AAB DNA Project Phase 3

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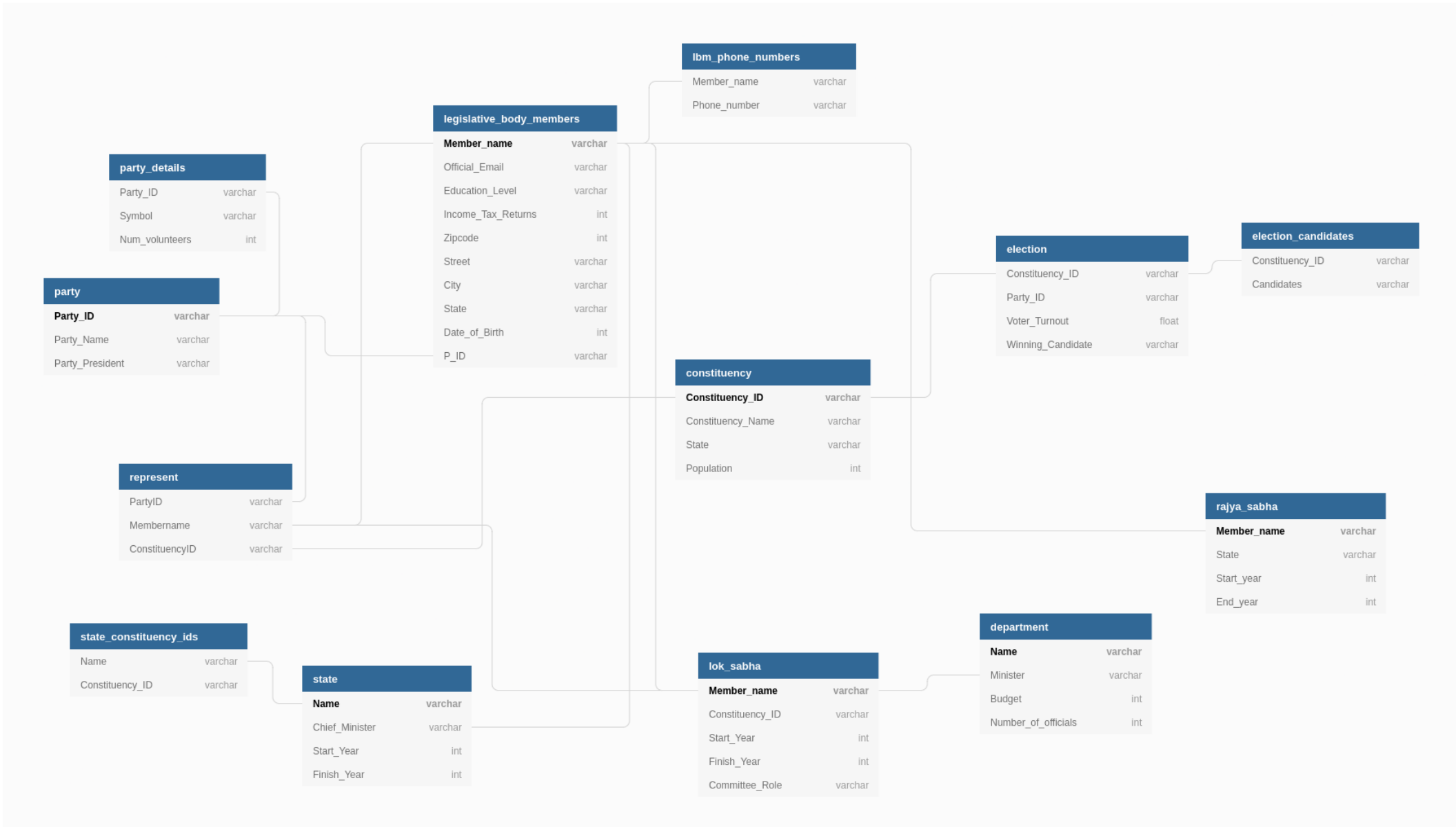
Changes made to the ER model made of phase 2:

1. In the Election entity, the Candidate attribute is multivalued.
2. Party ID attributes in the Lok Sabha, State and Rajya Sabha entities were redundant since Party ID was already mentioned for all members in the Legislative Body Members entity.
3. The Member name attribute in Lok Sabha and Rajya Sabha entities and the Minister attribute in the State entity were mapped to the Member name attribute in the Legislative Body Members entity and the cardinality ratio for each of these relationships was 1:1.

