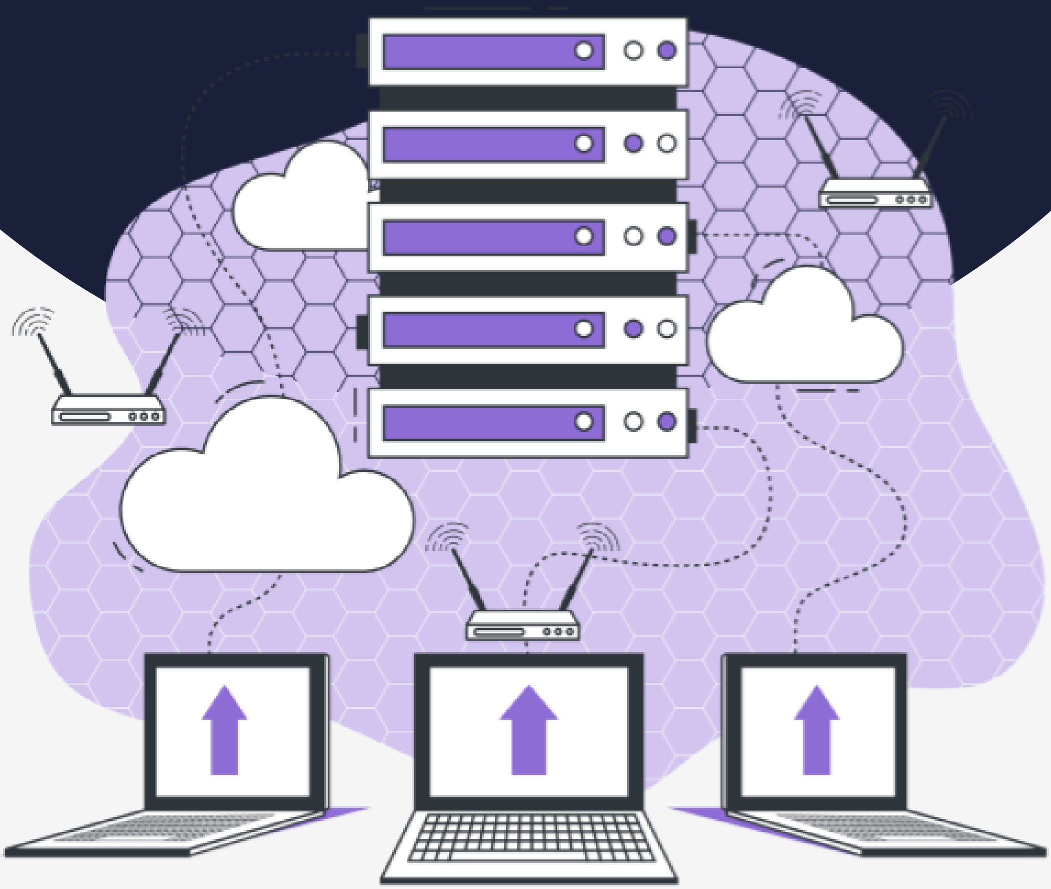
Lesson:

1 NF



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What is 1NF?

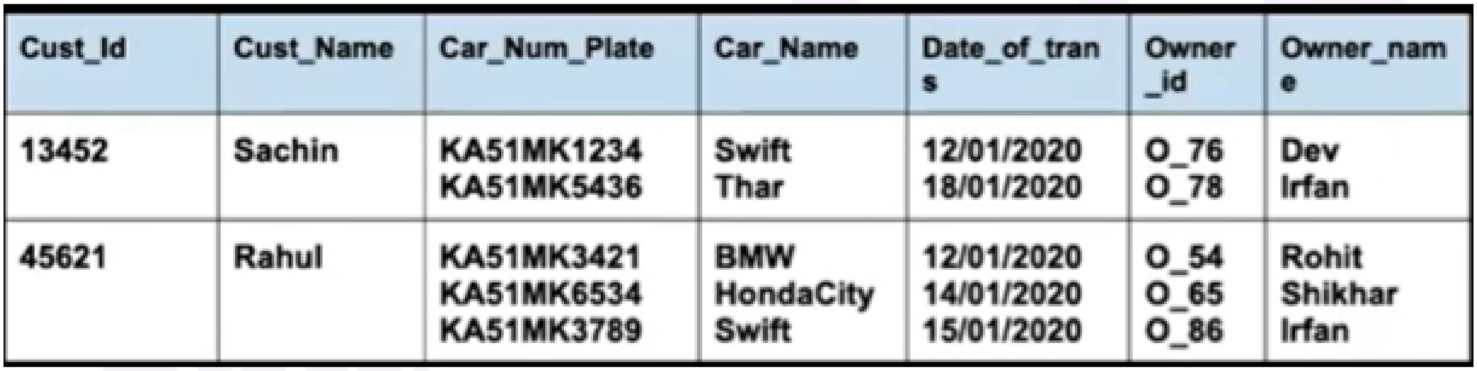
For a table to be in 1NF:

- All cells should have single/atomic values and no multiple values
- There has to be a primary key that uniquely identifies each row.

If both conditions are met the table is said to be in 1NF.

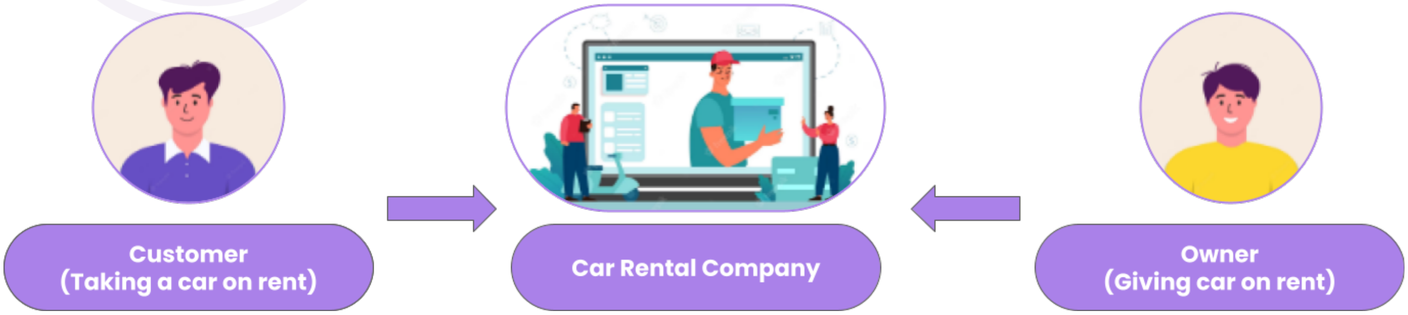
Assume the table below for a car rental company where owners can rent out their cars and customers can take the car on rent for a certain time.

Table:



Cust_Id	Cust_Name	Car_Num_Plate	Car_Name	Date_of_trans	Owner_id	Owner_name
13452	Sachin	KA51MK1234 KA51MK5436	Swift Thar	12/01/2020 18/01/2020	O_76 O_78	Dev Irfan
45621	Rahul	KA51MK3421 KA51MK6534 KA51MK3789	BMW HondaCity Swift	12/01/2020 14/01/2020 15/01/2020	O_54 O_65 O_86	Rohit Shikhar Irfan

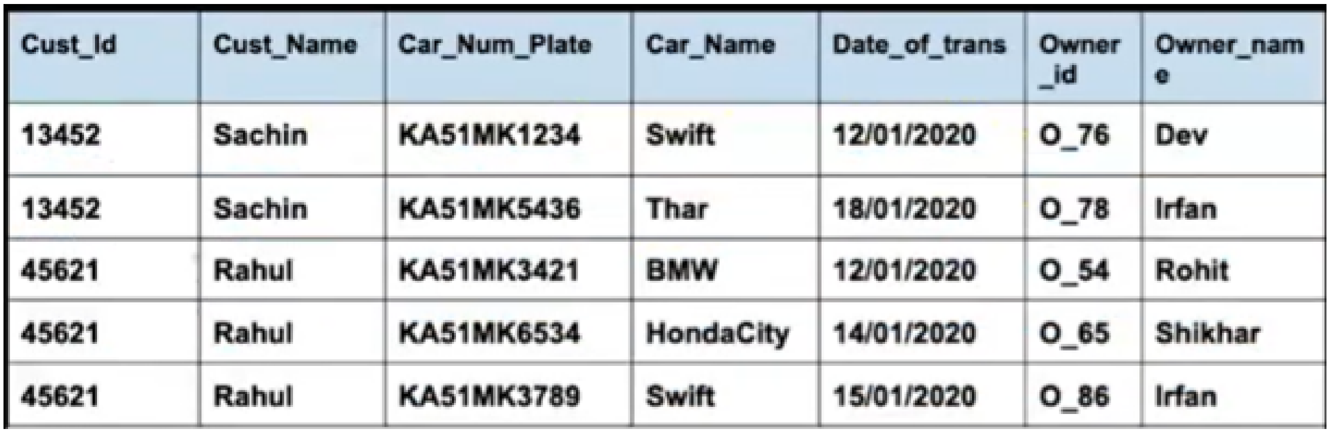
It could be understood as:



