Swipe >>>

Database

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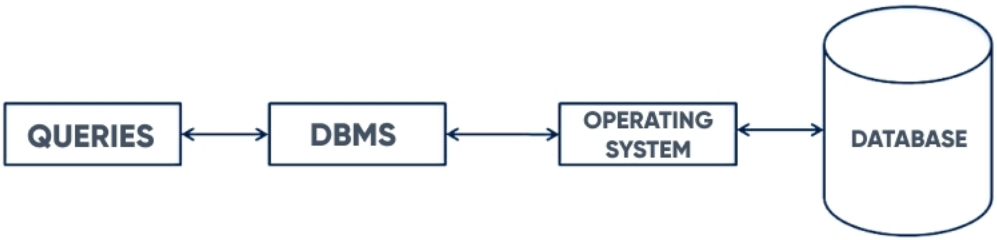
DBMS #1 Introduction

DBMS is a collection of inter-related data and set of programs to store & access those data in an easy and effective manner.



Advantages :-

1. Improved data sharing
2. Improved data security
3. Better data integration
4. Improved data access

Disadvantages :-

1. Increased costs
2. Management complexity
3. Maintaining currency
4. Frequent upgrade

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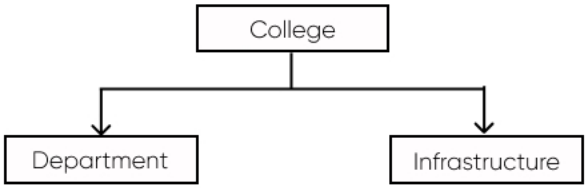
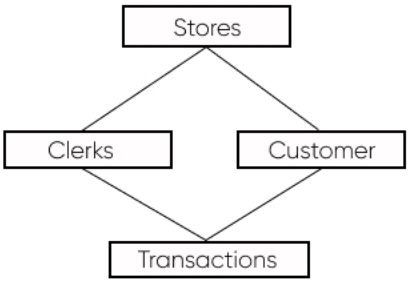
DBMS #2 Types of Database

1. Hierarchical DBMS



2. Network Model



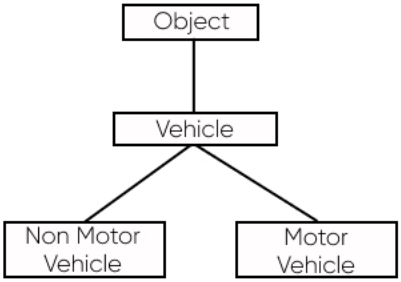
3. Relational model

Activity Code	Activity Name
24	Patching

Key = 24

Activity Code	Date	Route
24	01/12/01	I-95

4. Object-Oriented Model



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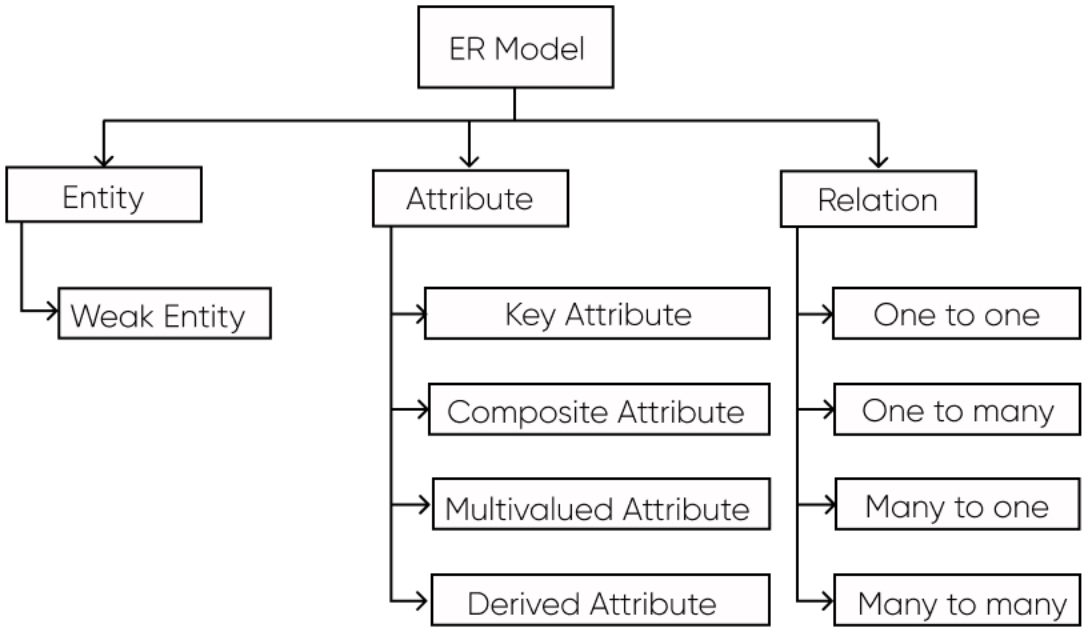
DBMS #3 Entity Relationship Model

