Database

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File-based system

- data is stored in one or more separate computer files defined, managed and manipulating by different application programs.

Disadvantages

- Data redundancy
  - information are duplicated in different files
  - results in memory wastage.
- Data isolation
  - Data is isolated in separate files it is difficult to access and update particular information from data files
- Integrity problems

- Security problems
  - Data is accessible by the all users and application without any limitations
- Concurrency access
- Data cannot be access by two users at the same time

Database approach

- Database approach is approach to remove all limitations of the File Based Approach
- It has four basic components
- **Database:** A database is a collection of related data.
- database management system: is software system used to create and manage databases.
- System catalogue/Data dictionary: The description of the data in the database management system.
- **Database application:** Database application refers to a program, or related set of programs, which use the database management system to perform the computer-related tasks of a particular business function, such as order processing.

Characteristics of database

- **Organized/Related** It should be well organized and related.
- **Security** Data should be protected from unauthorized access.
- **Shared** Data in a database are shared among different users and applications.
- **Recoverable** It should be recoverable in case of damage.
- **Easily Accessible** It should be available when and where it is needed
- **Flexible to change** It should be flexible to change.
- **Independence** Data at different levels should be independent of each other so that the changes in one level should not affect the other levels.
- **Consistency** Whenever more than one data element in a database represents related real world values, the values should be consistent with respect to the relationship.

Database models

- The *data model* is a collection of concepts or notations for describing data, data relationships, data semantics and data constraints. Most data models also include a set of basic operations for manipulating data in the database.
- Conceptual data model
- This Data Model defines **WHAT** the system contains. This model is typically created by Business stakeholders and Data Architects. The purpose is to organize, scope and define business concepts and rules.
- the 3 basic tenants of Conceptual Data Model are
- **Entity**: A real-world thing
- **Attribute**: Characteristics or properties of an entity
- **Relationship**: Dependency or association between two entities
- The data contained in the database
- The relationships between data items
- The constraints on data

Database models

- Logical data model
- concepts users can understand but are not too far from the way data is stored in the computer. Three well-known data models of this type are relational data models, network data models and hierarchical data models.
- This models define relations between different entities

- Physical data model
- defines the internal database storage structure, file organization or indexing techniques of the database

Importance of database

- Databases are everywhere. They are used everyday and in fact, we unknowingly came across it everyday of our lives. Your age, price of your grocery, the contact numbers in your cellphone and even the telephone directory is an example of a database
- Databases allow for data to be stored quickly and easily and are used in many aspects of your daily life.