

DnA Project Phase - 3

Team 17 - DNA 5'

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Changes made while converting to the Relational model

Changes:

- Entity Citizen → Relation Citizen
- Entity Neighbourhoods → Relation Neighbourhood and Neighbourhood_landmark
- Entity Banks → Relation Bank and Bank_interests
- Entity LEA → Relation LEA, LEA_cases and LEA_employees
- Entity Hospitals → Relation Hospitals, Hospitals_staff, Hospitals_nurses and Hospital_doctors

Reasoning:

All strong entities are expressed as relations. All single attributes are copied in directly, the components of all composite attributes are individually added as attributes, and for every multi-valued attribute a new relation is created with two attributes, one referring to the strong entity and the other attribute to store the attribute (both these taken together is the primary key)

Changes:

- Entity Patient and “visits hospital” Relationship → Relation Patients, Patients_diseases and Patients_doctors
- Entity Crimes and “reports crime” Relationship → Relation Crimes, Crimes_inspector, Crimes_charges and Crimes_crimetype
- Entity Banks Accounts and “opens account” Relationship → Relation BankAccount

Reasoning:

Every weak entity is represented as relation in a similar manner as above, and additionally, extra attributes are added in the same relation to refer to owner entities, based on the respective identifying relationships. All attributes that refer to parents, and the partial key of the weak entity all taken together becomes the primary key.

Changes:

- “lives in” Relationship → New foreign key

Reasoning:

This being a 1:N binary relationship, the attribute ad_pincode in Citizen (the N side) is made to be the foreign key referring to the pincode attribute in Neighbourhood (the 1 side)

Changes:

- “gives loan” Relationship → Relations of the form R_loan_*
- “serves neighbourhood” Relationship → Relations of the form R_serves

Reasoning:

Since these are all the M:N binary relationship types, new relations each with two attributes referring to primary keys of the relationships were added (and these both taken together is the primary key). Additionally, the attributes of “give loan” relationship are added in the respective relations as well

Every attribute corresponding to a person is represented as a foreign key referring to the cin attribute of the Citizen relation.

Below, the diagram of the relational model is attached

Changes made to accommodate 1NF :

No additional changes were required to change to First normal form.

- All datatypes have definite domains and each of the attributes take atomic and single values from the respective domains.
- Every relation has a primary key, and there are no attributes that are duplicate or repeating.

Changes made to accommodate 2NF :

No additional changes were required to change to Second normal form.

- In all relations, every non-key attribute depends on the entire primary key and not a part of it (full functional dependency) and there are no partial functional dependencies.

Changes made to accommodate 3NF :

A Minor change had to be made to accommodate Third normal form (attached image below)

- The `tax` and the `income_category` attributes are derived attributes which are derived from the attribute `income`, in the `Citizen` relation.
- This is a transitive dependency, and hence must be removed. So, we made 2 separate relations, one with attributes `income` (primary key) and `tax` and the other with attributes `income` (primary key) and `income_category` and removed these attributes from the relation.

