Project Phase - 1
Aryamaan Basu Roy - 2020101128
Aum Alok Khatlawala - 2020113008
Ben Paul Varghese - 2020101115

Introduction
We decided to come up with a mini-world for the Indian government. The mini-world is about storing and accessing data about the non-confidential information about the government.

Purpose
The system will enable users to access information about the government mentioned in the database such as Lok Sabha details, Rajya Sabha details, Parliamentarian details and Elections details.

Applications
1. Data requirements of the members of the legislative body (parliament, state assembly, panchayats/municipal body).
2. Information regarding upcoming elections contested in various constituencies.
3. Data about the ruling party/coalition and all the ministries.

Users
1. Members of the government at all levels can refer to data regarding the current members and events of the legislature.
2. The citizens of the country can view all data except specific confidential data under their right to information (RTI).
3. Foreign Governments can view public data about the legislative body elected.

Database Requirements
Entities
1. **Legislative Body Members**
   Attributes:
   a. Member name **(varchar(100), primary key)**
   b. Official Email **(varchar(200), unique)**
   c. Phone number **(Multivalued attribute) (varchar(13), not null)**
   d. Address **(Composite attribute) (varchar(400), not null) (super key)**
      - Zipcode
      - Street
      - City
      - State
   e. Income Tax Returns **(int)**
   f. Education Level **(varchar(100))**

g. Date of birth **(int with formatting)**
h. Age **(Derived attribute from Date of birth) (int)**

2. **Lok Sabha**
   Attributes:
   a. Member name **(varchar(100), primary key)**
   b. Party ID **(varchar(5))**
   c. Constituency ID **(varchar(5))**
   d. Term (start year - finish year) **(Composite attribute) (derive tenure) (int with formatting)**
   e. Tenure **(derived attribute) (int)**
   f. Committee Role **(varchar(20))**

3. **Rajya Sabha**
   Attributes:
   a. Member name **(varchar(100), primary key)**
   b. Party ID **(varchar(5))**
   c. State **(varchar(20))**
   d. Term (start year - finish year) **(Composite attribute) (int with formatting)**

4. **Election**
   Attributes:
   a. Constituency ID **(varchar(5))**
   b. Candidates (Multivalued attribute) **(varchar(100))**
   c. Party ID (Multivalued attribute) **(varchar(5))**
   d. Voter Turnout (in %) **(float)**
   e. Winning candidate **(varchar(100))**

5. **Department**
   Attributes:
   a. Name **(varchar(50)) (primary key)**
   b. Minister **(varchar(100))**
   c. Budget **(int)**
   d. Number of officials **(int)**

6. **State**
   Attributes:
   a. Name **(varchar(50)) (primary key)**
   b. Chief Minister **(varchar(100))**
   c. Party ID **(varchar(5))**
   d. Term (start year - finish year) **(Composite attribute) (int with formatting)**

e. IDs of all constituencies in the state **(Multivalued attribute) (varchar(5))**

7. **Party**
   Attributes:
   a. Party ID **(varchar(5))**
   b. Party Name **(varchar(50)**
   c. Party president **(varchar(100))**

8. **Constituency**
   Attributes:
   a. Constituency ID **(varchar(5)) (primary key)**
   b. Constituency Name **(varchar(50))**
   c. State **(varchar(50))**
   d. Population **(int)**

9. **Party Details**
   Attributes:
   a. Party ID **(varchar(5))**
   b. Symbol **(varchar(20))**
   c. No. of volunteers **(int)**

Weak Entities

1. "Elections" entity is a weak entity as the only attribute to uniquely identify rows is "Constituency ID" which is a foreign key from the "Constituency" entity. The elections entity has no relevance without details of constituencies.

2. "Party Details" entity is a weak entity as the only attribute to uniquely identify rows is "Party ID" which is a foreign key from the "Party" entity. The Party Details entity has no relevance otherwise.

