

## CPSC 304 Project Cover Page

**Milestone #: 2**

**Date: 7/16/2024**

**Group Number: 10**

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

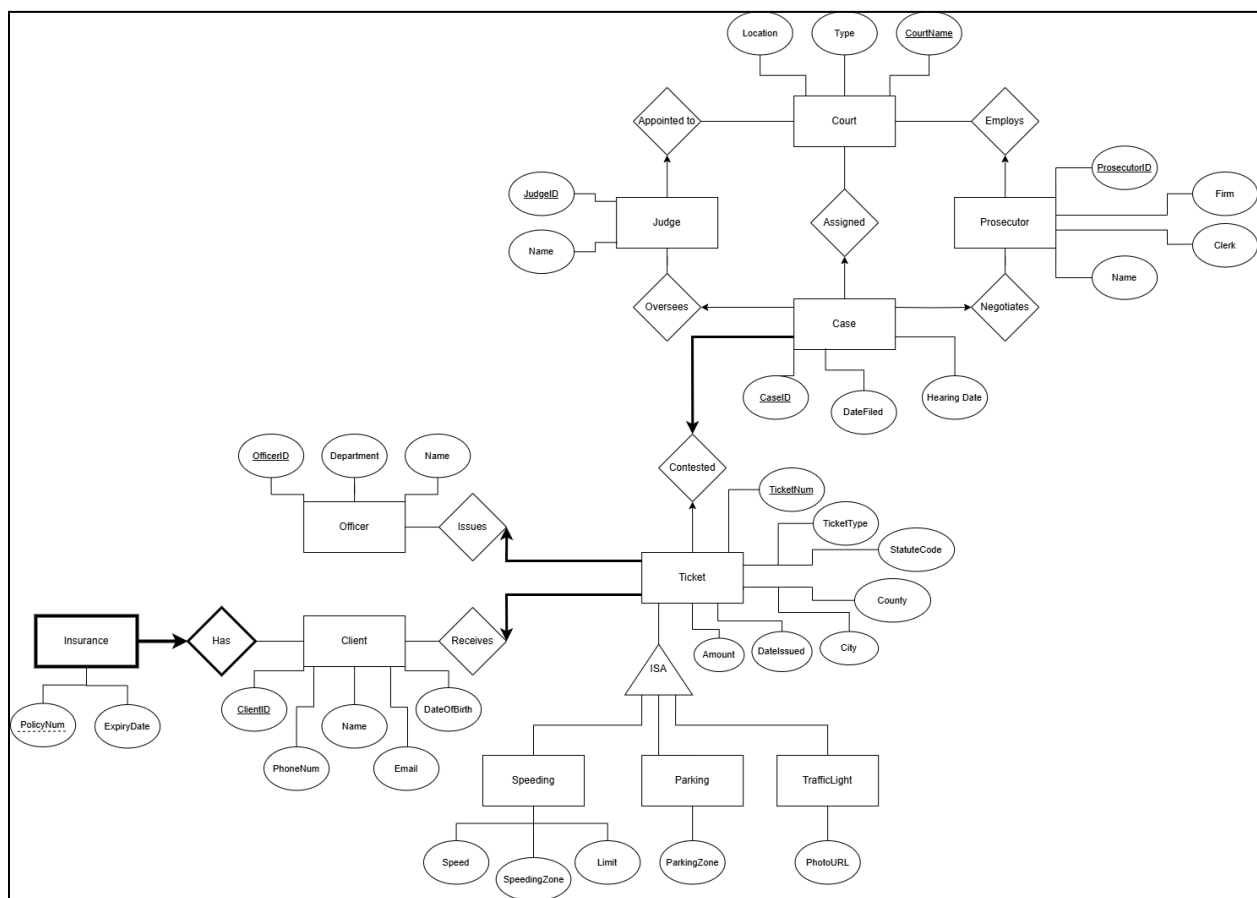
In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

## Milestone 2 - Relational Schema, Normalization, SQL DDL, Tentative Queries

### Brief Project Summary

The domain of the application is case management for a small law firm, Seattle Speeding and Traffic Tickets (SSTT). The application helps keep case records intact, accessible, and organized by keeping track of important information for each case and related entities.