It is a high-level data model. This model is used to define the data elements and relationship for a specified system.

Components of ER Model



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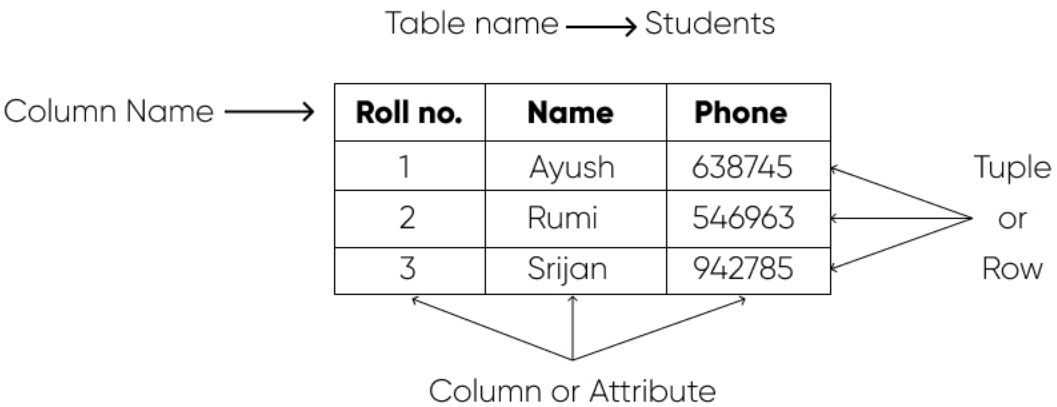
DBMS #4 Relational Model

#Relational data model is the primary data model, which is used widely around the world for data storage and processing.



#In this model, the data and relationships are represented by collection of inter-related tables.

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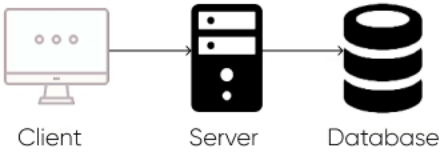
DBMS #5 Architecture

#The DBMS design depends upon its architecture. The basic client/server architecture is used to deal with a large number of PCs, web servers, database servers.

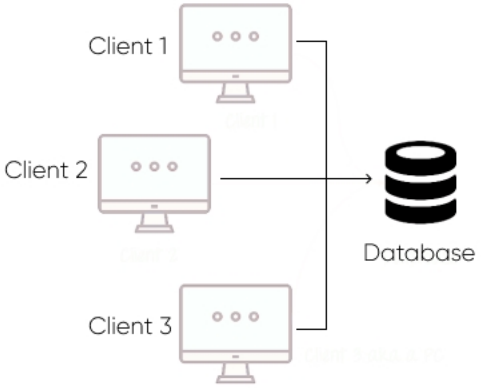
#Types

1-Tier Architecture

3-Tier Architecture



2-Tier Architecture



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DBMS #6 Database Language

#Database languages can be used to read, store and update the data in the database.

