Database Management System

(IT214)

Group Project

Electronic Election Management

Group ID : T513

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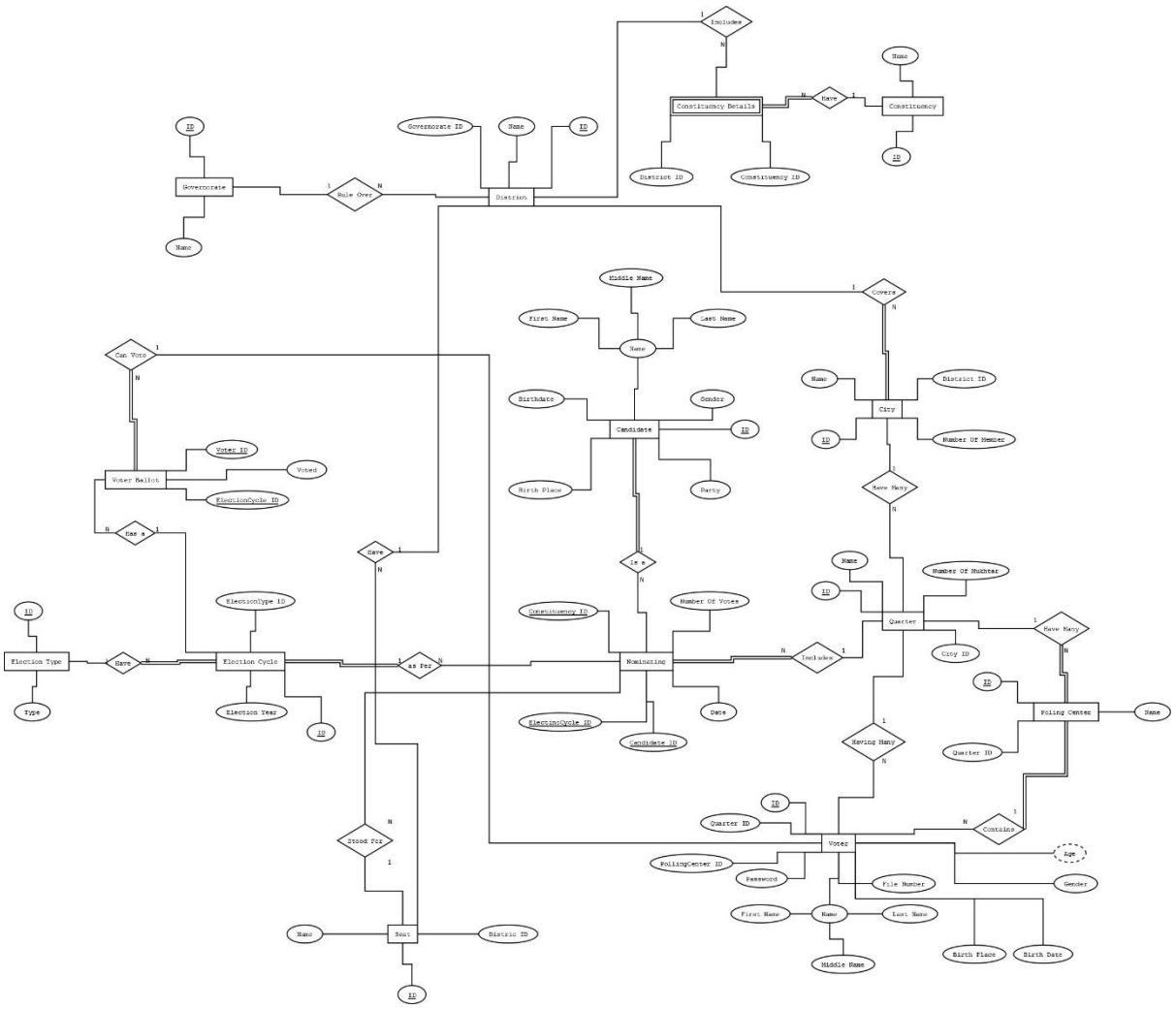
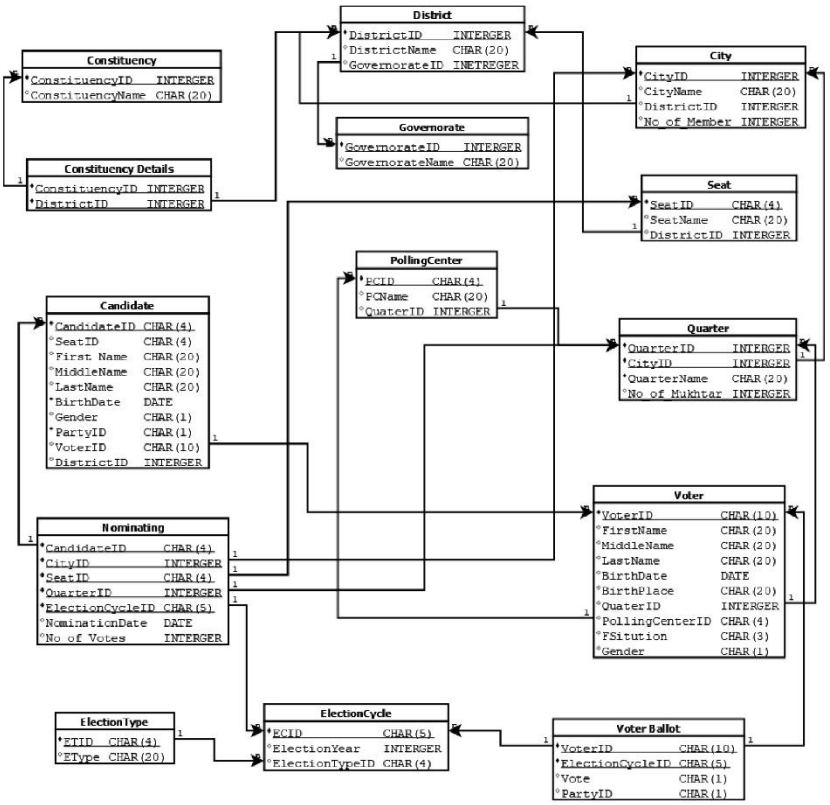
❖ ER Diagram


