Bharathidasan University

Centre for Differently Abled Persons

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- Programme Name : Bachelor of Computer Applications
- Course Code : 23UCAEC04A
- Course Title : Database Management Systems
- Sem : IV
- Unit : Unit IV
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Online
Computing
DBMS
Business

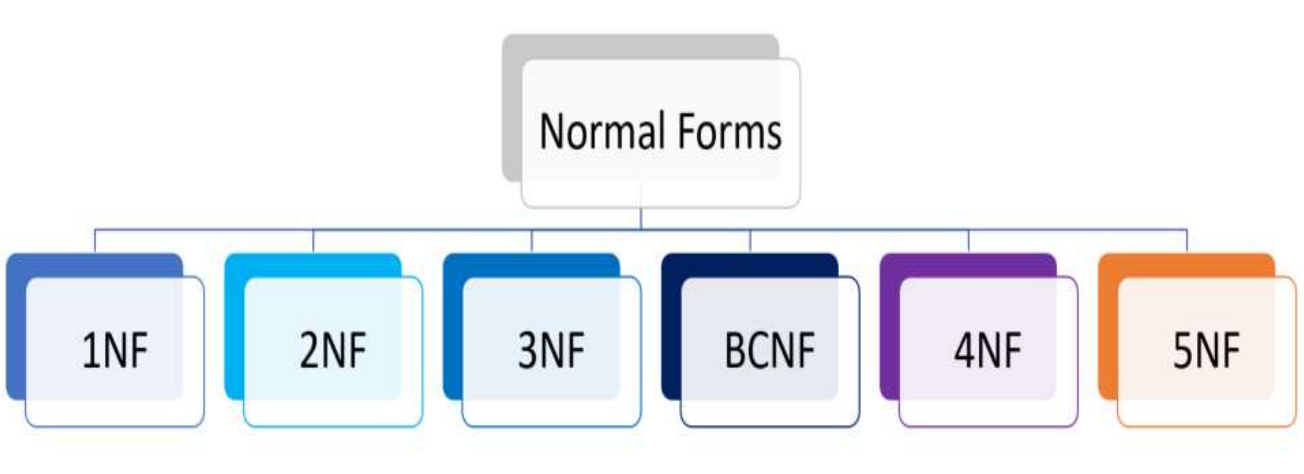
DATABASE

NORMALIZATION

Normalization

- Normalization is the process of organizing the data in the database.
- Normalization divides the larger table into the smaller table and links them using relationship.

Types of Normal Form



First Normal Form (1NF)

- A relation will be 1NF if it contains an atomic value.
- It must hold only single-valued attribute.

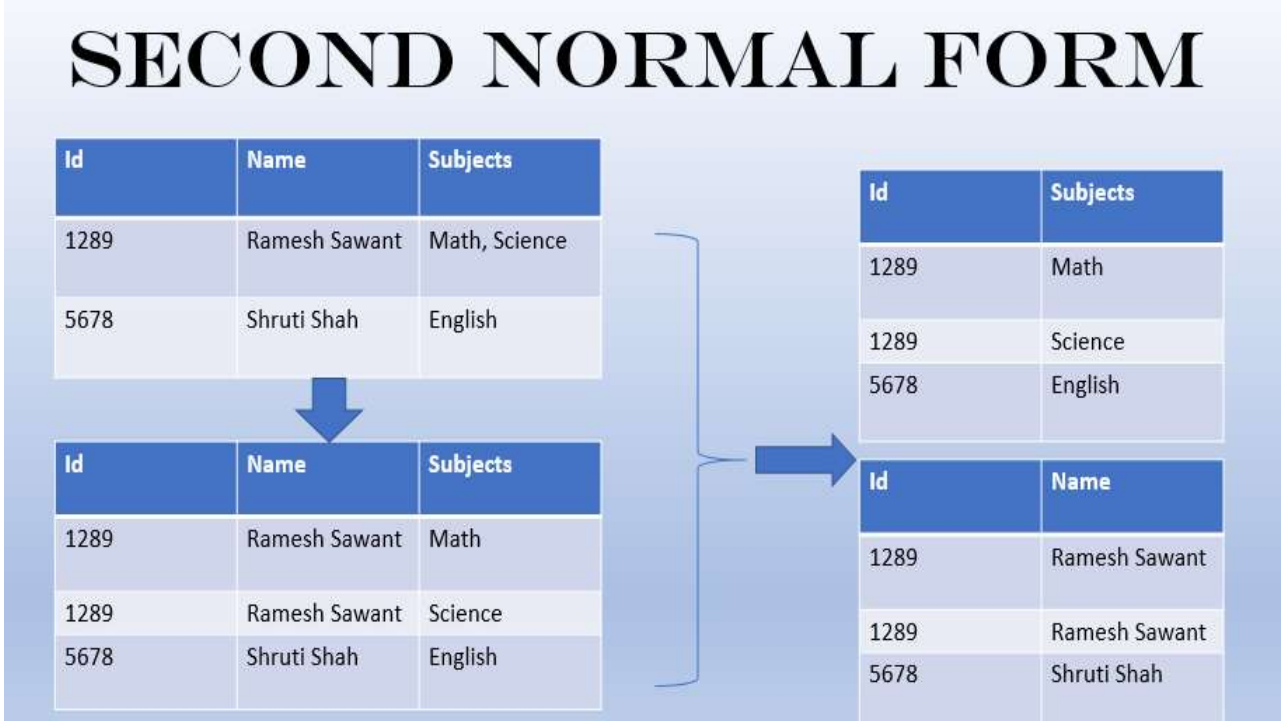
EXAMPLE: (Not 1NF → Contain multi value)