#Types

1. **Data Definition Language (DDL)**
   It is used to define database structure or pattern.

2. **Data Manipulation Language (DML)**
   It is used for accessing and manipulating data in a database. It handles user requests.

3. **Data Control Language (DCL)**
   It is used to retrieve the stored or saved data.

4. **Transaction Control Language (TCL)**
   It is used to run the changes made by the DML statement. TCL can be grouped into a logical transaction.

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DBMS #7 ACID Properties

To maintain the integrity of the data, there are four properties described in the database management system, which are known as the ACID properties.

#Types

A	→	Atomicity	→ All operations done successfully
C	→	Consistency	→ Reliable data
I	→	Isolation	→ Separation
D	→	Durability	→ Long life

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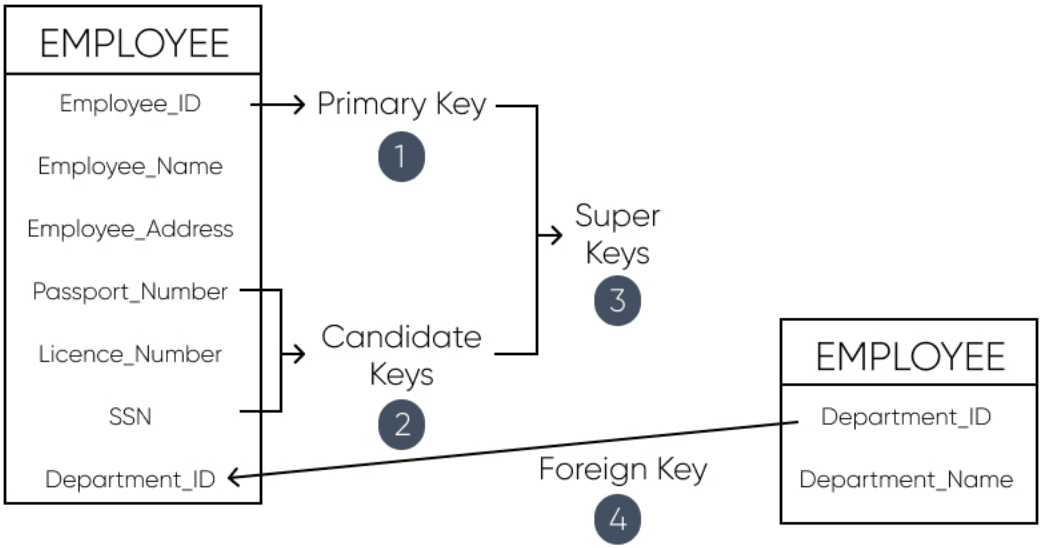
DBMS #8 Keys in Database

It is used to uniquely identify any record or row of data from the table. It is also used to establish and identify relationships between tables.

#Types



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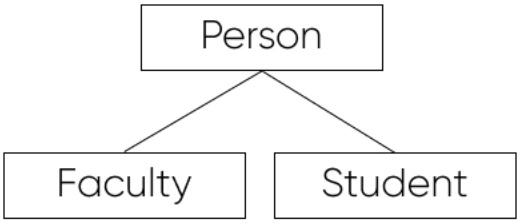
DBMS #9

Generalization, Specialization and Aggregation

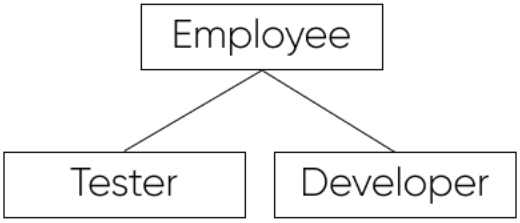
1. Generalization

Entities are combined to form a more generalized entity



2. Specialization

Used to identify the subset of an entity set that shares some distinguishing characteristics.



