**Database**

A database is a collection of data, usually stored in electronic form. A database is typically designed so that it is easy to store and access data.

For storing, fetching, analyzing and manipulating data in a structured format/order we need a database.

A database is usually controlled by a [database management system (DBMS)](https://www.oracle.com/database/what-is-database/#WhatIsDBMS). Together, the data and the DBMS, along with the applications that are associated with them, are referred to as a database system, often shortened to just database.

Types of data we store in database:

1. Binary data
2. Numeric data
3. Date and time
4. Textual data

**DBMS Softwares** :  MySQL, Microsoft SQL Server, Microsoft Access DBMS, Oracle, IBM DB2, and FoxPro ​

**DBMS features and types: -**

1. Avoid duplication of data, maintain low repetition and redundancy.
2. Manages large databases.
3. Provide and Maintain Security. A database management software doesn’t allow full access to anyone except the database administrator or the departmental head. Only they can modify the database and control user access, making the database more secure. All other users are restricted, depending on their access level.​
4. Improve File Consistency
5. Support multiuser environment.

**Types Of Databases: -**

There are many different types of databases. The best database for a specific organization depends on how the organization intends to use the data.

1. **Relational databases: -** A relational database is a type of database that stores data in tables composed of rows and columns. In a relational database, data is contained within a table, which is then linked to data contained within other tables through the use of unique identifying “keys.” Relational databases are designed to store structured data, or well-defined data like names, dates, and quantities that can be easily standardized within a table. SQL, or Structured Query Language, is the most common language used to interface with relational databases within relational database management systems (RDMS).
2. **Object-oriented databases: -** Information in an object-oriented database is represented in the form of objects, as in object-oriented programming.
3. **Distributed databases: -** A distributed database consists of two or more files located in different sites. The database may be stored on multiple computers, located in the same physical location, or scattered over different networks.
4. **Data warehouses: -** A central repository for data, a data warehouse is a type of database specifically designed for fast query and analysis.
5. **NoSQL databases/Non-relational database: -** Non-relational databases (often called [NoSQL databases](https://www.mongodb.com/nosql-explained)) are different from traditional relational databases because they store their data in a non-tabular form. They store data whatever manner is best suited to the type of data being stored. In effect, non-relational databases are designed to contain unstructured data, or loosely-defined data like email messages, videos, images, and business documents that aren’t easily standardized. They can also be used to store a mix of structured and unstructured data. There are several ways to create non-relational databases. Some of the most common approaches include using key-value data stores, column-family data stores, graph data stores, and document data stores. Non-relational databases are said to be NoSQL, meaning that they don’t use Structured Query Language, even though many NoSQL databases do support SQL queries.
6. **Graph databases: -** A graph database stores data in terms of entities and the relationships between entities.
   1. **OLTP databases: -** An OLTP database is a speedy, analytic database designed for large numbers of transactions performed by multiple users. These are only a few of the several dozen types of databases in use today. Other, less common databases are tailored to very specific scientific, financial, or other functions. In addition to the different database types, changes in technology development approaches and dramatic advances such as the cloud and automation are propelling databases in entirely new directions. Some of the latest databases include
7. **Open source databases: -** An open source database system is one whose source code is open source; such databases could be SQL or NoSQL databases.
8. **Cloud databases: -** A [cloud database](https://www.oracle.com/database/what-is-a-cloud-database/) is a collection of data, either structured or unstructured, that resides on a private, public, or hybrid cloud computing platform. There are two types of cloud database models: traditional and database as a service (DBaaS). With DBaaS, administrative tasks and maintenance are performed by a service provider.
9. **Multimodel database : -** Multimodel databases combine different types of database models into a single, integrated back end. This means they can accommodate various data types.
10. **Document/JSON database: -** Designed for storing, retrieving, and managing document-oriented information, [document databases](https://www.oracle.com/autonomous-database/autonomous-json-database/) are a modern way to store data in JSON format rather than rows and columns.
11. **Self-driving databases: -** The newest and most groundbreaking type of database, self-driving databases (also known as autonomous databases) are cloud-based and use machine learning to automate database tuning, security, backups, updates, and other routine management tasks traditionally performed by database administrators.

**DATA MODELING: -**

A data model is an [abstract model](https://en.wikipedia.org/wiki/Abstract_model) that organizes elements of [data](https://en.wikipedia.org/wiki/Data) and [standardizes](https://en.wikipedia.org/wiki/Standardization) how they relate to one another and to the properties of real-world [entities](https://en.wikipedia.org/wiki/Entity). For instance, a data model may specify that the data element representing a car be composed of a number of other elements which, in turn, represent the color and size of the car and define its owner.

Data modeling in [software engineering](https://en.wikipedia.org/wiki/Software_engineering) is the process of creating a [data model](https://en.wikipedia.org/wiki/Data_model) for an [information system](https://en.wikipedia.org/wiki/Information_system) by applying certain formal techniques. The goal is to illustrate the types of data used and stored within the system, the relationships among these data types, the ways the data can be grouped and organized and its formats and attributes.

Data can be modeled at various levels of abstraction. The process begins by collecting information about business requirements from stakeholders and end users. These business rules are then translated into data structures to formulate a concrete database design. A data model can be compared to a roadmap, an architect’s blueprint or any formal diagram that facilitates a deeper understanding of what is being designed.

Types of data models

Data models can generally be divided into three categories, which vary according to their degree of abstraction. The process will start with a conceptual model, progress to a logical model and conclude with a physical model.