**BCIS – 5420 : Database for Tax Management System**

**Schema – Creating Tables.**

-- **Firm\_Address**

CREATE TABLE Firm\_Address (

ID INT PRIMARY KEY,

Address VARCHAR(255)

);

-- **CA\_Firm**

CREATE TABLE CA\_Firm (

ID INT PRIMARY KEY,

FirmName VARCHAR(255),

Location VARCHAR(255)

);

-- **Client**

CREATE TABLE Client (

ID INT PRIMARY KEY,

FirstName VARCHAR(255),

LastName VARCHAR(255),

Address VARCHAR(255)

);

-- **Review**

CREATE TABLE Review (

ID INT PRIMARY KEY,

ClientID INT,

Rating INT,

Comment TEXT,

FOREIGN KEY (ClientID) REFERENCES Client(ID)

);

-- **Manager**

CREATE TABLE Manager (

ID INT PRIMARY KEY,

FirstName VARCHAR(255),

LastName VARCHAR(255),

FirmID INT,

FOREIGN KEY (FirmID) REFERENCES CA\_Firm(ID)

);

-- **Staff\_Details**

CREATE TABLE Staff\_Details (

ID INT PRIMARY KEY,

FirstName VARCHAR(255),

LastName VARCHAR(255),

FirmID INT,

FOREIGN KEY (FirmID) REFERENCES CA\_Firm(ID)

);

-- **Tax\_Returns**

CREATE TABLE Tax\_Returns (

ID INT PRIMARY KEY,

ClientID INT,

Year INT,

Amount DECIMAL(10, 2),

FOREIGN KEY (ClientID) REFERENCES Client(ID)

);

-- **Penalties**

CREATE TABLE Penalties (

ID INT PRIMARY KEY,

ClientID INT,

Description TEXT,

Amount DECIMAL(10, 2),

FOREIGN KEY (ClientID) REFERENCES Client(ID)

);

-- **CA**

CREATE TABLE CA (

ID INT PRIMARY KEY,

FirstName VARCHAR(255),

LastName VARCHAR(255),

FirmID INT,

FOREIGN KEY (FirmID) REFERENCES CA\_Firm(ID)

);

-- **Assistant\_CA**

CREATE TABLE Assistant\_CA (

ID INT PRIMARY KEY,

FirstName VARCHAR(255),

LastName VARCHAR(255),

FirmID INT,

FOREIGN KEY (FirmID) REFERENCES CA\_Firm(ID)

);

-- **Bill\_Details**

CREATE TABLE Bill\_Details (

ID INT PRIMARY KEY,

ClientID INT,

Amount DECIMAL(10, 2),

Description TEXT,

FOREIGN KEY (ClientID) REFERENCES Client(ID)

);

-- **Tax**

CREATE TABLE Tax (

ID INT PRIMARY KEY,

ClientID INT,

Year INT,

Amount DECIMAL(10, 2),

FOREIGN KEY (ClientID) REFERENCES Client(ID)

);

**Schema – Inserting Values**

-- **Insert values into Firm\_Address**

INSERT INTO Firm\_Address (ID, Address) VALUES

(1, '123 Main St'),

(2, '456 Oak St'),

(3, '789 Pine St'),

(4, '101 Maple Ave'),

(5, '222 Elm St'),

(6, '333 Birch Ln'),

(7, '444 Cedar Dr'),

(8, '555 Walnut St'),

(9, '666 Oak Ln'),

(10, '777 Pine Dr');

-- **Insert values into CA\_Firm**

**INSERT INTO CA\_Firm (ID, FirmName, Location) VALUES**

(1, 'ABC Accounting', 'City A'),

(2, 'XYZ Associates', 'City B'),

(3, 'LMN Consultants', 'City C'),

(4, 'PQR Solutions', 'City D'),

(5, 'EFG Services', 'City E'),

(6, 'RST Advisors', 'City F'),

(7, 'UVW Partners', 'City G'),

(8, 'IJK Professionals', 'City H'),

(9, 'MNO Associates', 'City I'),

(10, 'GHI Consultants', 'City J');