### ERD Diagram + Specified Changes



We improved the Ticket ISA relationship in two ways. Under the Parking entity, we changed ViolationType to ParkingZone. This more accurately describes the information the attribute contains. The entity formally called Camera (as in camera ticket) has been changed to TrafficLight to make the ISA relationship clearer for those who don't have domain familiarity.

We did not create a new TicketStatus attribute under Ticket that denotes insurance coverage. If a client has legal insurance, it typically covers all traffic and speeding offenses. SSTT does not handle DUIS or other criminal offenses.

We added total participation between ticket and client so that a ticket entity is required to have a relationship with a client entity. A client entity does not have to have a relationship with a ticket. This ensures that every ticket is associated with a client.

While it was suggested that we could remove it, we left the relationship between case and court. When considering future use of the database, it seems useful to be able to determine which court a case is at with minimal extra lookups.

Under insurance, policy number now has a dashed underline to denote it as a partial key. The “has” relationship is now shown with a thick line. This notation was omitted in error in the first draft of the ERD.

We have also added a number of new attributes to create non-primary key functional dependencies for the normalization exercise (question 6).

Changes are color coded in the following questions to make them easier to identify.

## Schema Derived from ER Diagram

Pink = Updated relations/attributes based on feedback

Purple = Updated to create FDs for question 6

Insurance(PolicyNum, ExpiryDate, **ClientID**)

- Not null: ExpiryDate

Client(ClientID, PhoneNum, Name, Email, DateOfBirth)

- Not null: PhoneNum, Name, Email
- Unique: Email

Officer(OfficerID, Department, Name)

- Not null: Department, Name

Ticket(TicketNum, DateIssued, Amount, **TicketType**, **StatuteCode**, **County**, **City**, **OfficerID**, **CaseID**)

- Not null: DateIssued, Amount, OfficerID, City, County, StatuteCode

Speeding(TicketNum, Speed, **SpeedingZone**, Limit)

Parking(TicketNum, **ParkingZone**)

**TrafficLight**(TicketNum, PhotoURL)

- Unique: PhotoURL

Court(CourtName, Location, Type)

- Not null: Location

Judge(JudgeID, Name, **CourtName**)

Prosecutor(ProsecutorID, Firm, **Clerk**, Name, **CourtName**)

Case(CaseID, DateFiled, Hearing Date, **CourtName**, **ProsecutorID**, **JudgeID**, **TicketNum**)

- Not null and unique: TicketNum

## Functional Dependencies

Relation	Functional Dependencies (Purple = New Attributes)
Insurance	PolicyNum, ClientID -> ExpiryDate
Client	ClientID -> PhoneNum, Name, Email, DateOfBirth
Officer	OfficerID -> Department, Name
Ticket	TicketNum -> DateIssued, Amount, City, County, StatuteCode, OfficerID, CaseID  City -> County  StatuteCode -> TicketType
Speeding	TicketNum -> Speed, SpeedingZone, Limit  SpeedingZone -> Limit
Parking	TicketNum -> ParkingZone
TrafficLight	TicketNum -> PhotoURL
Case	CaseID -> DateFiled, Hearing Date, TicketNum, CourtName, ProsecutorID, JudgeID
Judge	JudgeID -> Name, CourtName
Court	CourtName -> Location, Type
Prosecutor	Prosecutor -> Name, Firm, CourtName, Clerk  Firm -> Clerk

## Normalization to BCNF

Purple = New Table, Blue = Modified Table

Insurance(PolicyNum, ExpiryDate, **ClientID**)

Client(ClientID, PhoneNum, Name, Email, DateOfBirth)

Officer(OfficerID, Department, Name)

Ticket(TicketNum, DateIssued, Amount, **OfficerID**, **CaseID**, **City**, **StatuteCode**)