Relationships

1. Legislative Body Member *belongs to* a party
   a. Degree: 2
   b. The relationship is between a legislative member (from any chamber) and the party, that they belong to.
   c. Cardinality ratio: N:1
      One member can only belong to one party, but one party can have several members.
2. Elections *are held* in constituencies.
   a. Degree: 2
   b. The relationship involves the Constituency and Election entities.
   c. Cardinality ratio: 1:1

One constituency has only one election and one election can be held in only one constituency.

3. Some Lok Sabha Members *are part of* a Department.
    a. Degree: 2
    b. The relationship involves the Lok Sabha members and the Department entity.
    c. Cardinality ratio: 1:1
       Each department has one Lok Sabha member (who is the minister) and one member can belong to only one department.
4. Lok Sabha members *are part of* the collection of all Members of Legislative Bodies and they *belong to* a Party and *represent* a Constituency.
    a. Degree: 4
    b. The relationship involves the Lok Sabha, Legislative Body Member, Party, and Constituency entities.
    c. Cardinality ratio: 1:1:1:1 - Reason: Let the entities be a, b, c and d. To understand its ratio, we take one entity, let's say a, and set b, c and d as a given and calculate how many values a can take. Following this, we can easily see that given a "Members of Legislative Body *belonging to* a Party and *representing* a Constituency", we can have only one Lok Sabha member. Similarly, it is easy to verify the values for the other entities.

Points to Remember:
1. <u>No of entity types:</u> 9
2. <u>Weak Entities are mentioned above.</u>
3. <u>One entity with 2 primary keys:</u> 'member name' and 'email' attributes in entity "Legislative Body Members" can be the primary key as they are unique for every entry.
4. <u>n>3 relationship:</u> 4th relationship mentioned above is a degree 4 relationship.
5. <u>Subclass:</u> 'Lok Sabha' and 'Rajya Sabha' entities are subclasses of superclass "Legislative Body Members". They have attributes of their own and all member entries in Lok sabha and Rajya sabha inherit properties from the superclass entity.
6. <u>Composite:</u>
    ● "Address" attribute in the "Legislative Body Members" entity is composed of 4 attributes: zip code, city, street, state.
    ● "Term" attribute in Rajya Sabha and Lok Sabha entities is composed of 2 attributes: start year, end year.
   <u>Multivalued:</u>
    ● "Candidates" attribute in elections entity

- "Party ID" attribute in elections entity
  Both can have multiple values as multiple candidates belonging to different parties contest for one constituency

Derived:
- Age attribute is derived from DOB attribute in "Legislative Body Members"

7. Cardinality constraints are mentioned above under entities.

Bonus points:
1. Super Key: Address attribute in "Legislative Body Members". Candidate Key: 'member name' and 'email' attributes in entity "Legislative Body Members" are keys as they are unique for every entry. Alternate Key: email is a key but not a primary key.

2. Relationship type with the same participating entity type in distinct roles: COLLEAGUE relationship between Member (Rajya Sabha) and Member (Lok Sabha).

Functional Requirements
Modifications
1. Insert:
   a. The government official designated to maintaining the mini-world can insert data about all attributes of a new legislative body member into the respective entities.
   b. The person managing the database can insert new Political Parties (and Constituencies which is rare) if there is ever a need.
2. Delete:
   a. The government can delete data about a legislative body member who has been permanently suspended.
3. Update:
   a. The person handling the mini-world can modify multiple attributes of a legislative body member such as Phone number, Address and Income Tax Returns.
   b. Modify the "Candidates" (multivalued attribute) in "Elections" based on the number of people joining in and dropping out of the elections for that particular constituency.
   c. Modify "Budget" allocated to a particular "Department".

Retrievals

1. Selection: "Retrieve all data of Lok Sabha members who are ministers of a Department" (Entities used: Legislative Body Member, Lok Sabha, Department)
2. Projection: "Retrieve Constituency ID of all elections with voter turnout>65%" (Entities used: Election).
3. Aggregate: "Retrieve data of the department with MIN budget" (Entities used: Department).
4. Search: Search Legislative Body Members with the same landline area code by entering the first few digits of a phone number. Example: "Enter 11 → displays all members living in New Delhi".
5. Analysis:
   a. "Average population of constituencies where voter turnout was<40%"
   b. "Average age of all members belonging to a party"