Transforming the ER model to a relational model:

1. For each multivalued attribute, as per the guidelines, we made a new table which had the primary key as the first column in the table and the multivalued attribute as the other column in the table. This change was made to Phone number (in Legislative Body Members), Candidate (Election) and IDs of all constituencies (State).
2. For each composite attribute, we mentioned each sub attribute as a separate column in the table. This change was made to Address (Legislative Body Members) and Term (State, Rajya Sabha and Lok Sabha).
3. Since we can't mention foreign keys in the dbdiagram.io editor, we have explicitly drawn the relationship lines between each foreign key and the corresponding primary key that it maps to.
4. We have created a separate table for the n=4 relationship and linked it with the corresponding table.

RELATIONAL MODEL:


lbm_phone_numbers
Member_name varchar
Phone_number varchar
legislative_body_members
Member_name varchar
Official_Email varchar
Education_Level varchar
Income_Tax_Returns int
Zipcode int
Street varchar
City varchar
State varchar
Date_of_Birth int
P_ID varchar
party_details
Party_ID varchar
Symbol varchar
Num_volunteers int
party
Party_ID varchar
Party_Name varchar
Party_President varchar
election
Constituency_ID varchar
Party_ID varchar
Voter_Turnout float
Winning_Candidate varchar
election_candidates
Constituency_ID varchar
Candidates varchar
constituency
Constituency_ID varchar
Constituency_Name varchar
State varchar
Population int
represent
PartyID varchar
Membername varchar
ConstituencyID varchar
rajya_sabha
Member_name varchar
State varchar
Start_year int
End_year int
state_constituency_ids
Name varchar
Constituency_ID varchar
state
Name varchar
Chief_Minister varchar
Start_Year int
Finish_Year int
lok_sabha
Member_name varchar
Constituency_ID varchar
Start_Year int
Finish_Year int
Committee_Role varchar
department
Name varchar
Minister varchar
Budget int
Number_of_officials int

Normalization:

- **1NF:**

  A table is in 1 NF if and only if:

  1. There are only Single Valued Attributes.
  2. Attribute Domain does not change.
  3. There is a unique name for every Attribute/Column.
  4. The order in which data is stored does not matter.

  Hence the table must not contain any composite or multivalued attribute. This was taken care of while converting from ER model to relational. Hence it is already in its first normal form. **Thus, the 1NF model has not been included.**

- **2NF:**

  A relation is in 2NF if it has No Partial Dependency, i.e., no non-prime attribute (attributes which are not part of any candidate key) is dependent on any proper subset of any candidate key of the table.

  In all our entities, the primary key or the foreign key comprises only a single attribute. Keeping the above definition in mind, there exists no candidate key made from multiple attributes itself. Hence there is no question of partial dependency on a proper subset of any candidate key. Thus it is already in its second normal form. **Thus, the 2NF model has not been included.**

