IST 659 : Data Admin Concepts and Database Management Latika Mahesh Wadhwa

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**Bank Accounts Management System**



3)

**(1) List of Functionally Dependent attributes**

* Customer\_id -> first\_name, last\_name, flat\_no, street\_no, city, state, country, pin\_code, phone\_no, email\_id
* Customer\_id, account\_id -> first\_name, last\_name, flat\_no, street\_no, city, state, country, pin\_code, phone\_no, email\_id, voice\_plan\_id, text\_plan\_id, text\_amount, per\_mb\_charge, data\_plan\_id, data\_amount, total\_bill\_amount
* Start\_date-> end\_date, due\_date
* Account\_no, start\_date -> voice\_plan\_id, text\_plan\_id, text\_amount, per\_mb\_charge, data\_plan\_id, data\_amount, last\_payment\_amount, last\_payment\_date, total\_bill\_amount, mb\_used, no\_of\_text, mins
* Data\_plan\_id -> per\_mb\_charge
* Voice\_plan\_id -> per\_min\_charge
* Text\_plan\_id-> no\_of\_text
* Data\_plan\_id, start\_date -> mins, voice\_amount
* Voice\_plan\_id, start\_date -> no\_of\_text, text\_amount
* Text\_plan\_id, start\_date -> mb\_used, data\_amount

**(2) The data model that conforms to 1NF**



**(3) A database is in first normal form if it satisfies the following conditions:**

* Contains only atomic values
* There are no repeating groups

In the above relation, each column has atomic values and can be uniquely identified by a set of composite primary keys namely:

* customer\_id
* account\_id
* start\_date

**(4) The data model that conforms to 2NF**



**(5) Explanation of what partial dependencies you have found and how you removed them**

A relation is in **second normal form** if it is in 1NF and every non key attribute is fully functionally dependent on the primary key

But not every attribute is fully functionally dependent on the combination of all three keys(in our case account\_id and start\_date). Therefore we change the relation in 2NF by splitting the attributes in such a form that they completely depend on the key or combination of keys.

**(7) Explanation of what transitive dependencies you have found and how you removed them**

Following are the transitive dependencies found:

* + Account\_id-> voice\_plan\_id : voice\_plan\_id -> per\_min\_charge
  + Account\_id-> data\_plan\_id : data\_plan\_id -> per\_mb\_charge
  + Account\_id-> text\_plan\_id : text\_plan\_id -> per\_text-charge
  + Account\_id, start\_date -> mins: mins-> voice\_amount
  + Account\_id, start\_date -> no\_of\_text: no\_of\_text -> text\_amount
  + Account\_id, start\_date -> mb\_used: mb\_used-> data\_amount

To remove these transitive dependencies we create following new relations VoiceUsage

* DataUSage
* TextUsage
* TextPlan
* DataPlan
* VoicePlan

These tables are made directly functionally dependent on their keys hence eliminating transitive dependencies

To eliminate these transitive dependencies 3NF data model is created as below (6)

**(6) The data model that conforms to 3NF**

