Project Design Report

[Atlanta PD Uniform Crime Report]

[Randomness]

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Introduction:

Our database model is a representation of the Atlanta Police Department's Uniform Crime Reports. To be more specific, our database revolves around the crime incidents that are reported to the Atlanta PD. This includes but is not limited to the location of the incident, the people involved, the type of offense, and the time/date that it occurred. We chose to use the Atlanta PD's UCR, because we wanted to shed more light on the crime activity in our city. By creating an expansive database, detailing as much information on a specific incident, we want to provide an application that can be used to filter and retrieve the history of specific crime incidents of the city of Atlanta, while only having to provide little background information. We also hope that our database can be utilized to provide safety, by providing a method to pinpoint areas of the city that tend to have higher crime activity, so that people can avoid any unwarranted trouble.

Requirements Analysis

Data Requirements:

Incident Entity
1) Each incident will have a unique ID(Primary Key)
2) 2 Types(subclasses): Offense and Non-Crime
2) Each incident must have one and only one associated time and day to show when the incident was reported
3) Each incident must have at least one associated location to show where the incident was reported
4) If applicable, an incident is associated with an officer who handled the incident.
5) Each incident is classified by at least one UCR classification
6) Is a superclass

UCR Classification Entity
1) Each UCR Classification has one or more UCR Sub-Classification relationships.
2) One attribute, UCR Alphabet

UCR Sub-Classification Entity
1) Each UCR Sub-Classification is related to one UCR Classification
2) Includes: GCIC code and a description
3) The description is a composite attribute consisting of a name, description subcategory and weapons involved.

Offense Entity
1) Attributes include disposition and offense id
2) subclass of Incident entity
3) Each Offense has at least one Victim
4) If applicable, an Offense has suspects

Non-Crime Entity
1) One multivalued attribute, person involved
2) subclass of Incident entity

Occurrence Time Entity
1) Is a weak entity which is related to at least one Incident
2) Includes a time(composite attribute), which consists of an hour and min attribute

Occurrence Date Entity
1) Is a weak entity which is related to at least one Incident
2) Includes a date(composite attribute), which consists of the month, day and year.

Neighborhood Entity
1) Uniquely identified by a name(Primary Key), and stores npu attribute
2) Each Neighborhood has one location relationships

Location Entity
1) Each Location will have one X-Coordinate relationship and Y- Coordinate relationship
2) Each Location will have one relationship with a Beat
3) Each Location will have one neighborhood relationship
4) Each Location will have a unique address(Primary Key), which is a composite attribute consisting of the attributes: house# and street name

Beat Entity
1) Each Beat will be classified by a unique Beat ID(Primary Key)
2) A Beat is assigned to one or more Officers
3) A beat also has a time attribute

Person Entity
1) Includes name, birth date, address, and a unique ssn
2) 3 Types(subclasses): Officer, Victim, Suspect
3) Is a superclass

Officer Entity
1) Attributes include a rank, and a unique badge #(Primary Key)
2) An Officer can be assigned to a beat
3) An Officer can work shifts
4) An Officer must handle at least one incident
5) Disjoint Specialization of Person entity

Victim Entity
1) Attributes include a unique victim ID(Primary key), and one or more incidents
2) Disjoint Specialization of Person entity

Suspect Entity
1) Attributes include a unique suspect ID(Primary key), and one or more incidents
2) Disjoint Specialization of Person entity

Shift Entity
1) Two unique attributes: time of day, and date(Composite Primary Key)
2) Worked by at least one Officers
3) Has at least one Beat

X_Coordinate Entity
1) Consists of one unique attribute, the x-coordinate(latitude)

Y_Coordinate Entity
1) Consists of one unique attribute, the y-coordinate(longitude)

Functional Requirements:

