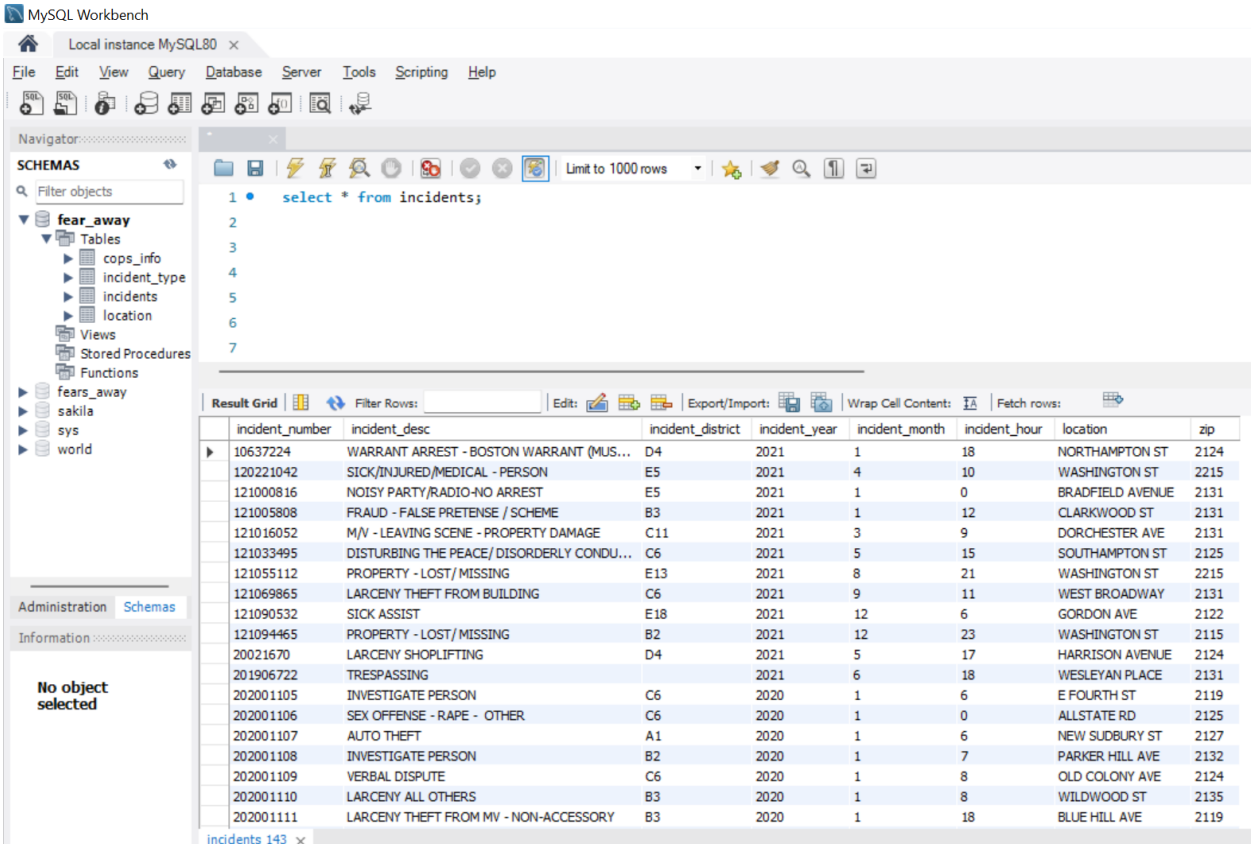
Assignment 4: Normalization

Fears Away Database

Incidents Table:



incident_number	incident_desc	incident_district	incident_year	incident_month	incident_hour	location	zip
10637224	WARRANT ARREST - BOSTON WARRANT (MUS...	D4	2021	1	18	NORTHAMPTON ST	2124
120221042	SICK/INJURED/MEDICAL - PERSON	E5	2021	4	10	WASHINGTON ST	2215
121000816	NOISY PARTY/RADIO-NO ARREST	E5	2021	1	0	BRADFIELD AVENUE	2131
121005808	FRAUD - FALSE PRETENSE / SCHEME	B3	2021	1	12	CLARKWOOD ST	2131
121016052	M/V - LEAVING SCENE - PROPERTY DAMAGE	C11	2021	3	9	DORCHESTER AVE	2131
121033495	DISTURBING THE PEACE/ DISORDERLY CONDU...	C6	2021	5	15	SOUTHAMPTON ST	2125
121055112	PROPERTY - LOST/ MISSING	E13	2021	8	21	WASHINGTON ST	2215
121069865	LARCENY THEFT FROM BUILDING	C6	2021	9	11	WEST BROADWAY	2131
121090532	SICK ASSIST	E18	2021	12	6	GORDON AVE	2122
121094465	PROPERTY - LOST/ MISSING	B2	2021	12	23	WASHINGTON ST	2115
20021670	LARCENY SHOPLIFTING	D4	2021	5	17	HARRISON AVENUE	2124
201906722	TRESPASSING		2021	6	18	WESLEYAN PLACE	2131
202001105	INVESTIGATE PERSON	C6	2020	1	6	E FOURTH ST	2119
202001106	SEX OFFENSE - RAPE - OTHER	C6	2020	1	0	ALLSTATE RD	2125
202001107	AUTO THEFT	A1	2020	1	6	NEW SUDBURY ST	2127
202001108	INVESTIGATE PERSON	B2	2020	1	7	PARKER HILL AVE	2132
202001109	VERBAL DISPUTE	C6	2020	1	8	OLD COLONY AVE	2124
202001110	LARCENY ALL OTHERS	B3	2020	1	8	WILDWOOD ST	2135
202001111	LARCENY THEFT FROM MV - NON-ACCESSORY	B3	2020	1	18	BLUE HILL AVE	2119