TicketLocation(City, County)

TicketTypes(StatuteCode, TicketType)

Speeding(**TicketNum**, Speed, **SpeedingZone**)

ZoneLimits(SpeedingZone, Limit)

Parking(**TicketNum**, ParkingZone)

TrafficLight(**TicketNum**, PhotoURL)

Case(CaseID, DateFiled, Hearing Date, **CourtName**, **ProsecutorID**, **JudgeID**, **TicketNum**)

Court(Name, Location, Type)

Judge(JudgeID, Name, **CourtName**)

Prosecutor(ProsecutorID, Name, **FirmName**, **CourtName**)

FirmEmployment(Firm, Clerk)

## SQL DDL Statements for Normalized Relations

```
CREATE TABLE Insurance(  
    PolicyNum INT,  
    ExpiryDate DATE NOT NULL,  
    ClientID INT,  
    FOREIGN KEY (ClientID) REFERENCES Client(ClientID)  
        ON UPDATE CASCADE,  
    PRIMARY KEY (PolicyNum, ClientID)  
)
```

```
CREATE TABLE Client(  
    ClientID INT PRIMARY KEY,  
    PhoneNum CHAR(10) NOT NULL,  
    Name VARCHAR(30) NOT NULL,  
    Email VARCHAR(30) NOT NULL,  
    DateOfBirth DATE,  
    UNIQUE(Email)  
)
```

```
CREATE TABLE Officer(  
    OfficerID INT PRIMARY KEY,  
    Department VARCHAR(30) NOT NULL,  
    Name VARCHAR(30) NOT NULL  
)
```

```
CREATE TABLE Ticket(  
    TicketNum INT PRIMARY KEY,  
    DateIssued DATE NOT NULL,  
    Amount DECIMAL(12,2) NOT NULL,  
    OfficerID INT NOT NULL,  
    CaseID INT,  
    City VARCHAR(30),  
    StatuteCode INT,  
    FOREIGN KEY (OfficerID) REFERENCES Officer(OfficerID)  
        ON UPDATE CASCADE,  
    FOREIGN KEY (CaseID) REFERENCES Case(CaseID)  
        ON UPDATE CASCADE,  
    FOREIGN KEY (City) REFERENCES TicketLocation(City)  
        ON UPDATE CASCADE,  
    FOREIGN KEY (StatuteCode) REFERENCES TicketTypes(StatuteCode)  
        ON UPDATE CASCADE  
)
```

```
CREATE TABLE TicketLocation(  
    City VARCHAR(30) PRIMARY KEY,  
    County VARCHAR(30) NOT NULL  
)
```

```
CREATE TABLE TicketTypes(  
    StatuteCode INT PRIMARY KEY,  
    TicketType VARCHAR(10)  
)
```

```
CREATE TABLE Speeding(  
    TicketNum INT PRIMARY KEY,  
    TicketType VARCHAR(10)  
    SpeedingZone VARCHAR(30),  
    FOREIGN KEY (TicketNum) REFERENCES Ticket(TicketNum),  
    FOREIGN KEY (SpeedingZone) REFERENCES ZoneLimits(SpeedingZone)  
)
```

```
CREATE TABLE ZoneLimits(  
    SpeedingZone VARCHAR(30) PRIMARY KEY,  
    Limit INT  
)
```

```
CREATE TABLE Parking(  
    TicketNum INT PRIMARY KEY,  
    ParkingZone VARCHAR(30)  
)
```

```
CREATE TABLE TrafficLight(  
    TicketNum INT PRIMARY KEY,  
    PhotoURL VARCHAR(50)  
)
```

```
CREATE TABLE Case(  
    CaseID INT PRIMARY KEY,  
    DateFiled DATE,  
    HearingDate DATE,  
    CourtName VARCHAR(30),  
    ProsecutorID INT,  
    JudgeID INT,  
    TicketNum INT NOT NULL,  
    FOREIGN KEY (CourtName) REFERENCES Court(CourtName)  
    ON UPDATE CASCADE,
```



```
        FOREIGN KEY (ProsecutorID) REFERENCES Prosecutor(ProsecutorID)
            ON UPDATE CASCADE,
        FOREIGN KEY (JudgeID) REFERENCES Judge(JudgeID)
            ON UPDATE CASCADE,
        FOREIGN KEY (TicketNum) REFERENCES Ticket(TicketNum)
            ON UPDATE CASCADE
        UNIQUE(TicketNum)
    )
```

```
CREATE TABLE Court(
    CourtName VARCHAR(30) PRIMARY KEY,
    Location VARCHAR(30) NOT NULL,
    Type VARCHAR(30)
)
```

```
CREATE TABLE Judge(
    JudgeID INT PRIMARY KEY,
    Name VARCHAR(30),
    CourtName VARCHAR(30),
    FOREIGN KEY (CourtName) REFERENCES Court(CourtName)
)
```

```
CREATE TABLE Prosecutor(
    ProsecutorID INT PRIMARY KEY,
    Name VARCHAR(30),
    CourtName VARCHAR(30),
    FirmName VARCHAR(30),
    FOREIGN KEY (CourtName) REFERENCES Court(CourtName),
    FOREIGN KEY (FirmName) REFERENCES FirmEmployment(Firm)
)
```

```
CREATE TABLE FirmEmployment(
    Firm VARCHAR(30) PRIMARY KEY,
    Clerk VARCHAR(30)
)
```

