

Normal Forms in Database



Databases and Practice -Menna Khaliel

What is Normalization Process?

Redundancy in a relation may causes insertion, deletion, and update anomalies

- **Normalization is database design technique that minimizes redundancy from a relation or a set of relations.**
- **Normalization rules divides larger tables into smaller tables and links them using relationship**

Normalization Rules: Normal Forms

- Normal Forms are maintenance rules that are used to eliminate or reduce the redundancy in database relations:
 - 1NF (First Normal Form)
 - 2NF (Second Normal Form)
 - 3NF (Third Normal Form)
 - BCNF (Boyce-Codd Normal Form)
 - 4NF (Fourth Normal Form)
 - 5NF (Fifth Normal Form)
 - 6NF (Sixth Normal Form)

The Theory of Data Normalization is still being developed further. For example, there are discussions even on 6th Normal Form. However, in most practical applications, normalization achieves its best in 3rd Normal Form



First Normal Form –1NF

RULES:

1. Each table cell should contain a single value
2. Each record needs to be unique

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean, Clash of the Titans	Ms.
Robert Phil	3 rd Street 34	Forgetting Sarah Marshal, Daddy's Little Girls	Mr.
Robert Phil	5 th Avenue	Clash of the Titans	Mr.



FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean	Ms.
Janet Jones	First Street Plot No 4	Clash of the Titans	Ms.
Robert Phil	3 rd Street 34	Forgetting Sarah Marshal	Mr.
Robert Phil	3 rd Street 34	Daddy's Little Girls	Mr.
Robert Phil	5 th Avenue	Clash of the Titans	Mr.

Second Normal Form –2NF

RULES:

1. Be in 1NF
2. all non-key attributes are fully functional dependent on the primary key.

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean	Ms.
Janet Jones	First Street Plot No 4	Clash of the Titans	Ms.
Robert Phil	3 rd Street 34	Forgetting Sarah Marshal	Mr.
Robert Phil	3 rd Street 34	Daddy's Little Girls	Mr.
Robert Phil	5 th Avenue	Clash of the Titans	Mr.



Table1 →

MEMBERSHIP ID	MOVIES RENTED
1	Pirates of the Caribbean
1	Clash of the Titans
2	Forgetting Sarah Marshal
2	Daddy's Little Girls
3	Clash of the Titans

Table2 →

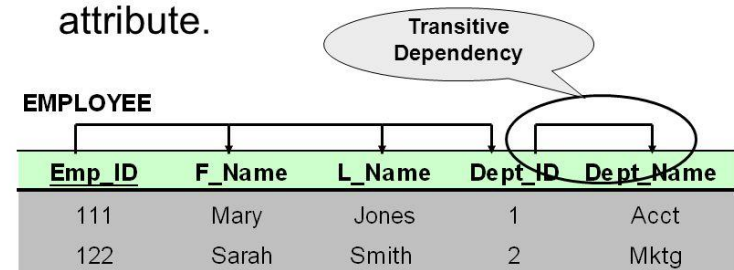
MEMBERSHIP ID	FULL NAMES	PHYSICAL ADDRESS	SALUTATION
1	Janet Jones	First Street Plot No 4	Ms.
2	Robert Phil	3 rd Street 34	Mr.
3	Robert Phil	5 th Avenue	Mr.

Transitive Functional Dependencies

A transitive functional dependency is when changing a non-key column, might cause any of the other non-key columns to change

Dependencies: Definitions

- ◆ **Transitive Dependency** – when a non-key attribute determines another non-key attribute.



MEMBERSHIP ID	FULL NAMES	PHYSICAL ADDRESS	SALUTATION
1	Janet Jones	First Street Plot No 4	Ms.
2	Robert Phil	3 rd Street 34	Mr.
3	Robert Phil	5 th Avenue	Mr.

Change in Name → May Change Salutation

Third Normal Form –3NF

RULES:

1. Be in 2NF
2. No transition dependency exists.

MEMBERSHIP ID	MOVIES RENTED
1	Pirates of the Caribbean
1	Clash of the Titans
2	Forgetting Sarah Marshal
2	Daddy's Little Girls
3	Clash of the Titans

MEMBERSHIP ID	FULL NAMES	PHYSICAL ADDRESS	SALUTATION
1	Janet Jones	First Street Plot No 4	Ms.
2	Robert Phil	3 rd Street 34	Mr.
3	Robert Phil	5 th Avenue	Mr.

SAME TWO TABLES

Table1

MEMBERSHIP ID	MOVIES RENTED
1	Pirates of the Caribbean
1	Clash of the Titans
2	Forgetting Sarah Marshal
2	Daddy's Little Girls
3	Clash of the Titans

Table2

MEMBERSHIP ID	FULL NAMES	PHYSICAL ADDRESS	SALUTATION ID
1	Janet Jones	First Street Plot No 4	2
2	Robert Phil	3 rd Street 34	1
3	Robert Phil	5 th Avenue	1



NEW TABLE

Table3

SALUTATION ID	SALUTATION
1	Mr.
2	Ms.
3	Mrs.
4	Dr.

References

- [What is Normalization in DBMS \(SQL\)? 1NF, 2NF, 3NF, BCNF Database with Example](#)
- [Normal Forms in DBMS - GeeksforGeeks](#)
- [DBMS Normalization: 1NF, 2NF, 3NF and BCNF with Examples - javatpoint](#)