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DATABASE

# WHY DATABASE?

Organisation: Database neatly organise information allowing us to store large amount of data in one place.

Efficiency: With a database, we can search for any piece of data in seconds, saving time and effort.

Data Management: Databases allow easy updates, deletions or additions of data in an organised manner, reducing the risk of mistakes.

Security features ensuring that only authorised individuals can access the information keeping data safe.

Backup and Recovery: Data bases have backup recovery features that help restore data in case of failure.

Multiuser access: They enable multiple users to work on the same data simultaneously without interference.

Data Integrity: Databases ensure rule, ensure that data remains accurate and consistent across all operations.

# WHAT IS A DATABASE?

Database is an organised collection of interrelated data stored together without harmful or unnecessary redundancy.

# CHARECTERISTICS OF A GOOD DATABASE

1. PERFORMANCE: Facility for the retrieval and the manipulation of data irrespective of the number of tables with minimum time.
2. MINIMAL REDUNDANCY: The database should support minimal redundancy of data.
3. MULTIUSER: The Database should provide multi-user support
4. INTEGRITY: When multiple users use the Database, the data items and the associations between the data should not be destroyed
5. PRIVACY AND SECURITY: the data should be protected against accidental or intentional access by unauthorised persons.
6. THE DB LANGUAGE: The DB language used should be easy and powerful.

# DATA MODELS

Data models are collection of tools for describing data and their inter relationships. They are:

1. OBJECT BASED LOGICAL MODEL
2. RECORD BASED LOGICAL MODEL
3. PHYSICAL DATA MODEL

## OBJECT BASED LOGICAL MODEL

#### ER MODEL

Represents data in terms of entities and the relationships between them. Used during the design phase to visualise logical structures.

#### OBJECT ORIENTED MODEL

Represents data in terms of their object’s classes and relationships.

## RECORD BASED LOGICAL MODEL

Organizes data into fixed formats or records.

#### RELATIONAL MODEL

Data is stored in tables with rows and columns.

#### NETWORK MODEL

Data is stored as records with links.

#### HIERARCHICAL MODELS

Data is organised in a tree structure.

## PHYSICAL DATA MODEL

Describes how data is physically stored in database, focusing on implementation details such as storage on hardware and performance optimisation.

# RELATIONAL MODEL TERMINOLOGY

Tables: The basic storage structure of the database holding all necessary data about real-world entities.

ROW(TUPLES): Contain all the data about an item.

COLUMN(ATTRIBUTE): Contain a particular piece of data for all entities.

CARDINALITY: The number of rows in a table.

DEGREE: The number of columns in a table.

# DDL-DATA DEFENITION LANGUAGE

## WHY DDL?

To store the data, first the structure to hold the data should first be created.

DDL is used to create, modify even remove the objects in the data base.

These statements define the structure of the database. It consists of statements that can create modify and remove database objects.

* CREATE-To create database objects
* ALTER- To change the structure of existing objects.
* DROP-To remove existing objects.
* TRUNCATE-To remove the data from the table.

# DATA TYPE

Each attributes holds a specific type of data.

Varchar(size): It’s a variable length character string having minimum length 1 and maximum length 4000.

Char(size): Fixed length character string with minimum length 1 and maximum length 2000.

Number(p,s): To store numbers

p🡪 Precision (Total number of digits)

s🡪Scale (Number of digits to right of decimal)

Date: To store date.

Long: Variable length character string upto 2 GB.

Problem:CREATE

Employee table creation

create table Employee(

EmplyeeID int,

EmployeeName char(20),

EmployeeLocation char(10)

)

create table Student(

StudentID int,

StudentName char(20),

age char(2),

locationchar(20),

DOB char(10)

)

ALTER-MODIFY: Change the datatype of a column/increase /decrease the length of a column

ALTER TABLE TABLE\_NAME MODIFY COLUMN\_NAME NEW\_DATA\_TYPE