed by one user do not appear in files utilised by other users, resulting in data inconsistency. RDBMS, on the other hand, manages redundancy by keeping a single data repository that is defined once and accessed by multiple users. Data remains constant because there is no or little redundancy.

2. <u>Data sharing</u>

    The file system does not allow data sharing or it is too complicated. Due to the centralised structure in RDBMS, data may be simply exchanged.

3. <u>Data concurrency</u>

    When more than one user accesses the same data at the same time, this is referred to as data concurrency. Anomalies occur when one user's edits are overwritten by changes made by another user. There is no method in the file system to prevent abnormalities. A locking system is provided by RDBMS to prevent abnormalities from occurring.

4. <u>Data searching</u>

Each file system search activity necessitates the creation of a separate application programme. RDBMS, on the other hand, has built-in searching capabilities. To access data from the database, the user merely needs to submit a short query.

5. Data integrity
   Before putting data into a database, some constraints may need to be applied to the data. There is no process in the file system to check these constraints automatically. RDBMS, on the other hand, ensures data integrity by enforcing user-defined restrictions on data.

Challenges of Relational Database Management System
This storage system had multiple disadvantages like:

1. Rigid Schema:
   In case the data schema is dynamic and changes, RDBMS would not be compatible.
2. Limited Scaling Patterns:
   The limitation here is that scaling patterns are very limited, unlike NoSQL DBs.
3. Cost:
   RDBMS is comparatively expensive software.
4. Skills:
   The data administrator must be skilled in order to use this storage system.

We'll go through the two basic types of databases:
1. Relational Databases (SQL based).
2. NoSQL databases

SQL Database
SQL is a computer language that was created for managing data stored in a relational database management system. The data in relational DBMSs appear as tables of rows and columns with a well-defined structure and dependencies.
SQL databases require little engineering effort to secure because of their integrated structure and data storage method. They're a fantastic fit for creating and maintaining complicated software solutions where every interaction has a variety of outcomes. ACID compliance is one of the SQL foundations (Atomicity, Consistency,

Isolation, Durability). If we are creating eCommerce or financial apps, for example, where database integrity is crucial, ACID compliance is the way to go.

Some examples of SQL databases
- MySQL
- Oracle
- PostgreSQL

Some Applications of SQL are
- Developers and DBAs (Database Administrators) use SQL to create Data Integration Scripts.
- It is used to handle analytical queries in order to evaluate data and derive insights from it.
- Information Retreival
- Insertion, Deletion, and Updation are examples of data and database table manipulation.

Advantages for using SQL Database:
1. It has a straightforward structure that corresponds to the majority of data types seen in most programmes.
2. It makes use of SQL, which is widely used and enables JOIN operations by default.
3. Allows for quick data updates. Because the entire database is saved on a single machine and relationships between entries are used as pointers, we can update a record once and have all of its associated records updates at the same time.
4. Atomic transactions are also supported by relational databases.