-- **Insert values into Client**

**INSERT INTO Client (ID, FirstName, LastName, Address) VALUES**

(1, 'John', 'Doe', '111 Maple Ave'),

(2, 'Jane', 'Smith', '222 Elm St'),

(3, 'Bob', 'Johnson', '333 Birch Ln'),

(4, 'Alice', 'Williams', '444 Cedar Dr'),

(5, 'Charlie', 'Brown', '555 Walnut St'),

(6, 'Eva', 'Miller', '666 Oak Ln'),

(7, 'Frank', 'Davis', '777 Pine Dr'),

(8, 'Grace', 'Taylor', '888 Cedar Ave'),

(9, 'Henry', 'Clark', '999 Oak Dr'),

(10, 'Ivy', 'Moore', '101 Pine Ln');

**-- Insert values into Review**

**INSERT INTO Review (ID, ClientID, Rating, Comment) VALUES**

(1, 1, 5, 'Excellent service!'),

(2, 2, 4, 'Good communication'),

(3, 3, 3, 'Average experience'),

(4, 4, 5, 'Very satisfied'),

(5, 5, 2, 'Needs improvement'),

(6, 6, 4, 'Professional team'),

(7, 7, 3, 'Timely responses'),

(8, 8, 5, 'Highly recommended'),

(9, 9, 1, 'Dissatisfied'),

(10, 10, 4, 'Good value for money');

**-- Insert values into Manager**

**INSERT INTO Manager (ID, FirstName, LastName, FirmID) VALUES**

(1, 'Michael', 'Manager', 1),

(2, 'Laura', 'Lead', 2),

(3, 'Chris', 'Supervisor', 3),

(4, 'Samuel', 'Director', 4),

(5, 'Emily', 'Manager', 5),

(6, 'Daniel', 'Lead', 6),

(7, 'Sophia', 'Supervisor', 7),

(8, 'Matthew', 'Director', 8),

(9, 'Olivia', 'Manager', 9),

(10, 'William', 'Lead', 10);

-- **Insert values into Staff\_Details**

**INSERT INTO Staff\_Details (ID, FirstName, LastName, FirmID) VALUES**

(1, 'Sarah', 'Staffer', 1),

(2, 'Alex', 'Assistant', 2),

(3, 'Ryan', 'Associate', 3),

(4, 'Emma', 'Secretary', 4),

(5, 'Jacob', 'Clerk', 5),

(6, 'Ava', 'Intern', 6),

(7, 'Liam', 'Trainee', 7),

(8, 'Mia', 'Junior', 8),

(9, 'Ethan', 'Analyst', 9),

(10, 'Chloe', 'Consultant', 10);

-- **Insert values into Tax\_Returns**

**INSERT INTO Tax\_Returns (ID, ClientID, Year, Amount) VALUES**

(1, 1, 2021, 5000.00),

(2, 2, 2021, 7000.00),

(3, 3, 2021, 4500.00),

(4, 4, 2021, 6000.00),

(5, 5, 2021, 3000.00),

(6, 6, 2021, 8000.00),

(7, 7, 2021, 3500.00),

(8, 8, 2021, 7500.00),

(9, 9, 2021, 4000.00),

(10, 10, 2021, 5500.00);

-- **Insert values into Penalties**

**INSERT INTO Penalties (ID, ClientID, Description, Amount) VALUES**

(1, 1, 'Late filing', 200.00),

(2, 2, 'Underpayment', 150.00),

(3, 3, 'Accuracy penalty', 100.00),

(4, 4, 'Late payment', 250.00),

(5, 5, 'Tax evasion', 500.00),

(6, 6, 'Incorrect deductions', 120.00),

(7, 7, 'Late submission', 180.00),

(8, 8, 'Penalty for errors', 90.00),

(9, 9, 'Non-compliance', 300.00),

(10, 10, 'Failure to report income', 200.00);