Incidents table contains the Boston crime incidents across different neighborhoods along with their street address.

- Primary key for this table is Incident Number

1st Normal Form

- This table has one primary key which is incident_number
- No column of this table contains multi value attributes.
- There is unique name for every column.
- Two columns of this table do not store similar information.

2nd Normal Form

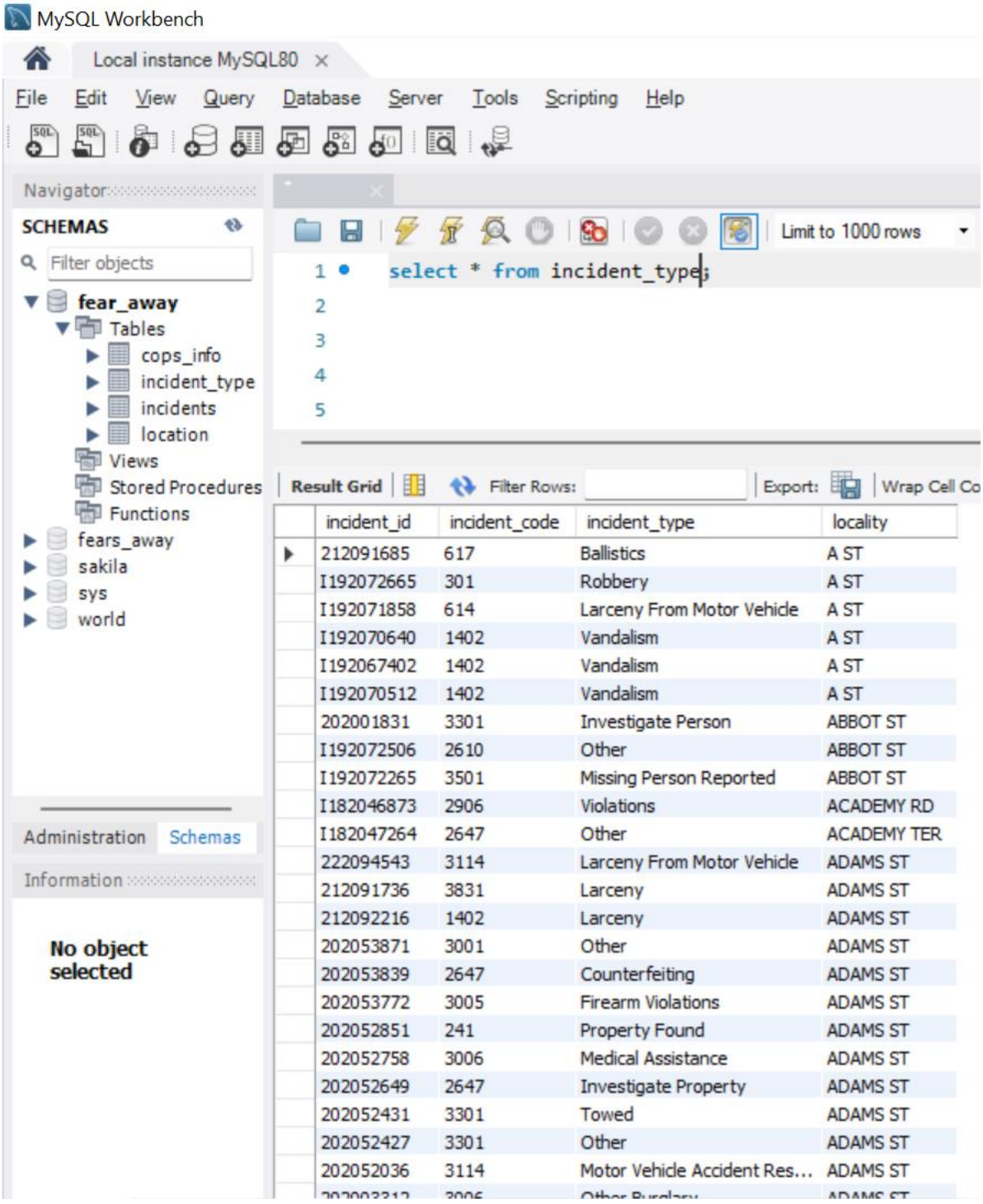
- All requirements for 1st NF are meeting.
- No separate table need to be created as it has no redundant data.
- The tables are related to each other by use of foreign keys-incident_id.