S.NO	NAME	PHONE_NUMBER
1	PRIYA	8901234567, 8976543201
2	RIYA	7890123456

S.NO	NAME	PHONE_NUMBER
1	PRIYA	8901234567
1	PRIYA	8976543201
2	RIYA	7890123456

Second Normal Form (2NF)

- In the 2NF, relational must be in 1NF.
- In the second normal form, all non-key attributes are fully functional dependent on the primary key



Third Normal Form (3NF)

- A relation will be in 3NF if it is in 2NF and not contain any transitive functional dependency.
- EXAMPLE: Book Details (Not in 3NF)

Book ID	Genre ID	Genre Type	Price
1	1	DBMS	30
2	2	C++	35
3	1	DBMS	25
4	3	OS	20
5	2	C++	35

Book ID →Genre ID

Genre Id → Genre Type

Book ID → Genre Type (Via) Genre Id

So Split table to satisfy 3NF

Book:

Book Id	Genre Id	Price
1	1	30
2	2	35
3	1	25
4	3	20
5	2	35

Genre:

Genre Id	Genre Type
1	DBMS
2	C++
3	OS

Boyce Codd Normal Form (BCNF)

- It is in 3NF
- For Every Function Dependencies X→ Y, X should be super key

EXAMPLE:

Student number	Course	Professor
1	DBMS	Prem
1	JAVA	Santhosh
2	C++	Kavin
3	JAVA	Keerthana
4	C	Hari

- Super key is dependent on non-primary key
- This is not allowed in BCNF, so split table to form BCNF

Student Number	Professor Id
1	P1
1	P2
2	P3
3	P4
4	P5

Professor Id	Professor Name	Course
P1	Prem	DBMS
P2	Santhosh	JAVA
P3	Kavin	C++
P4	Keerthana	JAVA
P5	Hari	C

Fourth Normal Form (4NF)

- It Should be BCNF
- It should not have Multi-valued Dependency.
- Multi value dependency is not allowed in table with 2 column

ST_ID	COURSE	HOBBY
100	Computer	Dancing
100	Maths	Dancing
100	Computer	Cricket
100	Maths	Cricket
150	Physics	Hockey

- Here occur Multi value dependency.
- Split the table to avoid Multi value

ST_ID	COURSE
100	Computer
100	Maths
150	Physics

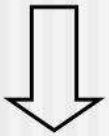
ST_ID	HOBBY
100	Dancing
100	Cricket
150	Hockey

Fifth Normal Form (5NF)

- A relation is in 5NF if it is in 4NF and not contains any join dependency and joining should be lossless.
- 5NF broken into as many tables as possible in order to avoid redundancy.
- 5NF is also known as Project-join normal form (PJ/NF).