Includes
Name
Constituency Details
Have
Constituency
ID
Governorate ID
Name
ID
Governorate
Rule Over
District
District ID
Consituency ID
Name
Middle Name
Covers
First Name
Last Name
Name
Can Vote
Name
District ID
Birthdate
Gender
City
Candidate
ID
ID
Number Of Member
Voter ID
Voted
Voter Ballot
Birth Place
Party
Have Many
ElectionCycle ID
Has a
Name
Number Of Mukhtar
ID
Have
Is a
ElecsionType ID
Consituency ID
Number Of Votes
Quarter
Have Many
Election Type
Have
Election Cycle
as For
Nominating
Includes
City ID
ID
ID
Polling Center
Name
Election Year
ElectionCycle ID
Candidate ID
Date
Having Many
Quarter ID
ID
Quarter ID
Contains
Stood For
Voter
Age
PollingCenter ID
Password
File Number
Gender
Name
Seat
District ID
First Name
Name
Last Name
Birth Place
Birth Date
Middle Name
ID

❖ Relational Schema



❖ Normalization

1. Constituency

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case, "ConstituencyID" is the primary key, and "ConstituencyName" contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since "ConstituencyName" depends fully on the primary key "ConstituencyID" in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from ConstituencyID and ConstituencyName, there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is already in 3NF.Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is ConstituenctID, which is also the primary key of the relation. Hence, it isa candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation ConstituencyID → {ConstituencyID,ConstituencyName} is in BCNF.

2. Constituency Details

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case, “DistrictID , ConstituencyID” contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since " DistrictID , ConstituencyID " depends fully on the primary key " DistrictID , ConstituencyID " in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from DistrictID and ConstituencyID there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is already in 3NF.Next, we need to check if all determinants of the relation are candidate keys. In thiscase, the only determinant is DistrictID, ConstituencyID. which is alsothe primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation {DistrictID , ConstituencyID} → {DistrictID, ConstituencyID} is in BCNF.

3. District

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case, DistrictID is the primary key, and “DistrictName, GovernorateID” contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since "DistrictName, GovernorateID” depends fully on the primary key “DistrictID” in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from “DistrictID”,”DistrictName”, “GovernorateID” there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is already in 3NF.Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is DistrictID. which is also the primary key of the relation. Hence, it is a candidate key.Since all determinants of the relation are candidate keys, we can conclude that the given relation DistrictID → {DistrictID, DistrictName, GovernorateID} is in BCNF.

4. Governorate

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case " GovernorateID" is the primary key, and "GovernorateName" contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since "GovernorateName" depends fully on the primary key "GovernorateID" in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from "GovernorateID" and "GovernorateName", there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is already in 3NF.Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is GovernorateID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation GovernorateID → {GovernorateID, GovernorateName} is in BCNF.

5. City

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case “CityID” is the primary key, and “CityName, DistrictID, No_of_Member” contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since “CityName, DistrictID, No_of_Member” depends fully on the primary key “CityID” in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from CityID and “ CityName”, “DistrictID”, “No_of_Nember” there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is in 3NF.Next, we need to checkif all determinants of the relation are candidate keys. In this case, the only determinant is CityID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation CityID → {CityID, CityName, DistrictID, No_of_Member } is in BCNF.

6. Seat

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case, “SeatID” is the primary key, and “SeatName, DistrictID “contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since “SeatName, DistrictID” depends fully on the primary key “SeatID” in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from “SeatID” and “SeatName, DistrictID” there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is already in 3NF. Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is SeatID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation SID → {SeatID,SeatName, DistrictID } is in BCNF.

