**DBMS Lab Project SQL Implementation**

**KEY MILESTONE # 0****3**

**Spring 2025**

**CSE-403L**

**Database Management System Lab**

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“We affirm that we have completed this work with integrity”

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**Voting and Election Management System Database Documentation**

Database Overview

This document describes the database structure for a Voting and Election Management System, including tables, metadata, keys, sample data, and example queries.

Tables and Metadata

1. Voter

* Description: Stores information about voters.
* Columns:
* `VoterID` (INT, Primary Key, Auto Increment): Unique identifier for each voter.
* `Name` (VARCHAR(100), Not Null): Voter's full name.

2. Election

* Description: Stores information about elections.
* Columns:
* `ElectionID` (INT, Primary Key, Auto Increment): Unique identifier for each election.
* `ElectionType` (VARCHAR(50), Not Null): Type of election (e.g., Presidential, Local).

3. Candidate

* Description: Stores information about candidates participating in elections.
* Columns:
* CandidateID` (INT, Primary Key, Auto Increment): Unique identifier for each candidate.
* Name (VARCHAR(100), Not Null): Candidate's full name.
* Party (VARCHAR(100), Not Null): Candidate's political party.
* ElectionID (INT, Foreign Key to Election): References the election the candidate is participating in.

4. Vote

Description: Stores voting records.

* Columns:
* VoteID` (INT, Primary Key, Auto Increment): Unique identifier for each vote.
* VoterID` (INT, Foreign Key to Voter): References the voter who cast the vote.
* CandidateID` (INT, Foreign Key to Candidate): References the candidate voted for.
* ElectionID` (INT, Foreign Key to Election): References the election the vote is for.
* PollingStationID` (INT, Foreign Key to PollingStation): References the polling station where the vote was cast.

5. PollingStation

* Description: Stores information about polling stations.
* Columns:
* PollingStationID` (INT, Primary Key, Auto Increment): Unique identifier for each polling station.
* Location` (VARCHAR(100), Not Null): Location of the polling station.

Keys

* Primary Keys:
* Voter: `VoterID`
* Election: `ElectionID`
* Candidate: `CandidateID`
* Vote: `VoteID`
* PollingStation: `PollingStationID`

Foreign Keys:

* Candidate: `ElectionID` references Election(`ElectionID`)
* Vote: `VoterID` references Voter(`VoterID`)
* Vote: `CandidateID` references Candidate(`CandidateID`)
* Vote: `ElectionID` references Election(`ElectionID`)
* Vote: `PollingStationID` references PollingStation(`PollingStationID`)

- Unique Constraint:

- Vote: `(VoterID, ElectionID)` to ensure a voter casts at most one vote per election.

Sample Data

VOTER

|  |  |
| --- | --- |
| VoterID | Name |
| 1 | Harron |
| 2 | Khan |
| 3 | Jan |

Election

|  |  |
| --- | --- |
| ElectionID | ElectionType |
| 1 | Presidential |
| 2 | Local |

Candidate

|  |  |  |  |
| --- | --- | --- | --- |
| CandidateID | Name | Party | ElectionID |
| 1 | Person1 | Party A | 1 |
| 2 | Person 2 | Party B | 1 |
| 3 | Person 3 | Party C | 2 |

PollingStation

|  |  |
| --- | --- |
| PollingStationID | Location |
| 1 | City Hall |
| 2 | City Hall |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| VoteID | VoterID | CandidateID | ElectionID | PollingStationID |
| 1 | 1 | 1 | 1 | 1 |
| 2 | 2 | 1 | 1 | 1 |
| 3 | 3 | 2 | 2 | 2 |

Example Queries

SELECT c.Name, c.Party, e.ElectionType

FROM Candidate c

JOIN Election e ON c.ElectionID = e.ElectionID

WHERE e.ElectionID = 1;

1. Retrieve all candidates in a specific election:

SELECT c.Name, c.Party, e.ElectionType

FROM Candidate c

JOIN Election e ON c.ElectionID = e.ElectionID

WHERE e.ElectionID = 1;

2. Count votes per candidate in an election:

SELECT c.Name, c.Party, COUNT(v.VoteID) as VoteCount

FROM Candidate c

LEFT JOIN Vote v ON c.CandidateID = v.CandidateID

WHERE c.ElectionID = 1

GROUP BY c.CandidateID, c.Name, c.Party;

3. List voters who voted at a specific polling station:

SELECT v.Name, p.Location

FROM Voter v

JOIN Vote vo ON v.VoterID = vo.VoterID

JOIN PollingStation p ON vo.PollingStationID = p.PollingStationID

WHERE p.PollingStationID = 1;

4. Check if a voter has already voted in an election:

SELECT COUNT(\*) as VoteExists

FROM Vote

WHERE VoterID = 1 AND ElectionID = 1;