



First Normal Form (1NF)

Ensures each column contains only atomic (indivisible) values

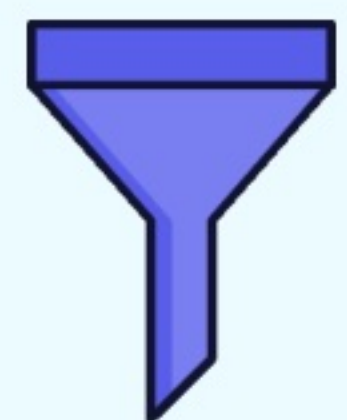
Raw Orders Table

OrderID	Customer Name	CustomerEmail	Product1	Product2	Product3
5001	Adam Smith	adam@example.com	"Shoes"	"Hat"	"Watch"



1st Normal Form

OrderID	Customer Name	CustomerEmail	Product	OrderDate
5001	Adam Smith	adam@example.com	Shoes	2025-05-01
5001	Adam Smith	adam@example.com	Watch	2025-05-01
5001	Adam Smith	adam@example.com	Hat	2025-05-01

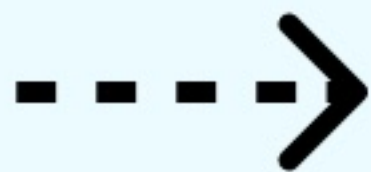


Second Normal Form (2NF)

Ensures every non-key column depends on the entire primary key

Current Orders Table

OrderID	Product	Customer Name	CustomerEmail	OrderDate
5001	Shoes	Adam Smith	adam@example.com	2025-05-01
5001	Hat	Adam Smith	adam@example.com	2025-05-01
5001	Watch	Adam Smith	adam@example.com	2025-05-01



Orders Table

OrderID	Customer Name	CustomerEmail	OrderDate
5001	Adam Smith	adam@example.com	2025-05-01

OrderItems Table

OrderID	Product1
5001	Shoes
5001	Hat
5001	Watch

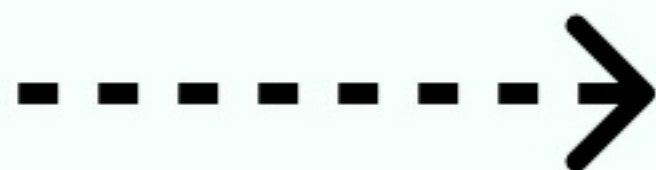


Third Normal Form (3NF)

Removes transitive dependencies. Non-key columns should depend on the primary key

Orders Table

OrderID	Customer Name	CustomerEmail	Region	OrderDate
5001	Adam Smith	adam@example.com	West US	2025-05-01



Customers Table

CustomerEmail	Customer Name	Region
adam@example.com	Adam Smith	West US

Orders Table

OrderID	Customer Email	OrderDate
5001	adam@example.com	2025-05-01



Boyce-Codd Normal Form (BCNF)

Strengthens 3NF by requiring that every column that determines another to be a candidate key

Course Assignment Table

CourseID	Room Number	Instructor
CS101	Room A	Dr Adams
CS102	Room B	Dr Baker
CS101	Room B	Dr Adams
CS102	Room A	Dr Baker



Course Instructor Table

CourseID	Instructor
CS101	Dr Adams
CS102	Dr Baker
CS101	Dr Adams
CS102	Dr Baker

Course Room Mapping Table

Room Number	Time Slot	CourseID
Room A	9:00 AM	CS101
Room B	10:00 AM	CS102
Room A	11:00 AM	CS101
Room B	12:00 PM	CS102



Fourth Normal Form (4NF)

Ensures that a table does not mix multiple independent one-to-many relationships for same entity

Employee Skills and Projects

EmployeeID	Skill	Project
E001	Java	ProjectX
E001	Python	ProjectX
E001	Java	ProjectY
E001	Python	ProjectY



Employee Skills Table

EmployeeID	Skill
E001	Java
E001	Python

Employee Project Table

EmployeeID	Project
E001	ProjectX
E001	ProjectY