7. Candidate

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case” CandidateID” is the primary key, and “PartyID,VoterID” contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since “PartyID,VoterID” depends fully on the primary key “CandidateID” in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there

is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from CandidateID and PartyID,VoterID there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is in 3NF.Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is CandidateID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation CandidateID → {CandidateID, PartID,VoterID} is in BCNF.

8. Nominating

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case “CondidateID , SeatID, ElectionCycleID” is the primary key, and “NominationDate, No_of_Votes” contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since “NominationDate, No_of_Votes” depends fully on the primary key “CondidateID , SeatID, ElectionCycleID“ in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from CondidateID , SeatID, ElectionCycleID , NominationDate, No_of_Votes there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is already in 3NF. Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is CondidateID , ConstituencyID, ElectionCycleID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are can- didate keys, we can conclude that the given relation { CondidateID, SeatID, ElectionCycleID}→{CondidateID, SeatID, ElectionCycleID, NominationDate, No_of_Votes} is in BCNF.

9. Quarter

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case “QuaretrID” is the primary key, and “QuarterName, CityID, No_of_Moukhtar” contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since “QuarterName, CityID, No_of_Moukhtar” depends fully on the primary key “QuarterID” in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from QuaretrID, QuaretrName, CityID, No_of_Moukhtar there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is a l r e a d y in 3NF.Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is QuarterID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation QuarterID → {QuarterID, QuaretrName, CityID, No_of_Moukhtar} is in BCNF.

10. Polling Center

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case “PCID” is the primary key, and “PCName, QuarterID” contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since " PCName, QuarterID " depends fully on the primary key “PCID” in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from PCID, PCName, QuarterID there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is already in 3NF.Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is PCID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation PCID → {PCID, PCName, QuarterID} is in BCNF.

11. Voter

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case “VoterID” is the primary key, and “VoterName, FirstName, MiddleName, QuarterID,PollingCenterID,FSituation,Birthplace, BirthDate,Gender” contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since VoterName, FirstName, MiddleName, QuarterID,PollingCenterID,FSituation,Birthplace, BirthDate,Gender depends fully on the primary key “VoterID” in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from VoterID, VoterName, FirstName, MiddleName, QuarterID,PollingCenterID,FSituation,Birthplace, BirthDate,Gender there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is in 3NF. Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is VoterID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation VoterID → {VoterID, VoterName, Surname, FirstName, MiddleName, QuarterID,PollingCenterID,FSituation,Birthplace, BirthDate,Gender} is in BCNF.

12. Voterballot

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case, “VoterID, ElectionCycleID,PartyID” is the primary key, and " Vote" contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since " Vote" depends fully on the primary key " VoterID, ElectionCycleID,PartyID " in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from VoterID, ElectionCycleID, Vote,PartyID there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is in 3NF. Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is VoterID, ElectionCycleID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation {VoterID, ElectionCycleID} → {VoterID, ElectionCycleID, PartyID,Vote} is in BCNF.

13. Election Type

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case, " ETID " is the primary key, and " EType " contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since " EType " depends fully on the primary key " ETID " in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from ETID and EType, there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is in 3NF.Next, we need to check if all determinantsof the relation are candidate keys. In this case, the only determinant is ETID. which is also the primary key of the relation. Hence, it isa candidate key.Since all determinants of the relation are candidate keys, we can conclude that the given relation ETID → {ETID, EType} is in BCNF.

14. Election Cycle

1NF (First Normal Form)

A table is in 1NF if it has a primary key, and all columns in the table contain atomic values, meaning they cannot be further divided. In this case, " ECID " is the primary key, and "ElectionYear, ElectionTypeID " contains a single value, so the table is in 1NF.

2NF (Second Normal Form)

A table is in 2NF if it is in 1NF and all non-primary key columns depend fully on the primary key. In other words, there should be no partial dependencies. Since "ElectionYear, ElectionTypeID " depends fully on the primary key " ECID " in this case, the table is in 2NF.

3NF (Third Normal Form)

The relation is in 3NF if it is in 2NF and there are no transitive dependencies, which means that no non-prime attribute is transitively dependent on the primary key. In other words, if there is an attribute that is functionally dependent on another non-prime attribute, it should be part of the primary key. Since we do not have any other attributes or functional dependencies in the given relation apart from ECID and ElectionYear, ElectionTypeID, there are no transitive dependencies, and the relation trivially satisfies 3NF.

BCNF

The relation is in 3NF.Next, we need to check if all determinants of the relation are candidate keys. In this case, the only determinant is EID. which is also the primary key of the relation. Hence, it is a candidate key. Since all determinants of the relation are candidate keys, we can conclude that the given relation ECID → {ECID, ElectionYear, ElectionTypeID} is in BCNF.

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