

## First Normal form (1NF)

- A relation will be 1NF if it contains an atomic value.
  - Each record must be unique
  - It states that an attribute of a table cannot hold multiple values; it must hold only single-valued attributes.
- IT ELIMINATES REPOSITORY GROUP IN THE TABLE

Student Id	Student Name	Courses
1	Alice	Math, Physics
2	Bob	Chemistry, Biology, Math
3	Carol	Physics

Student ID	Student Name	Courses
1	Alice	Math
1	Alice	Physics
2	Bob	Chemistry
2	Bob	Biology
2	Bob	Math

## **Second Normal form (2NF)**

- In the 2nf relational must be in 1nf.
- In the second form, all non-prime attributes  
→ ELIMINATE PARTIAL KEY DEPENDENCY

## **Third Normal form**

- A relation must be in 2NF and no transitive dependency for no-key attributes,
- 3NF has to reduce the data duplicates.  
→ ELIMINATE TRANSITIVE DEPENDENCY

**Example:**

<u>UNF</u>	<u>1NF</u>	2NF	3NF
Project code	Project code	<u>Project code</u>	<u>Project Code</u>
Project Title	Project Title	Project Title	<u>Employee No.</u>
Project Managers	Project Managers	Project Managers	Hourly Rate
Project budget	Project Budget	Project Budget	-----
Employee No.	-----	-----	<u>Employee No.</u>
Employee Name	Project code	<u>Project code</u>	Employee Name
Department No.	Employee No.	Employee NO	Department No.
Department Name	Employee Name	Hourly rate	-----
Hourly Rate	Department NO.	-----	<u>Project code</u>
	Department name	<u>Employee No</u>	Project Title
	Hourly Rate	Employee Name	Project Managers
			Project Budget
			-----
			<u>Department No.</u>
			Department Name

**Classwork EX1:**

UNF	1NF	2NF	3NF
Patient Surname	<u>Patient No.</u>	<u>Patient No.</u>	<u>Patient No.</u>
Patient Forename	Patient Surname	Patient Surname	Patient Surname
Ward No.	Patient Forename	Patient Forename	Patient Forename
Ward Name	Ward No.	Ward No.	Ward No.
Prescription Date	Ward name	Ward name	-----
Drug Code	-----	-----	<u>Ward no.</u>
Drug Name	<u>Patient no.</u>	<u>Patient no.</u>	Ward name
Dosage	<u>Prescription Date</u>	<u>Prescription Date</u>	-----
Length of Treatment	<u>Drug Code</u>	<u>Drug Code</u>	<u>Patient no.</u>
<u>Patient No.</u>	Drug Name	Dosage	<u>Prescription Date</u>
	Dosage	Length of Treatment	<u>Drug Code</u>
	Length of Treatment	-----	Dosage
		<u>Drug Code</u>	Length of Treatment
		Drug Name	-----
			<u>Drug Code</u>
			Drug name

**Classwork EX2:**

<b><u>UNF</u></b>	<b><u>1NF</u></b>	<b><u>2NF</u></b>	<b><u>3NF</u></b>
<u>Order No.</u>	<u>Order No.</u>	<u>Order No.</u>	<u>Order No.</u>
CustomerN0	CustomerN0	CustomerN0	CustomerN0
Customer Name	Customer Name	Customer Name	Deport no
Customer Address	Customer Address	Customer Address	-----
Telno	Telno	Telno	<u>CustomerN0</u>
Deport No	Deport no	Deport no	Customer Name
Deport Name	Deport Name	Deport Name	Customer Address
Product No	-----	-----	Telno
Product Name	<u>Order No.</u>	<u>Order No.</u>	-----
Product Qty	<u>Product No</u>	<u>Product No.</u>	<u>Deport no</u>
Product Price	Product Name	Product Qty	Deport Name
	Product Qty	-----	-----
	Product Price	<u>Order No.</u>	<u>Order No.</u>
		Product Name	<u>Product No.</u>
		Product Price	Product Qty
			-----
			<u>Product No.</u>
			Product Qty
			Product Name

**Classwork Ex3:**

<b>UNF</b>	<b>1NF</b>	<b>2NF</b>	<b>3NF</b>
Branch ID	<u>Branch ID</u>	<u>Branch ID</u>	<u>Branch ID</u>
Branch Name	Branch Name	Branch Name	Branch Name
Address	Address	Address	Branch manager employee ID
Post Code	Post Code	Post Code	Branch Manager surname
Town	Town	Town	Franchise Owner Telno.
Country	Country	Country	Franchise Owner name
Branch Manager Employee ID	Branch manager employee ID	Branch manager employee ID	Franchise Owner ID
Branch Manager surname	Branch Manager surname	Branch Manager surname	Franchise Owner Start Date

