CS434 – Data Base Theory and Design

Project #1

Team Database Application (TDA): Part 1 - Relational Database Design

Team

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The domain I would like to manage with the TDA is **Washington DC Crime Datasets 2024** by the District of Columbia Metropolitan Police Department (MPD)

Overview

The dataset provides comprehensive information on reported crimes within a subset of locations and attributes of incidents. The purpose of the application is to create a relational database system that tracks, stores, and visualizes reported crime incidents across Washington D.C. The application will use real-world dataset provided by the District of Columbia Metropolitan Police Department (MPD). The dataset will help discover crime patterns and aid in strategic decision-making for community safety and law enforcement.

Entities

The **"Crimes 2024"** dataset includes the following key entities:

1. Crime_incident
   - ccn VARCHAR PRIMARY KEY : A unique identifier assigned by MPD to each incident report.
   - report_date TIMESTAMP : The date the offense was reported, which may be later than the date the offense actually occurred.
   - shift VARCHAR : Time the report was taken. Day shift generally runs between 0700 and 1500 (military time); evening shift between 1500 and 2300, and midnight shift between 2300 and 0700. If the shift is unknown, the field will say "UNK".
   - start_date TIMESTAMP : Crime incident start date and time.
   - end_date TIMESTAMP : Crime incident end date and time.

2. Method
   - method_id INT PRIMARY KEY : Unique key assigned to type of weapon.
   - method_type VARCHAR : Types of weapon used to commit crime.

3. Offense
   - offense_id INT PRIMARY KEY : Unique key assigned to crime offense.
   - method_id INT FOREIGN KEY : Unique key assigned to type of weapon.
   - offense_name VARCHAR : Crime offense.

4. Crime Location
   - crime_id VARCHAR PRIMARY: A unique identifier assigned by MPD to each incident report.
   - location_id INT PRIMARY KEY : Unique key assigned to location crime occurred.
   - latitude FLOAT : Latitude (decimal degrees) of Crime Incident.
   - longitude FLOAT : Longitude (decimal degrees) of Crime Incident.

5. Location
    - location_id INT PRIMARY KEY : Unique key assigned to geographical location.
    - ward INT : Ward ID
    - ans VARCHAR : ANC ID
    - district INT : Police district
    - psa INT : Police Service Areas
    - neighborhood_cluster VARCHAR : Neighbourhood cluster

6. Block Group
    - X-block INT : Block X Coordinate
    - Y-block INT : Block Y Coordinate

Relationships

Crime and Crime Location have many-to-one relationship, which means one crime occurs at one crime location, but one location may be associated with many crime.

Crime and Offense have many-to-one relationship, where one offense can have multiple crimes but one crime can belong to only one offense.

Crime and Method have many-to-one relationship, where one method can have multiple crimes but one crime can belong to only one method.

Crime Location and Location can have many-to-one relationship, where multiple crime locations is described with a single location

Crime and Block Group have many-to-one relationship, where many crimes can happen in one block group.