**-- Insert values into CA**

**INSERT INTO CA (ID, FirstName, LastName, FirmID) VALUES**

(1, 'David', 'Certified', 1),

(2, 'Emily', 'Accredited', 2),

(3, 'George', 'Licensed', 3),

(4, 'Hannah', 'Certified', 4),

(5, 'Isaac', 'Accredited', 5),

(6, 'Julia', 'Licensed', 6),

(7, 'Kevin', 'Certified', 7),

(8, 'Lily', 'Accredited', 8),

(9, 'Mark', 'Licensed', 9),

(10, 'Nora', 'Certified', 10);

-- **Insert values into Assistant\_CA**

**INSERT INTO Assistant\_CA (ID, FirstName, LastName, FirmID) VALUES**

(1, 'Alice', 'Assistant', 1),

(2, 'Brian', 'Associate', 2),

(3, 'Catherine', 'Junior', 3),

(4, 'Daniel', 'Assistant', 4),

(5, 'Eva', 'Associate', 5),

(6, 'Frank', 'Junior', 6),

(7, 'Grace', 'Assistant', 7),

(8, 'Henry', 'Associate', 8),

(9, 'Ivy', 'Junior', 9);

**Queries on the database created**

**-- Query 1: Retrieve all clients and their associated CA firms**

SELECT Client.FirstName, Client.LastName, CA\_Firm.FirmName

FROM Client

JOIN CA\_Firm ON Client.ID = CA\_Firm.ID;

**-- Query 2: Find the average rating for each CA firm**

SELECT CA\_Firm.FirmName, AVG(Review.Rating) AS AverageRating

FROM CA\_Firm

LEFT JOIN Manager ON CA\_Firm.ID = Manager.FirmID

LEFT JOIN Review ON Manager.ID = Review.ClientID

GROUP BY CA\_Firm.FirmName;

**-- Query 3: List clients who have incurred penalties along with penalty details**

SELECT Client.FirstName, Client.LastName, Penalties.Description, Penalties.Amount

FROM Client

JOIN Penalties ON Client.ID = Penalties.ClientID;

**-- Query 4: Retrieve the total tax amount for each client in the year 2021**

SELECT Client.FirstName, Client.LastName, SUM(Tax\_Returns.Amount) AS TotalTaxAmount

FROM Client

LEFT JOIN Tax\_Returns ON Client.ID = Tax\_Returns.ClientID

WHERE Tax\_Returns.Year = 2021

GROUP BY Client.FirstName, Client.LastName;

**-- Query 5: Get the names of clients who have not received any reviews**

SELECT Client.FirstName, Client.LastName

FROM Client

LEFT JOIN Review ON Client.ID = Review.ClientID

WHERE Review.ID IS NULL;

**-- Query 6: Find the CA firms that have managers and list the managers**

SELECT CA\_Firm.FirmName, Manager.FirstName, Manager.LastName

FROM CA\_Firm

JOIN Manager ON CA\_Firm.ID = Manager.FirmID;

**-- Query 7: Identify clients with the highest tax amount in each year**

SELECT Client.FirstName, Client.LastName, Tax\_Returns.Year, Tax\_Returns.Amount

FROM (

SELECT ClientID, Year, Amount,

RANK() OVER (PARTITION BY Year ORDER BY Amount DESC) AS TaxRank

FROM Tax\_Returns

) AS RankedTax

JOIN Client ON RankedTax.ClientID = Client.ID

WHERE TaxRank = 1;

**-- Query 8: Retrieve clients who have both tax returns and penalties**

SELECT DISTINCT Client.FirstName, Client.LastName

FROM Client

JOIN Tax\_Returns ON Client.ID = Tax\_Returns.ClientID

JOIN Penalties ON Client.ID = Penalties.ClientID;

**-- Query 9: List clients and their associated assistants along with firm details**

SELECT Client.FirstName AS ClientFirstName, Client.LastName AS ClientLastName,

Assistant\_CA.FirstName AS AssistantFirstName, Assistant\_CA.LastName AS AssistantLastName,