Franchise Owner name	Franchise Owner Telno.	Franchise Owner Telno.	Post Code *
Franchise Owner ID	Franchise Owner name	Franchise Owner name	-----
Franchise Owner Telno.	Franchise Owner ID	Franchise Owner ID	<u>Post Code</u>
Franchise Owner Start Date	Franchise Owner Start Date	Franchise Owner Start Date	Branch Address
Employee ID	-----	-----	Town
Employee First Name	<u>Branch ID</u>	<u>Employee ID</u>	Country
Employee Surname	<u>Employee ID</u>	Employee First Name	-----
EmployeeNI No.	<u>Item ID</u>	Employee Surname	<u>Employee ID</u>
Item ID	<u>Supplier ID</u>	EmployeeNI No.	Employee First Name
Item name	Employee First Name	-----	Employee Surname
Item Description	Employee Surname	<u>Item ID</u>	EmployeeNI No.
Unit Price	EmployeeNI No.	Item name	-----
Price +VAT	Item name	Item Description	<u>Item ID</u>
No. in Stock	Item Description	Unit Price	Item name
Category Code	Unit Price	Category Code	Item Description
Category Description	Price +VAT	No. in Stock	Unit Price
Supplier ID	No. in Stock	Category Description	Category Code *
Supplier Name	Category Code	-----	No. in Stock
	Category Description	<u>Supplier ID</u>	Category Description
	Supplier Name	Supplier Name	-----
		-----	Category Code
		<u>Branch ID</u>	Category Description
		<u>Employee ID</u>	-----
		<u>Item ID</u>	<u>Supplier ID</u>
		<u>Supplier ID</u>	Supplier Name
		Price +VAT	-----
			<u>Branch ID</u>
			<u>Employee ID</u>
			<u>Item ID</u>
			<u>Supplier ID</u>
			Price +VAT

Example4:

UNF	1NF	2NF	3NF
OrderNO	<u>OrderNo</u>	<u>OrderNo</u>	<u>OrderNo</u>
OrderDate	OrderDate	OrderDate	OrderDate
CustomerID	CustomerID	CustomerID	CustomerID *

Title	Title	Title	-----
FirstName	FirstName	FirstName	CustomerID
LastName	LastName	LastName	Title
Address	Town	Town	FirstName
Town	Country	Country	LastName
Country	Address	Address	Telephone
PostCode	Telephone	Telephone	PostCode*
Telephone	PostCode	PostCode	-----
BookID	-----	-----	PostCode
ISBN	<u>OrderNo</u>	<u>BookID</u>	Country
BookTitle	<u>BookID</u>	Author	Address
Author	BookTitle	Publisher	Telephone
Publisher	Author	Price	-----
Price	Publisher	ISBN	<u>BookID</u>
Qty	Price	Book Title	Author
	Qty	-----	Publisher
	ISBM	<u>OrderNo</u>	Price
		<u>BookId</u>	ISBN
		Qty	Book Title
			-----
			<u>OrderNo</u>
			<u>BookId</u>
			Qty

Example5:

UNF	1NF	2NF	3NF
Customer Account No	<u>Customer Account</u> <u>No</u>	<u>Customer Account</u> <u>No</u>	<u>Customer Account</u> <u>No</u>
Customer Name	Customer Name	Customer Name	Customer Name
Customer Address	Customer Address	Customer Address	Customer Address
Customer Tel No.	Customer Tel No.	Customer Tel No.	Customer Tel No.
Holiday Reference No	-----	-----	-----
Booking Date	<u>Customer Account</u> <u>No</u>	<u>Holiday Reference No</u>	<u>Customer Account</u> <u>No</u>
Hotel Name	<u>Holiday Reference No</u>	FlightNo	<u>Holiday Reference No</u>
Holiday Resort	Booking Date	Hotel Name	Booking Date
Flight No	Hotel Name	Holiday Resort	-----
Departure Airport	Holiday Resort	Departure Airport	<u>Holiday Reference No</u>
Arrival Airport	Flight No	Arrival Airport	Hotel Name
Department Date	Departure Airport	Department Date	Holiday Resort
Return Date	Arrival Airport	Return Date	FlightNo*

	Department Date	-----	-----
	Return Date	<u>Customer Account No</u>	<u>FlightNo</u>
		<u>Holiday Reference No</u>	Departure Airport
		Booking Date	Arrival Airport
			Department Date
			Return Date

#### →Skeleton Table

**Customer**(Customer Acc No, customer name, customer address, customer tel no.)

**Booking** (customer Acc no\*, Holiday Ref no\*, booking date)

**Holiday**(Holiday Ref No, Hotel name, Holiday Resort, Flight no\*)

**Flight**(flight no, Departure Airport, Arrival airport, Departure date, Return date)