## Insert Statements to Populate Tables (> 5 Tuples)

```
INSERT INTO Insurance(PolicyNum, ExpiryDate, ClientID)
VALUES
```

```
    ('201', '2024-09-04', '1'),
    ('202', '2027-03-29', '2'),
    ('203', '2028-07-15', '3'),
    ('204', '2025-10-12', '4'),
    ('205', '2026-01-17', '5');
```

```
INSERT INTO Client(ClientID, PhoneNum, Name, Email, DateOfBirth)
VALUES
```

```
    (1, '6043219876', 'John Doe', 'johndoe@example.com', '1990-05-15'),
    (2, '6045551234', 'Jane Smith', 'janesmith@example.com', '1985-09-20'),
    (3, '6047894567', 'Michael Johnson', 'michaeljohnson@example.com', '1982-07-10'),
    (4, '6042345678', 'Sarah Brown', 'sarahbrown@example.com', '1995-02-28'),
    (5, '6048765432', 'David Wilson', 'davidwilson@example.com', '1988-11-03');
```

```
INSERT INTO Officer (OfficerID, Department, Name)
VALUES
```

```
    (1, 'Traffic Control', 'Alice Jones'),
    (2, 'Highway Patrol', 'Benjamin Lee'),
    (3, 'Patrol', 'Olivia Martinez'),
    (4, 'Public Safety', 'Ethan Taylor'),
    (5, 'Traffic Control', 'Sophia Clark');
```

```
INSERT INTO Ticket (TicketNum, DateIssued, Amount, OfficerID, CaseID, City, StatuteCode)
VALUES
```

```
    (1, '2024-07-21', 150.00, 1, 101, 'Seattle', '123'),
    (2, '2024-07-20', 100.00, 2, 102, 'Seattle', '125'),
    (6, '2024-07-19', 200.00, 3, 103, 'Tacoma', '127'),
    (7, '2024-07-18', 120.00, 4, 104, 'Bellingham', '128'),
    (11, '2024-07-17', 180.00, 5, 105, 'Vancouver', '129');
```

```
INSERT INTO TicketLocation(City, County)
VALUES
```

```
    ('Seattle', 'King County'),
    ('Tacoma', 'Pierce County'),
    ('Bellingham', 'Whatcom County'),
    ('Vancouver', 'Clark County'),
    ('Spokane', 'Spokane County');
```

```
INSERT INTO TicketTypes(StatuteCode, TicketType)
VALUES
```

```
    ('123', 'Speeding'),
    ('125', 'Speeding'),
    ('127', 'Parking'),
    ('128', 'Parking'),
    ('129', 'TrafficLight');
```

```
INSERT INTO Speeding(TicketNum, Speed, SpeedingZone)
VALUES
```

```
    (1, 120, 'Highway'),
    (2, 65, 'Residential'),
    (3, 80, 'Construction Zone'),
    (4, 50, 'School Zone'),
    (5, 85, 'Highway, Crew Working');
```

```
INSERT INTO ZoneLimits (SpeedingZone, Limit)
VALUES
```

```
    ('Highway', 90),
    ('Residential', 40),
    ('Construction Zone', 50),
    ('School Zone', 30),
    ('Highway, Crew Working', 70);
```

```
INSERT INTO Parking (TicketNum, ParkingZone)
VALUES
```

```
    (6, 'Residents Only'),
    (7, 'Disability'),
    (8, 'Private Lot'),
    (9, 'Passenger'),
    (10, 'Metered');
```

```
INSERT INTO TrafficLight (TicketNum, PhotoURL)
VALUES
```

```
    (11, 'https://example.com/photo1.jpg'),
    (12, 'https://example.com/photo2.jpg'),
    (13, 'https://example.com/photo3.jpg'),
    (14, 'https://example.com/photo4.jpg'),
    (15, 'https://example.com/photo5.jpg');
```

```
INSERT INTO Case (CaseID, DateFiled, HearingDate, CourtName, ProsecutorID, JudgeID,
TicketNum)
```

```
VALUES
```

```
    (101, '2024-01-25', '2024-08-10', 'King County Courthouse', 1, 1, 1),
```