- **3NF:**

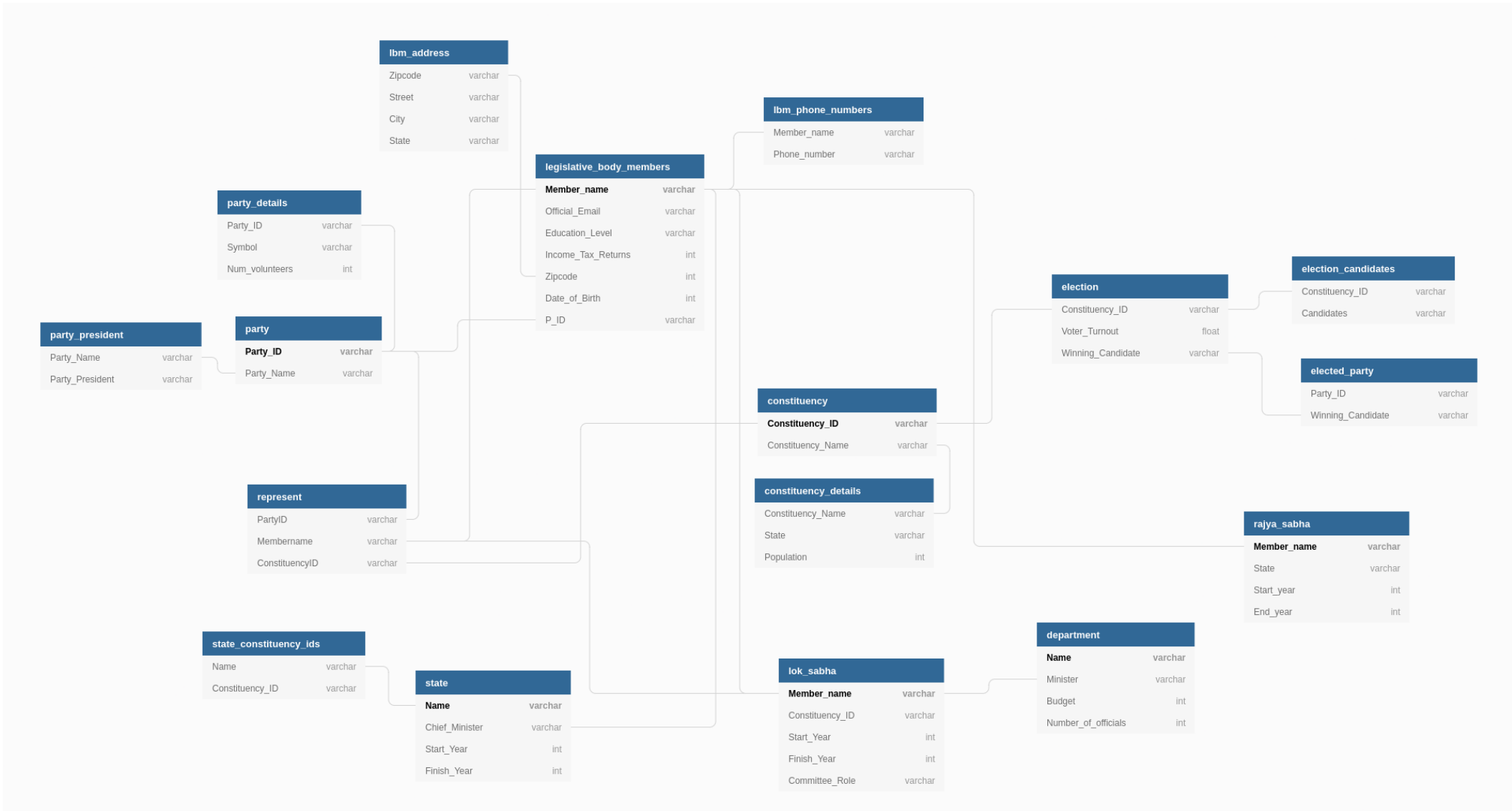
  A relation is in 3NF if it is already in 2NF and in which no attribute (which is not part of the primary key) is transitively dependent on the primary key.

  We had the following instances of transitive dependencies in our relation -

  - In the Legislative Body Member table, the State, City, Street, and Zip Code attributes are transitively dependent on the primary key (Member_name). To normalize, we create the LBM_Address table which stores State, City, Street, and Zip Code. Additionally, we remove State, City, and Street attributes from the Legislative Body Member table.
  - In the Election table, the Winning_Candidate and Party_ID attributes are transitively dependent on the foreign key (Constituency_ID). To normalize, we create the Elected_Party table which stores the Winning_Candidate and Party_ID attributes. Additionally, we remove Party_ID from the Election table.
  - In the Constituency table, the State, Population, and Consitituency_Name attributes are transitively dependent on the primary key (Constituency_ID). To normalize, we create the Constituency_Details table which stores the State, Population, and Consitituency_Name attributes. Additionally, the State and Population attributes are removed from the Constituency table.

- In the Party table, the Party_Name and the Party_President attributes are transitively dependent on the primary key (Party_ID). To normalize, we create the Party_President table which stores the Party_Name and the Party_President attributes. Additionally, the Party_President attribute was removed from the Party table.

3NF MODEL:


lbm_address
Zipcode varchar
Street varchar
City varchar
State varchar
lbm_phone_numbers
Member_name varchar
Phone_number varchar
legislative_body_members
Member_name varchar
Official_Email varchar
Education_Level varchar
Income_Tax_Returns int
Zipcode int
Date_of_Birth int
P_ID varchar
party_details
Party_ID varchar
Symbol varchar
Num_volunteers int
party_president
Party_Name varchar
Party_President varchar
party
Party_ID varchar
Party_Name varchar
election
Constituency_ID varchar
Voter_Turnout float
Winning_Candidate varchar
election_candidates
Constituency_ID varchar
Candidates varchar
elected_party
Party_ID varchar
Winning_Candidate varchar
constituency
Constituency_ID varchar
Constituency_Name varchar
constituency_details
Constituency_Name varchar
State varchar
Population int
represent
PartyID varchar
Membername varchar
ConstituencyID varchar
rajya_sabha
Member_name varchar
State varchar
Start_year int
End_year int
state_constituency_ids
Name varchar
Constituency_ID varchar
state
Name varchar
Chief_Minister varchar
Start_Year int
Finish_Year int
lok_sabha
Member_name varchar
Constituency_ID varchar
Start_Year int
Finish_Year int
Committee_Role varchar
department
Name varchar
Minister varchar
Budget int
Number_of_officials int