What is Normalization and different forms of Normalization?

Why we need Normalization...

- Data Redundancy.
- Waste of disk space.
- Creates maintenance problems.
- Inconsistent dependency.

orderDetails table

orderID	orderDate	orderTotal	operatorID	custID	custName	custAddress	custEmail	custPhone
A-231	01/13/2019	300.00	NY-203	2325	Edward	29 Samsung Street, Queens,NY 11859	edward@outlook.com	324-987-3587, 324-897-3582
Z-980	03/05/2020	725.00	LA-3258	9800	Smith	358 Bristol Street, Denbury, MA, 32587	smith123@gmail.com	589-698-8547, 212-396-1380
Y-2432	01/13/2019	72.00	NY-009	2325	Edward	29 Samsung Street, Queens,NY 11859	edwrad@outlook.com	324-987-3587, 324-897-3582
G-2020	02/24/2021	92.78	NY-224	7816	Alex	115-A Alpine Ave,Edison,NJ 32598	alex9898@yahoo.com	214-859-9852

What is Normalization...

- Normalization is the process of organizing data in a database, in order to reduce data redundancy and improve data integrity
- First proposed by Edgar F. Cord as part of his relational model.
- Systematic approach of decomposing tables to eliminate data redundancy(repetition) and undesirable characteristics like Insertion, Update and Deletion Anomalies.
- It is a multi-step process that puts data into tabular form, removing duplicated data from the relation tables.
- Normalization works in accordance with a series of so-called normal forms.
- 1NF, 2NF, 3NF....
- Although other levels of normalization are possible, third normal form is considered the highest level necessary for most applications.

1NF or First Normal Form...

A relation is in 1NF If ...

- It Contains only atomic values, An atomic value is a value that cannot be divided
- There are no Repeating Groups, A repeating group is a series of fields/attributes that are repeated throughout a database table.

orderDetails table

orderID	orderDate	orderTotal	operatorID	custID	custName	custAddress	custEmail	custPhone
A-231	01/13/2019	300.00	NY-203	2325	Edward	29 Samsung Street, Queens,NY 11859	edward@outlook.com	324-987-3587, 324-897-3582
Z-980	03/05/2020	725.00	LA-3258	9800	Smith	358 Bristol Street, Denbury, MA, 32587	smith123@gmail.com	589-698-8547, 212-396-1380
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Tables in 1NF

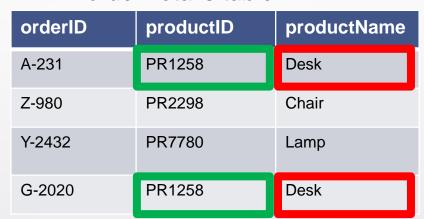
orderID	orderDate	orderTotal	operatorID	custID	custID	custName	custAddress	custEmail	custPriPhone	custAltPhone
A-231	01/13/2019	300.00	NY-203	2325	2325	Edward	29 Samsung Street, Queens,NY 11859	edward@outlook.com	324-987-3587	324-897-3582
Z-980	03/05/2020	725.00	LA-3258	9800	9800	Smith	358 Bristol Street,Denbury,	smith123@gmail.com	589-698-8547	212-396-1380
Y-2432	01/13/2019	72.00	NY-009	2325			MA, 32587			
G-2020	02/24/2021	92.78	NY-224	7816	7816	Alex	115-A Alpine Ave,Edison,NJ 32598	alex9898@yahoo.com	214-859-9852	NULL

2NF or 2ND Normal Form...

A relation is in 2NF If ...

- It is in 1NF.
- All partial key dependencies are removed, where an attribute in a table depends on only a part of the primary key and not on the whole key.

orderDetails table



Tables in 2NF

orderID	productID
A-231	PR1258
Z-980	PR2298
Y-2432	PR7780
G-2020	PR1258

productID	productName
PR1258	Desk
PR2298	Chair
PR7780	Lamp

3NF or 3RD Normal Form...

A relation is in 3NF If ...

- It is in 2NF.
- Non-Primary key columns shouldn't depend on the other non-Primary key columns.
- There is no transitive functional dependency.