(102, '2024-03-05', '2024-09-12', 'Joel W. Solomon Courthouse', 2, 2, 2),  
(103, '2024-04-16', '2025-01-25', 'Frank R. Lautenberg Courthouse', 3, 3, 6),  
(104, '2024-05-18', '2024-12-03', 'Byron White United States Courthouse', 4, 4, 7),  
(105, '2024-07-08', '2025-02-27', 'Richard C. Lee United States Courthouse', 5, 5, 11);

INSERT INTO Court(Name, Location, Type)  
VALUES

('King County Courthouse', 'Seattle', 'Civil'),  
(Joel W. Solomon Courthouse', 'Seattle', 'Civil'),  
(Frank R. Lautenberg Courthouse', 'Seattle', 'Civil'),  
(Byron White United States Courthouse', 'Seattle', 'Civil'),  
(Richard C. Lee United States Courthouse', 'Seattle', 'Civil');

INSERT INTO Judge (JudgeID, Name, CourtName)  
VALUES

(1, 'Greg Johnson', 'King County Courthouse'),  
(2, 'Jordan Lopez', 'Joel W. Solomon Courthouse'),  
(3, 'Bryan Smith', 'Frank R. Lautenberg Courthouse'),  
(4, 'Jack Williams', 'Byron White United States Courthouse'),  
(5, 'Nate Garcia', 'Richard C. Lee United States Courthouse');

INSERT INTO Prosecutor (ProsecutorID, Name, FirmName, CourtName)  
VALUES

(1, 'Mark Taylor', 'Taylor & Associates', 'King County Courthouse'),  
(2, 'Lisa Rodriguez', 'Rodriguez Law Firm', 'Joel W. Solomon Courthouse'),  
(3, 'Peter Nguyen', 'Nguyen Legal Services", 'Frank R. Lautenberg Courthouse'),  
(4, 'Jennifer Adams', 'Adams & Partners', 'Byron White United States Courthouse'),  
(5, 'Daniel Harris', 'Harris Law Group', 'Richard C. Lee United States Courthouse');

INSERT INTO FirmEmployment (Firm, Clerk)  
VALUES

('Taylor & Associates', 'Emma White'),  
(Rodriguez Law Firm', 'Alexander Brown'),  
(Nguyen Legal Services', 'Isabella Garcia'),  
(Adams & Partners', 'Jacob Martinez'),  
(Harris Law Group', 'Sophie Thompson');