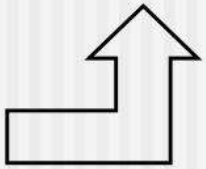
5NF Example

EmpID	ProjectID	Skill
101	A	Program
101	B	Design
102	B	Program



EmpID	Skill
101	Program
101	Design
102	Program

EmpID	ProjectID
101	A
101	B
102	B



EmpID	ProjectID	Skill
101	A	Program
101	A	Design
101	B	Program
101	B	Design
102	B	Program

QUERY PROCESSING

Query Processing

Query Processing is the activity performed in extracting data from the database.

The steps involved are:

1. Parsing and translation

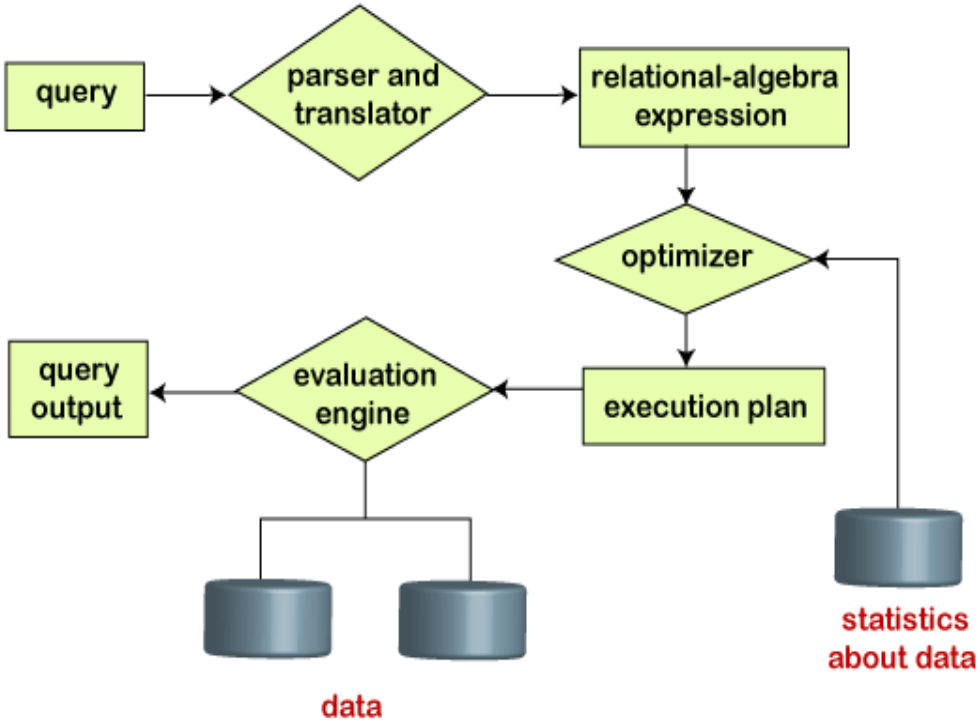
Queries get translated in high-level database languages such as SQL.

2. Optimization

It executes a given query by considering the possible query plans.

3. Evaluation

Translated relational algebra expression with the instructions used for specifying and evaluating each operation.

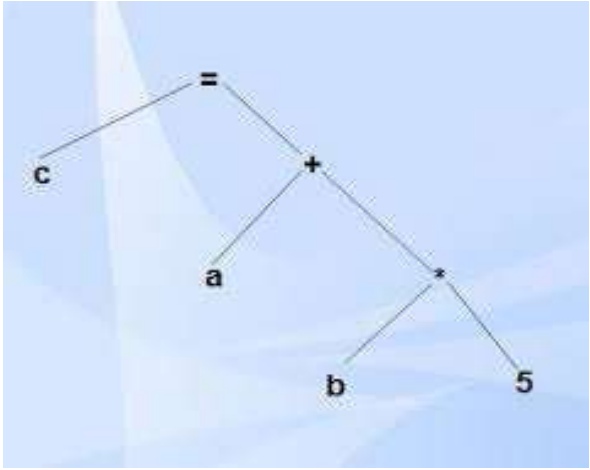


Syntax Analyzer

- A Syntax Analyzer create the syntactic structure.
- It is also called as parser.
- In parse tree, all terminals are leaves

EXAMPLE:

C = a + b * 5



Query Decomposition

- It transfers High-level query into a relational algebra query.
- It is correct way to retrieve data from the database.

Query Decomposition consists of 4 stage

1. Normalization: Query into normalized forms
2. Analysis: Detect and reject incorrect queries
3. Elimination of Redundancy: Eliminate repeated data
4. Rewriting: Transform query to RA

Thank You