CA\_Firm.FirmName

FROM Client

JOIN Assistant\_CA ON Client.ID = Assistant\_CA.ID

JOIN CA\_Firm ON Assistant\_CA.FirmID = CA\_Firm.ID;

**-- Query 10: Find the total amount billed to clients by each CA firm**

SELECT CA\_Firm.FirmName, SUM(Bill\_Details.Amount) AS TotalBilledAmount

FROM CA\_Firm

LEFT JOIN Manager ON CA\_Firm.ID = Manager.FirmID

LEFT JOIN Bill\_Details ON Manager.ID = Bill\_Details.ClientID

GROUP BY CA\_Firm.FirmName;

**-- Query 11: Retrieve clients who have reviews with comments containing the word 'satisfied'**

SELECT Client.FirstName, Client.LastName, Review.Comment

FROM Client

JOIN Review ON Client.ID = Review.ClientID

WHERE LOWER(Review.Comment) LIKE '%satisfied%';

**-- Query 12: Get the count of clients managed by each manager**

SELECT Manager.FirstName, Manager.LastName, COUNT(Client.ID) AS ClientCount

FROM Manager

LEFT JOIN Client ON Manager.ID = Client.ID

GROUP BY Manager.FirstName, Manager.LastName;

**-- Query 13: List clients who have not incurred any penalties**

SELECT Client.FirstName, Client.LastName

FROM Client

LEFT JOIN Penalties ON Client.ID = Penalties.ClientID

WHERE Penalties.ID IS NULL;

**-- Query 14: Find the average tax amount for each year**

SELECT Tax\_Returns.Year, AVG(Tax\_Returns.Amount) AS AverageTaxAmount

FROM Tax\_Returns

GROUP BY Tax\_Returns.Year;

**-- Query 15: Retrieve clients with the highest total amount billed**

SELECT Client.FirstName, Client.LastName, SUM(Bill\_Details.Amount) AS TotalBilledAmount

FROM Client

LEFT JOIN Bill\_Details ON Client.ID = Bill\_Details.ClientID

GROUP BY Client.FirstName, Client.LastName

ORDER BY TotalBilledAmount DESC

LIMIT 1;

**-- Query 16: Identify clients with multiple tax returns in the same year**

SELECT Client.FirstName, Client.LastName, Tax\_Returns.Year, COUNT(Tax\_Returns.ID) AS NumTaxReturns

FROM Client

JOIN Tax\_Returns ON Client.ID = Tax\_Returns.ClientID

GROUP BY Client.FirstName, Client.LastName, Tax\_Returns.Year

HAVING COUNT(Tax\_Returns.ID) > 1;

**-- Query 17: Find clients who have reviews with ratings less than 3**

SELECT Client.FirstName, Client.LastName, Review.Rating

FROM Client

JOIN Review ON Client.ID = Review.ClientID

WHERE Review.Rating < 3;

**-- Query 18: Retrieve clients who have both tax returns and reviews**

SELECT Client.FirstName, Client.LastName

FROM Client

JOIN Tax\_Returns ON Client.ID = Tax\_Returns.ClientID

JOIN Review ON Client.ID = Review.ClientID;

**-- Query 19: List clients who have incurred penalties with amounts greater than 200**

SELECT Client.FirstName, Client.LastName, Penalties.Description, Penalties.Amount

FROM Client

JOIN Penalties ON Client.ID = Penalties.ClientID

WHERE Penalties.Amount > 200;

**-- Query 20: Get the total number of clients managed by each CA firm**

SELECT CA\_Firm.FirmName, COUNT(Client.ID) AS TotalClients

FROM CA\_Firm

LEFT JOIN Manager ON CA\_Firm.ID = Manager.FirmID

LEFT JOIN Client ON Manager.ID = Client.ID

GROUP BY CA\_Firm.FirmName;