- Functional Requirement 1: Our database requires a member of the Atlanta PD(has to be an Officer?) to create/update data in the database to maintain the integrity of the database
- Functional Requirement 2: Our database requires an authorized DB administrator to delete data in the database to maintain the integrity of the database
- Functional Requirement 3: All authorized members will be provided a unique user login, for tracking and auditing purposes
- Functional Requirement 4: Our database will track and record all modifications done to the database, to provide the ability to review/audit any malicious attempts at tampering with our data(using the unique user login)
- Functional Requirement 5: Our database will use the time format HH:MM
- Functional Requirement 6: Our database will use the date format MM-DD-YYYY
- Functional Requirement 7: The modification of the UCR Classification and UCR Sub-Classifications should be maintained by an authorized DB administrator, members of the Atlanta PD should only have to assign their incident to an already stored UCR Classification/Sub Classification
- Functional Requirement 8: Our database will be accessible to the public, therefore we will not require specific credentials to view our data.
- Functional Requirement 9: The attributes within the Person entity table will require specific access to view, aside from the name attribute. This is to prevent private information from being leaked to the public, and to maintain the safety of the individuals stored in our database
- Functional Requirement 10: Database will include a feature to send a notification upon the creation of an incident. This will allow high ranking Officers to be notified of all incidents, if so desired.

Conceptual Design

Attributes & Entities:

Entity 1: Incident

Incident: Crime Incident that is reported to the Atlanta PD
Attributes

- ID: unique ID for every incident reported
- Occur Date: Composite Attribute consisting of time, day, month, year and avg day
- Time: the time that the incident was reported
- Day: the day that the incident was reported
- Month: the month that the incident was reported
- Year: the year that the incident was reported
- Avg Day:

Relationships

- has Occurrence Time: When incidents are reported an Occurrence Time is stored represented by the hour and minute of the day
- has Occurrence Date: When incidents are reported an Occurrence Date is stored represented by a calendar day, month, and year
- has UCR Classification: Uniform Crime Report classification code that details the type of incident that occurred
- handled by Officer: Officer that is responsible for handling the incident
- occurs in Neighborhood: When incidents are reported the Neighborhood of the incident is stored

Primary Key:

- It is identified by the ID, which is a uniquely assigned identifier for each incident reported

Entity 2: UCR Classification

UCR Classification: Classification of an Incident
Attributes

- UCR Alpha: Alphabet code of the UCR classification

Relationships

- has UCR Sub-Classification: a more in-depth description of the type of incident reported

Entity 3: UCR Sub-Classification

UCR Sub-Classification: More detailed classification of a UCR Classification
Attributes

- GCIC Code: Georgia Crime Information Center code
- Description: Composite attribute consisting of name, description subcat, and weapons involved
- name: Name of the UCR Sub-classification
- description subcat: Sub category of the UCR SUB-Classification
- weapons involved: Weapons involved in the incident

Entity 4: Offense

Offense: Subclass of the Incident Entity, this is an incident that is reported where malicious intent exists
Attributes:

- Disposition: Courts ruling/Punishment that is charged for the offense
- Offense ID: ID code used to represent the type of Offense that occurred

Relationships:

- has Victim: Person who was harmed in the Offense
- has Suspect: Person who is potentially involved in the Offense

Entity 5: Non-Crime

Non-Crime: Subclass of the Incident Entity, this is an incident that is reported that did not involve malicious intent
Attributes:

- Persons Involved: Multivalued attribute, the people involved in the incident

Entity 6: Shift

Shift: Work shift of an Officer
Attributes:

- Time of Day: time of the day in hours and minutes of the shift
- Date: the calendar date of the shift

Relationships:

- has Beat: the beat(patrol route) of the shift being worked

Primary Key:

- It is identified by the combination of the time of day and date attribute

Entity 7: Person

Person: A Person who is in some way or form involved with an incident, Parent class of a disjoint specialization
Attributes:

- Name: Full name of the Person
- Bdate: date of birth of the Personnel
- Address: Address of the Person
- SSN: Social Security Number of the Person

Entity 8: Officer

Officer: Subclass of the Person entity, a member of the Atlanta Police Department
Attributes:

- Badge #: unique identifier for the Officers
- rank: Officer's stature within the Police Department

Relationships:

- works Shift: the shift that the Police Officer works
- assigned to Beat: the beat(patrol route) that the Police Officer is assigned to

Primary Key:

- It is identified by Badge # attribute, because each Police Officer is assigned a unique badge #

Entity 9: Victim

Victim: Subclass of the Person entity, someone who was harmed in an incident
Attributes:

- Victim ID: Unique identifier for the Victim involved in an incident
- Incident: Multivalued Attribute, indicating the Incidents that the Victim is involved in

Primary Key:

- It is identified by the Victim ID, which is an identifier value assigned to every victim as they are stored into the database

Entity 10: Suspect
Suspect: Subclass of the Person entity, someone who may be involved in starting an incident
Attributes:
- Suspect ID: Unique identifier for the Suspect involved an incident
- Incident: Multivalued Attribute, indicating the Incidents that the Suspect is involved in

Primary Key:
- It is identified by the Suspect ID, which is an identifier value assigned to every suspect as they are stored into the database

Entity 11: Occurrence Time
Occurrence Time: Weak entity that represents the time of day that an incident occurs
Attributes:
- Time: Composite attribute consisting of hour and minute of the day
- Hour: hour of the day
- Min: minute of the day
- # Occurrences: Number of times an incident has been reported at the specified Time

Entity 12: Occurrence Date
Occurrence Date: Weak entity that represents the exact calendar date that an incident occurs
Attributes:
- Date: Composite attribute, consisting of month, day, and year of the incident
- Month: Calendar month when the incident occurred
- Day: Calendar day when the incident occurred
- Year: Calendar year when the incident occurred
- # Occurrences: Number of times an incident has been reported at the specified Date

Entity 13: Neighborhood
Neighborhood: A neighborhood within the jurisdiction of the Atlanta PD
Attributes:
- npu: Neighborhood Prosecution Unit of the Neighborhood
- name: Name of the neighborhood

Relationships:
- has location: The location of the neighborhood(physical address)

Primary Key:
- It is identified by the name attribute, which is the name of the neighborhood in Atlanta

Entity 14: Location
Location: A location(physical address) within the jurisdiction of the Atlanta PD
Attributes:
- Address: Composite attribute, consists of house # and street name
- House #: House number of the address at the location
- Street Name: The street name of the address at the location
- Type: The type of location

Relationships:
- has Y_Coordinate: Represents the longitude degree of the location
- has X_Coordinate: Represents the latitude degree of the location
- has Beat: The beats(patrol route) within the location

Primary Key:
- It is identified by the composite attribute, Address, which is a unique address of Atlanta

Entity 15: Beat
Beat: Patrol route of an Officer
Attributes:
- Beat ID: unique identifier for the Beat(patrol route)
- Time: The time that the Beat occurs

Primary Key:
- It is identified by the Beat ID, which is a unique identifier assigned to each beat(patrol route)

Entity 16: X-Coordinate
X-Coordinate: Latitude of a location
Attributes:
- X: Represents the degree in latitude

Primary Key:
- It is identified by the X attribute

Entity 17: Y-Coordinate
Y-Coordinate: Longitude of a location
Attributes:
- Y: Represents the degree in longitude

Primary Key:
- It is identified by the Y attribute

Relationships & Cardinalities

Relationship 1: Incident has Occurrence Date
Relation: shows the relation between an Incident and the day the incident occurred
Cardinalities:
- Incident to Occurrence Date, 1 to 1, because the relationship indicates the day the incident occurred
- Occurrence Date to Incident, 1 to N, because multiple incidents can occur in a day, but for the date to be stored an incident for that day has to have occurred

Relationship 2: Incident has Occurrence Time
Relation: shows the relation between an Incident and the time of day that the incident occurred
Cardinalities:
- Incident to Occurrence Time, 1 to 1, because the relationship indicates the time of the day that the incident occurred
- Occurrence Time to Incident, 1 to N, because multiple incidents can occur at a specific time, but for the time to be stored an incident for that time has to have occurred

Relationship 3: Incident has UCR Classification
Relation: shows the relation between an Incident and the UCR classification of the incident
Cardinalities:
- Incident to UCR Classification, 1 to N, because an incident can be classified under multiple categories based on the events that took place

- UCR Classification to Incident, 0 to N, because there may not have been an incident reported for a classification(possibly something very rare and severe), but many of the same classification of incidents can occur

Relationship 4: Incident handled by Officer
Relation: shows the relation between an Incident and the Officer that handles the case
Cardinalities:
- Incident to Officer, 0 to N, an incident does not have to be assigned to an officer right away, because the Atlanta PD only has so much manpower, but some incidents require multiple officers
- Officer to Incident, 1 to N, every officer has to be working on at least one incident, but due to the lack of manpower they can be assigned to multiple incidents