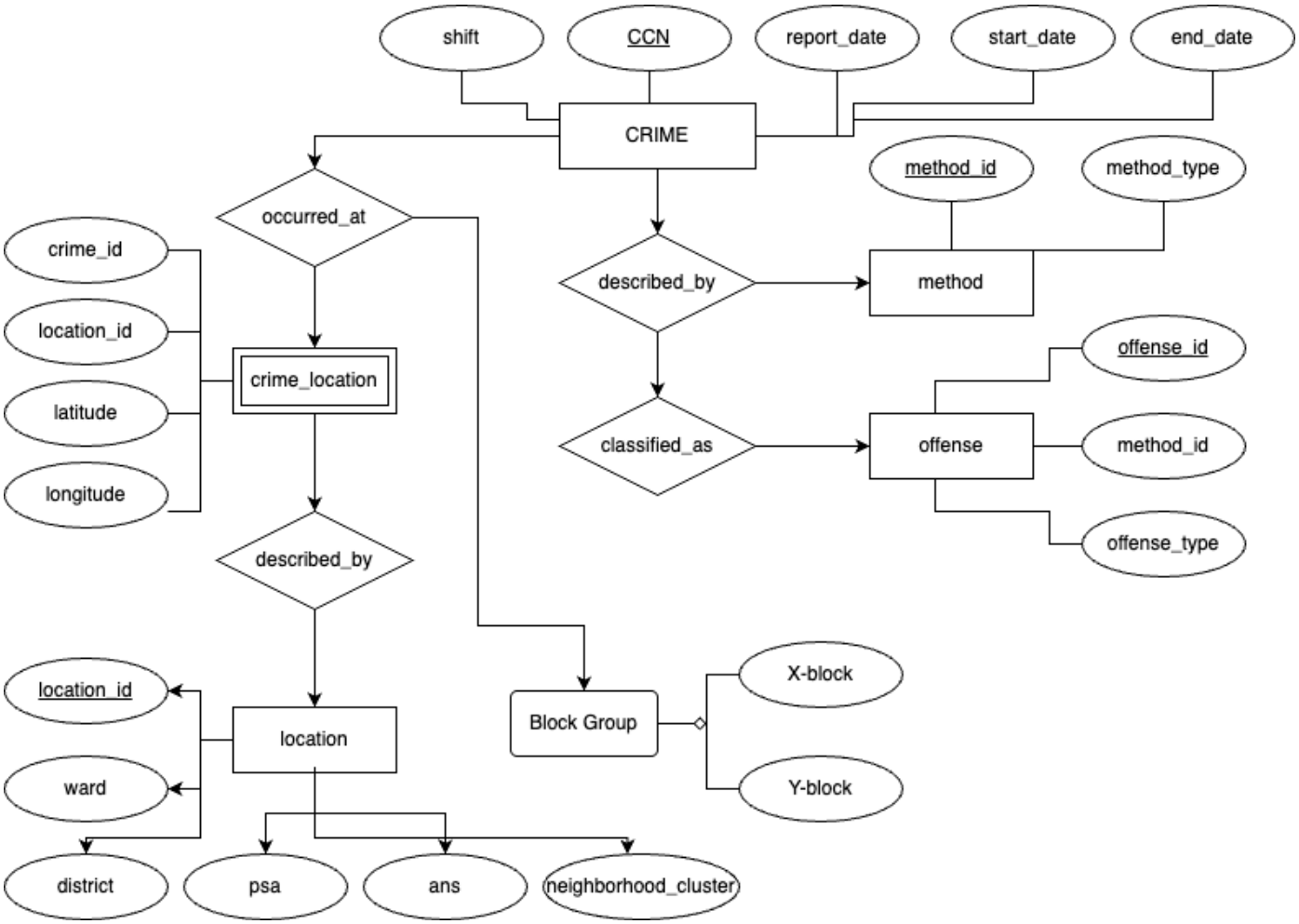
Difficult Aspects

- **Missing Data :** Some rows have x_coord = 0, y_coord = 0.
- **Timeline Confusion :** Difference between start_date, end_data and report_date
- **Geographical overlap :** A single incident may belong to overlapping jurisdictional boundaries.

Important Queries

- Which neighbourhood clusters have the highest number of reported theft incidents?
- At what time during the day does the crime occur the most?
- Which voting precincts have experienced more than 3 assault reports at the same street block?
- Is there a certain crime types in specific wards or neighbourhoods?
- What are the top 5 blocks with the highest number of reports?
- How many incidents involved a "Gun" as the method?

ERD


shift
CCN
report_date
start_date
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CRIME
method_id
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latitude
longitude
crime_location
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method
offense_id
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offense
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location_id
ward
location
Block Group
X-block
Y-block
district
psa
ans
neighborhood_cluster