



Normalization

.NET

Database normalization is the process of structuring a relational database in order to reduce data redundancy and improve data integrity.

[HTTPS://EN.WIKIPEDIA.ORG/WIKI/DATABASE_NORMALIZATION](https://en.wikipedia.org/wiki/Database_normalization)

Normalization Assignment (Pt. 1)

- Create an unnormalized table.
- List the information of at least 5 family members.
- There must be at least 5 attributes to each tuple (row) and at least 5 entities.

Normalization

https://www.tutorialspoint.com/dbms/database_normalization.htm

<https://www.c-sharpcorner.com/UploadFile/0146e3/database-normalization/>

Normalization is a method to prevent **anomalies** and keep a database in a consistent state. **Fields** and **tables** of a relational DB are organized to minimize redundancy and dependency.

Normalization involves dividing large **tables** into smaller (and less redundant) **tables** and defining relationships among their **atomic** data.

There are many **Normal Forms** but **1NF**, **2NF**, and **3NF** are primarily used.



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This table is not normalized. All the information is stored in one table.

Title	Fname	Lname	City	Movies Watched
Mr.	Mark	Moore	Crowley	Avengers Endgame, Thor
Miss.	Arely	Garza	Monterrey	Ant-Man, Captain Marvel
Mr.	David	Moore	Dallas	Spider-Man, Homecoming, Doctor Strange, Thor

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1st Normal Form (1NF)

- Have a single ***Primary Key***.
- Each table cell should contain a single value.
- Each entity needs to be unique.
- The table contains atomic values only.

ID(PK)	Title	Fname	Lname	City	Movies Watched
1	Mr.	Mark	Moore	Crowley	Avengers Endgame
2	Mr.	Mark	Moore	Crowley	Thor
3	Miss.	Arely	Garza	Monterrey	Ant-Man
4	Miss.	Arely	Garza	Monterrey	Captain Marvel
5	Mr.	David	Moore	Dallas	Spider-Man: Homecoming
6	Mr.	David	Moore	Dallas	Doctor Strange
7	Mr.	David	Moore	Dallas	Thor

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2nd Normal Form (2NF) –

- First, be in **1NF**.
- Remove subsets of data that apply to multiple rows of a **table** and place them in separate **tables** with **PK** → **FK** relationships among the new tables.
- If the table is in **1NF** and every non-key attribute is dependent on the **Primary Key**, then **2NF** is achieved.

Id(PK)	Title	Fname	Lname	City	1
1	Mr.	Mark	Moore	Crowley	
2	Miss.	Arely	Garza	Monterrey	
3	Mr.	David	Moore	Dallas	

Actions Taken:

- The **1NF** table is divided into two tables.
- Table 1 contains only person information. **Id** is created as the **Primary Key (PK)** for Table 1.
- Table 2 contains the information for each movie (still with some duplication). Table 2's new **PK** column is **MovieId**.

MovieId(PK)	Id(FK)	Movie	2
22	1	Avengers Endgame	
4	1	Thor	
12	2	Ant-Man	
21	2	Captain Marvel	
16	3	Spider-Man: Homecoming	
14	3	Doctor Strange	
4	3	Thor	

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To get to 3rd Normal Form (3NF) -

- There must be no dependencies between fields in a single row.
 - "Given a value for column B, is there only one possible value for column C?"
- If yes, B and C should be put into a new table, with one of them becoming the **Primary Key (PK)** and a reference to the new table should be left in the original table and marked as a **Foreign Key**.

Id(PK)	Title	Fname	LName	City
1	Mr.	Mark	Moore	Crowley
2	Miss.	Arely	Garza	Monterrey
3	Mr.	David	Moore	Dallas

A **Transitive Functional Dependency** occurs when the change of one **Candidate Key** column might cause any other **Candidate Key** column to change. In table 1, changing the non-key column 'Name' may change 'Title'.

MovieId(PK)	Id(FK)	Movie	2
22	1	Avengers Endgame	
4	1	Thor	
12	2	Ant-Man	
21	2	Captain Marvel	
16	3	Spider-Man: Homecoming	
14	3	Doctor Strange	
3	1	Thor	

Normalization in 3rd Normal Form

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Salutations	
TitleId (PK)	Title
1	Mr.
2	Miss.
3	Mrs.
4	Dr.

Cities	
CityId (PK)	City
76036	Crowley
75201	Dallas
32070	Monterrey
76701	Waco

Movies	
MovieId (PK)	Movie
22	Avengers Endgame
4	Thor
12	Ant-Man
21	Captain Marvel
16	Spider-Man: Homecoming
14	Doctor Strange

People/Movies Junction Table	
MovieId (FK)	Id (FK)
22	1
4	1
12	2
21	2
16	3
14	3
4	3

People				
Id (PK)	TitleId (FK)	Fname	Lname	CityId (FK)
1	1	Mark	Moore	76036
2	2	Arely	Garza	75201
3	1	David	Moore	32070

Actions Taken:

Table 1 is divided. Two new tables are created to store Title and City. Table 2 is divided to isolate Movie data and a ***Junction table*** is created to show the N-N relationship between movie and person. The database is now in **3NF**.

Assignment (Pt. 2)

- Convert your Pt. 1 table to a 3NF table.