Relationship 5: Incident occurs in Neighborhood
Relation: shows the relation between an Incident and the neighborhood in which the incident occurs in
Cardinalities:
- Incident to Neighborhood, 1 to N, when an incident occurs a neighborhood must be indicated, but the incident can extend into multiple neighborhoods
- Neighborhood to Incident, 0 to N, the neighborhoods are all stored at the creation of our database, some neighborhoods might have no crime, but some may have multiple instances of criminal activity

Relationship 6: UCR Classification has UCR Sub-Classification
Relation: shows the relation between a UCR Classification and it's underlying Sub-Classification
Cardinalities:
- UCR Classification to UCR Sub-Classification, 1 to N, every UCR Classification has at least one Sub-Classification
- UCR Sub-Classification to UCR Classification, 1 to 1, every Sub-Classification is unique to it's Parent UCR Classification

Relationship 7: Neighborhood has Location
Relation: shows the relation a neighborhood and the location that the neighborhood resides in
Cardinalities:
- Neighborhood to Location, 1 to N, there must be at least one location(physical address) in a neighborhood
- Location to Neighborhood, 1 to 1, because a location(physical address) can only reside within one neighborhood

Relationship 8: Location has Y_Coordinate
Relation: shows the relation between a Location and it's respective Y_Coordinate on the map
Cardinalities:
- Location to Y Coordinate, 1 to 1, a specific location only has one longitudinal value
- Y Coordinate to Location, 0 to N, because not every place has a crime report, but many crimes can occur within the same Y Coordinate

Relationship 9: Location has X_Coordinate
Relation: shows the relation between a Location and it's respective X_Coordinate on the map
Cardinalities:
- Location to Y Coordinate, 1 to 1, a specific location only has one latitudinal value

- Y Coordinate to Location, 0 to N, because not every place has a crime report, but many crimes can occur within the same X Coordinate

Relationship 10: Location has Beat
Relation: shows the relation between a location and the beat(patrol route)
Cardinalities:
- Location to Beat, 1 to 1, every location is patrolled by beat, due to lack of manpower Atlanta PD can not afford to patrol the same location with multiple units
- Beat to Location, 1 to N, a beat is a patrol route that extends at least from one location to another

Relationship 11: Shift has Beat
Relation: shows the relation an officer's shift and the shift's beat
Cardinalities:
- Shift to Beat 1 to N, a shift must cover at least one beat, but based on the length it may cover more than one
- Beat to Shift, 1 to 1, a beat should only be covered by one shift, because you wouldn't have the same two shifts covering one beat(inefficient)

Relationship 12: Officer works Shift
Relation: shows the relation between an Officer and the shift he works
Cardinalities:
- Officer to Shift, 0 to N, because there can be an officer who does not patrol the streets(Desk job instead)
- Shift to Officer, 1 to N, every shift must be covered by an officer, sometimes more than 1

Relationship 13: Officer assigned to Beat
Relation: shows the relation between an Officer and the beat that he is assigned to
Cardinalities:
- Officer to Beat 0 to N, because there can be an officer who does not patrol the streets(Desk job instead)
- Beat to Officer, 1 to N, because every beat has to be covered for safety reasons there must be at least one officer assigned to the route, sometimes more than 1

Relationship 14: Offense has Victim
Relation: shows the relation between an Offense and the Victim involved
Cardinalities:
- Offense to Victim, 1 to N, to classify an Offense the use of force or injury to the body of another person must occur
- Victim to Offense, 1 to N, the Victim could be involved in multiple Offenses, but to be stored in the database as a Victim he must be involved with at least one offense

Relationship 15: Offense has Suspect
Relation: shows the relation between an Offense and the Suspect involved
Cardinalities:
- Offense to Suspect, 1 to N, to classify an Offense the use of force or injury to the body of another person must occur, there has to be someone causing the incident
- Suspect to Offense, 1 to N, the Suspect could be involved in multiple Offenses, but to be stored in the database as a Suspect he must be involved with at least one offense

Teamwork

Introduction [Michael Dang]
Data Requirements [Michael Dang, Dean Brannon, Bradley Thomas]
Functional Requirements [Michael Dang]
Conceptual Design [Michael Dang, Dean Brannon, Bradley Thomas]
ER Design [Dean Brannon]

Appendix