Chapter - 10
Database Concepts.

* Database

A database may be defined as a collection of interrelated data stored together to serve multiple application..

* Limitations of the File-based Approach.

(i) Difficulty in Access.
(ii) Data Redundancy.
(iii) Data Inconsistency.
(iv) Data Isolation.
(v) Data Dependence.
(vi) Data Sharing Security / Control Issues.

* Advantages of Databases.

(i) Databases reduce the data redundancy to a large extent.

(ii) Databases can control data inconsistency to a large extent.

(iii) Databases facilitate sharing of data.

(iv) Databases enforce standards.

(v) Databases can ensure data security.

(vi) Databases ensure Data independence.

* DBMS Key Concepts.

(i) Database Schema.

A database Schema is a Sketch / Skeleton / blueprint of a planned data. It represents the design of Tables, Columns, relations, Constraints and relationships the make up a logically distinct Section of a database.

(ii) Database Instance.

A database Instance is a Snapshot of a database that exists at a particular time, i.e. the data which is stored in the database at a particular moment of time.

(iii) Metadata.

Meta-data refers to data about data. In a DBMS Context, the data in tables have certain properties and attributes, e.g. Such as the type, length, description of the Columns or other characteristics that allow the DBMS to process the data meaningful. Metadata is stored in Data Dictionary.

Data Dictionary.

Data Dictionary is a file storing metadata. (data about data) of the objects of a database.

(iv) Database Constraint.

A database Constraint is a set of rules that define valid data.

(v) Query.

A query is a type of command that retrieves data from a database stored on a server. A database query is usually written in SQL (Structured Query Language) - a specific type of language created ~~Speci~~ specifically for queries.

A query can be either a select query or an action query.

Select query.

A select query requests data from a database.

Action query.

An action query changes, updates, or adds data in the database tables.

(vi) Data manipulation.

Data manipulation is the result of action queries. Ex:- INSERT, UPDATE and DELETE queries)

(vii) Database Engine.

A database engine is the underlying software component that a DBMS uses to create, read, update and delete data from a database.

* Components of a Table.

(i) Byte

A byte is a group of eight bits and is used to store a character.

(ii) Data item (field)

A data item is the smallest unit of named data. It may consist of any number of bits or bytes. A data item represents one type of information and is often referred to as a field or data element.

(iii) Record.

A record is a named collection of data items which represents a complete unit of informati

(iv) Table.

A Table is a named collection of all occurrences of a given type of logical record.

Fields are the columns containing one type of information.

Requires 5 bytes.

Primary key Fields. Record.

Salesman no.	First Name	Surname	Sales made	Target
No-32	Sandeep	Sethi	51000	50000
So-09	Subhash	Kumar	22000	20000
So-11	Anand	Swami	25000	25000
So-17	Venket	Swami	19000	20000
WE-17	Vijay	Shah	33000	32000
WE-19	Arif	Sharma	17000	32000
WE-21	Vandana.	Pahwa	18000	18000.

↑ See, primary key field has unique value for each row.

Data item Requires 4 bytes

Figure 1.1 Components of a table.

* The Relational Model Terminology.

The relational model was propounded by E. F. Codd

Relation.

A relation is a table i.e, data arranged in rows and columns.

Domain.

A domain is a pool of values from which the actual values appearing in a given column are drawn.

Tuple.

The rows of Tables (relations) are generally refferred to as Tuples (usually pronounced to rhyme with "couples").

Attributes.

The columns of Tables (relations) are generally referred to as attributes.

Degree.

The number of attributes in a relation determine the degree of a relation. A relation HAVING 3 attributes is said to be a relation of degree. 3.

Cardinality.

A number of Tuples (rows) in a relation is called the cardinality of the relation.

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* Properties of a Relation.

(i) properties of columns (Attributes)

- The sequence / ordering of columns is insignificant.
- Each column has a unique Name.

(ii) Properties of Rows (Tuples)

- Each Row is unique (distinct)
- The sequence of Rows is insignificant.

(iii) Properties of Relations.

- Values are Atomic
- A column's values are from the same domain.
- Columns cannot contain empty values. we can use a specially designated legal blank value NULL to represent the missing value.

* Keys in a Database.

(i) Primary Key

A primary key is a set of one or more attributes that can uniquely identify tuples within the relation.

In some tables, combination of more than one attribute provides a unique values for each row. In such tables, the group of these attributes is declared as primary key. In such cases,

The primary key consists of more than one attribute, it is called composite-primary-key.

(ii) Candidate key

All attribute combinations inside a relation that can serve as primary key are candidate keys as they are candidates for the primary key position.

(iii) Alternate key.

A candidate key that is not the primary key is called an Alternate key.

(iv) Foreign key.

A non key attribute, whose values are derived from the primary key of some other table, is known as foreign key in its current table.

* MySQL Database System.

MySQL database system refers to the combination of a MySQL server instance and a MySQL database.

MySQL operates using client / server architecture.

Features of My SQL.

(i) Easy to use
(ii) Speed.
(iii) Cost
(iv) Query language support.
(v) Portability.
(vi) Data types.
(vii) Security.
(viii) Scalability and limits.
(ix) Connectivity.
(x) Localization.
(xi) Clients and tools.

Classification of SQL Statements.

(i) Data definition Language (DDL)
(ii) Data manupulation Language (DML)
(iii) Transaction Control Language (TCL)
(iv) Session Control Commands.
(v) System Control Commands.

⇒ Data Defination Language deals with Structure. DDL can be classified into the following types:-

(i) Create
(ii) Alter
(iii) Drop.
(iv) Rename
(v) Truncate
(vi) Grant and revoke
(vii) Maintanence Commands, (viii) Analyze

(ix) Check
(x) Repair
(xi) Restore.

* DML Commands.

=> By DML Commands we can perform the following operations.

(i) Retrieval of the information stored in database.
(ii) Insertion
(iii) Deletion.
(iv) Modification.

Commands of DML

(i) Insert
(ii) Update
(iii) Delete
(iv) Select.

* TCL Commands.

Transaction Control Commands are those Commands. It can classified into following types:-

(i) Commit
(ii) Rollback
(iii) Savepoint
(iv) Set Transaction

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Full Forms.

GUI - Graphical user Interface
CLI - Command line Interface.