To store this use case, we have the table shown above.
Now the question arises, is this table in 1NF?

For this to be in 1NF, no cell can have multiple values. But in the table, we can see that Car_Num_Plate, Car_Name, Date_of_trans, Owner_Id, and Owner_Name; all of these rows have multiple values for a single Cust_Id. Clearly, the table is not in 1NF.

If it has to be converted into 1NF the first thing to be done is to fix the multi-valued cells. In order to fix it, we need to break each row into multiple rows which will result in the following transformed table.



Cust_Id	Cust_Name	Car_Num_Plate	Car_Name	Date_of_trans	Owner_id	Owner_name
13452	Sachin	KA51MK1234	Swift	12/01/2020	O_76	Dev
13452	Sachin	KA51MK5436	Thar	18/01/2020	O_78	Irfan
45621	Rahul	KA51MK3421	BMW	12/01/2020	O_54	Rohit
45621	Rahul	KA51MK6534	HondaCity	14/01/2020	O_65	Shikhar
45621	Rahul	KA51MK3789	Swift	15/01/2020	O_86	Irfan

Here, none of the cells has multiple values.

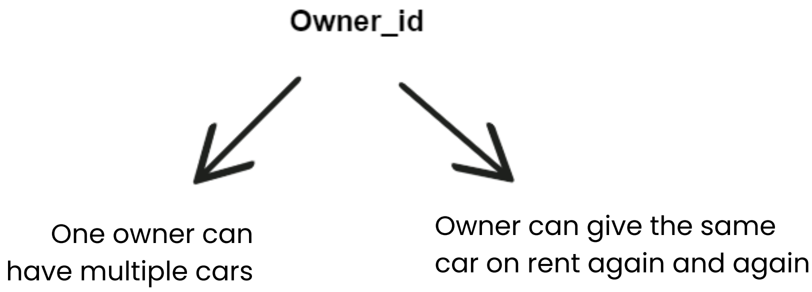
Now, we also need to have a uniquely identifying column which would be identified as the primary key. Let us try to find a suitable primary key for this table.

Let us look at all the candidates for the Primary key:

- Cust_Id - Since it has repeating values in multiple rows, it cannot be chosen as the P.K.
- Cust_Name - Clearly, the same name is appearing in multiple rows. Hence, cannot be made a P.K.
- Car_Num_Plate - It might seem to be like that for the limited dataset we are seeing here but let us not forget that the same car can be rented again and again.
  Hence, it will have the same value for multiple rows. Hence, cannot be made a P.K.

  In a larger perspective, the table will have each of the rows repeating some or the other value.
  Again, Car_name and Date_of_trans can also not be P.K. since they cannot be unique.

- Let us look at the candidature of Owner_id for being a P.K.



Owner_id
One owner can have multiple cars
Owner can give the same car on rent again and again

- Owner_name - can repeat, hence fails to qualify for P.K.

Therefore, no single column qualifies as a Primary key and we will have to find a combination of keys that can be unique (a composite key).

Let us say, we have a condition given here:
A car can be rented only once in a given day.

Now if we take the columns [Car_Num_Plate, Date_of_trans] as a composite key, it will always result in unique values based on the condition stated above.
Hence, this qualifies as the identifying composite key.

At last, both conditions for 1NF are satisfied.