3. Aggregation

Relationship with its corresponding entities is aggregated into a higher level entity.

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DBMS #10 Functional Dependency

It is a relationship that exists between two attributes. It typically exists between the primary key and non-key attribute within a table.

#Types

1. Trivial functional dependency

- A → B has trivial functional dependency if B is a subset of A.
- The following dependencies are also trivial like:
  A → A,
  B → B

2. Non-trivial functional dependency

- A → B has a non-trivial functional dependency if B is not a subset of A.
- When A intersection B is NULL, then A → B is called as .. complete non-trivial.

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DBMS #11 Inference Rule

Using the inference rule, we can derive additional functional dependency from the initial set.

#Types

1. Reflexive Rule (IR1)

If X Y then X → Y

2. Augmentation Rule (IR2)

If X → Y then XZ → YZ

3. Transitive Rule (IR3)

If X→Y and Y→Z then X→Z

4. Union Rule (IR4)

If X→Y and X→Z then X→YZ

5. Decomposition Rule (IR5)

If X→YZ then X→Y and X→Z

6. Pseudo transitive Rule (IR6)

If X→Y and YZ→W then XZ→W

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DBMS #12 Normalization (1NF,2NF,3NF)

It is the process of organizing the data in the database.

#Types

1NF

It states that an attribute of a table cannot hold multiple values. It must hold only single-valued attribute.

2NF

A relation will be in 2NF if it is in 1NF and all non-key attributes are fully functional dependent on the primary key.

3NF

A relation will be in 3NF if it is in 2NF and no transition dependency exists.

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DBMS #13 Normalization (BCNF,4NF,5NF)

It is the process of organizing the data in the database.

#Types

BCNF

BCNF is the advance version of 3NF. It is stricter than 3NF.A table is in BCNF if every functional dependency X → Y, X is the super key of the table.

4NF

A relation will be in 4NF if it is in Boyce Codd normal form and has no multi-valued dependency.

5NF

A relation is in 5NF if it is in 4NF and not contains any join dependency and joining should be lossless.

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DBMS #14 Relational Decomposition

When a relation in the relational model is not in appropriate normal form then the decomposition of a relation is required.

#Types

Lossless Decomposition

If the information is not lost from the relation that is decomposed, then the decomposition will be lossless.

Name	Price	Category
Word	100	WP
Oracle	100	DB

Name	Price
Word	100
Oracle	100

Name	Category
Word	WP
Oracle	DB

Dependency Preserving

At least one decomposed table must satisfy every dependency. It is an important constraint of the database.

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DBMS #15 Transaction

A transaction is an action or series of actions. It is performed by a single user to perform operations for accessing the contents of the database.

Operations

Read : Read operation is used to read the value of X from the database and stores it in a buffer in main memory.

Write : Write operation is used to write the value back to the database from the buffer.

Commit: It is used to save the work done permanently.

Rollback: It is used to undo the work done.

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DBMS #16 States of Transaction

Active – In this state, the transaction is being executed.

Partially Committed – A transaction executes its final operation, but the data is still not saved to the database.

Committed – In this state, all the effects are now permanently saved on the database system.

Failed – If any of the checks made by the database recovery system fails, then the transaction is said to be in the failed state.

Aborted – This is the state after the transaction has been rolled back after failure. The database has been restored to its state that was before the transaction began.

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DBMS #17 Deadlock

In a database, a deadlock is an unwanted situation in which two or more transactions are waiting indefinitely for one another to give up locks.

Types

Deadlock Avoidance

It is used for detecting the deadlock situation but this method is suitable only for the smaller database.

Deadlock Detection

When a transaction waits indefinitely to obtain a lock, then the DBMS should detect whether the transaction is involved in a deadlock or not.

Deadlock Prevention

It is suitable for a large database. If the resources are allocated in such a way that deadlock never occurs, then the deadlock can be prevented.

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+91 9956127183

support@csmock.com

www.csmock.com