3rd Normal Form

- All requirements for 2nd NF.
- There are no fields in this table which do not depend on primary key of the table.
- There are no fields dependent on the primary key or any another field.

Note: First I was confused that location and zip code has transitive dependency but even if I break it down none of them can be the primary key as 1 zip can have different streets.

Incident_Type Table:



Incident_type contains the different types of incidents across different locations in Boston.

- Primary key for this table is Incident_Id

1st Normal Form

- This table has one primary key which is incident_number
- No column of this table contains multi value attributes.
- There is unique name for every column.
- Two columns of this table do not store similar information.

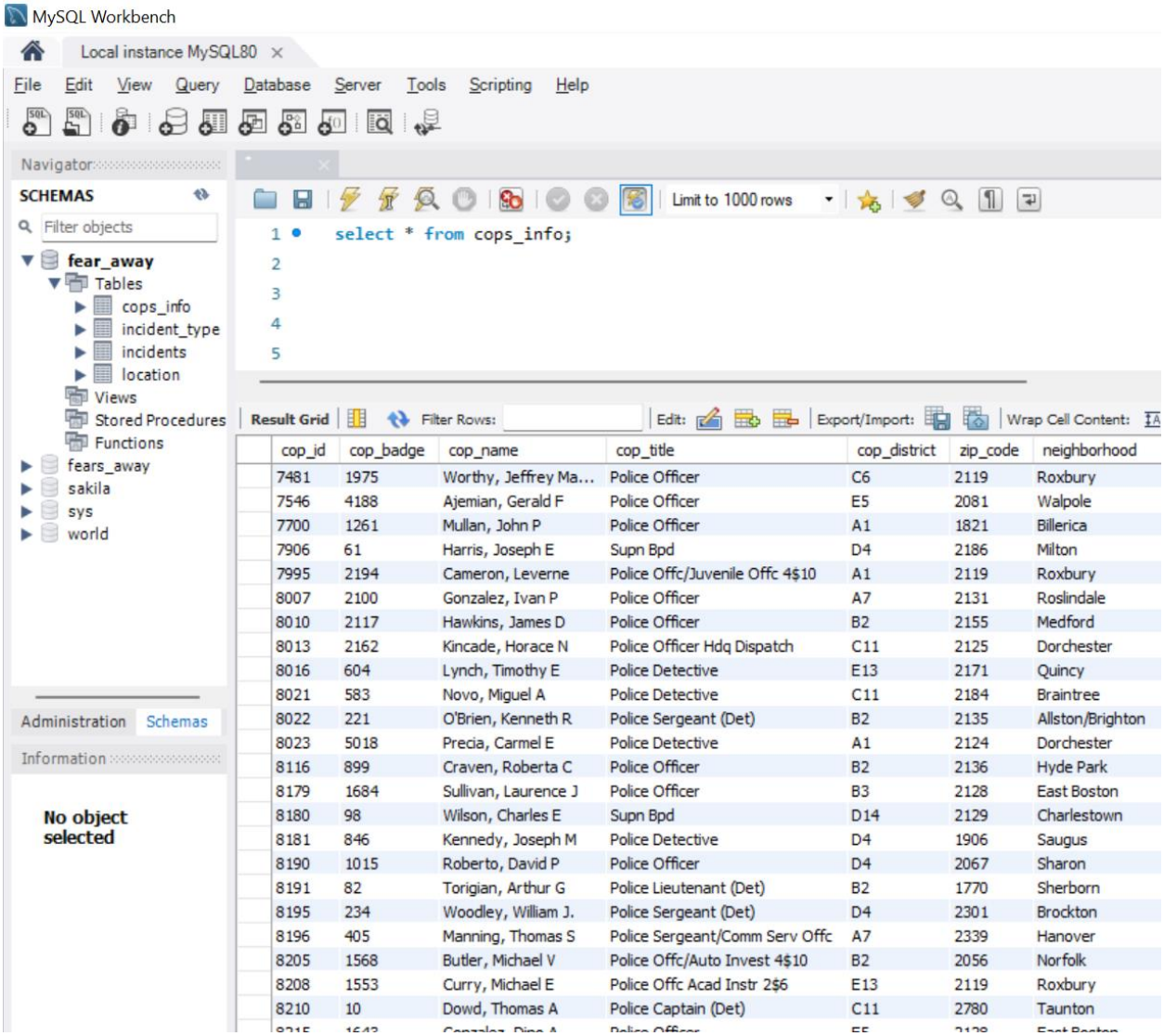
2nd Normal Form

- All requirements for 1st NF are meeting.
- No separate table need to be created as it has no redundant data.
- The tables are related to each other by use of foreign keys-incident_number, zip_code.

3rd Normal Form

- All requirements for 2nd NF.
- There are no fields in this table which do not depend on primary key of the table.
- There are no fields dependent on the primary key or any another field.

Cops_Info Table:



Cops info table contains details of officers in charge for each neighborhood in Boston.

- Primary key for this table is Cops_Id

1st Normal Form

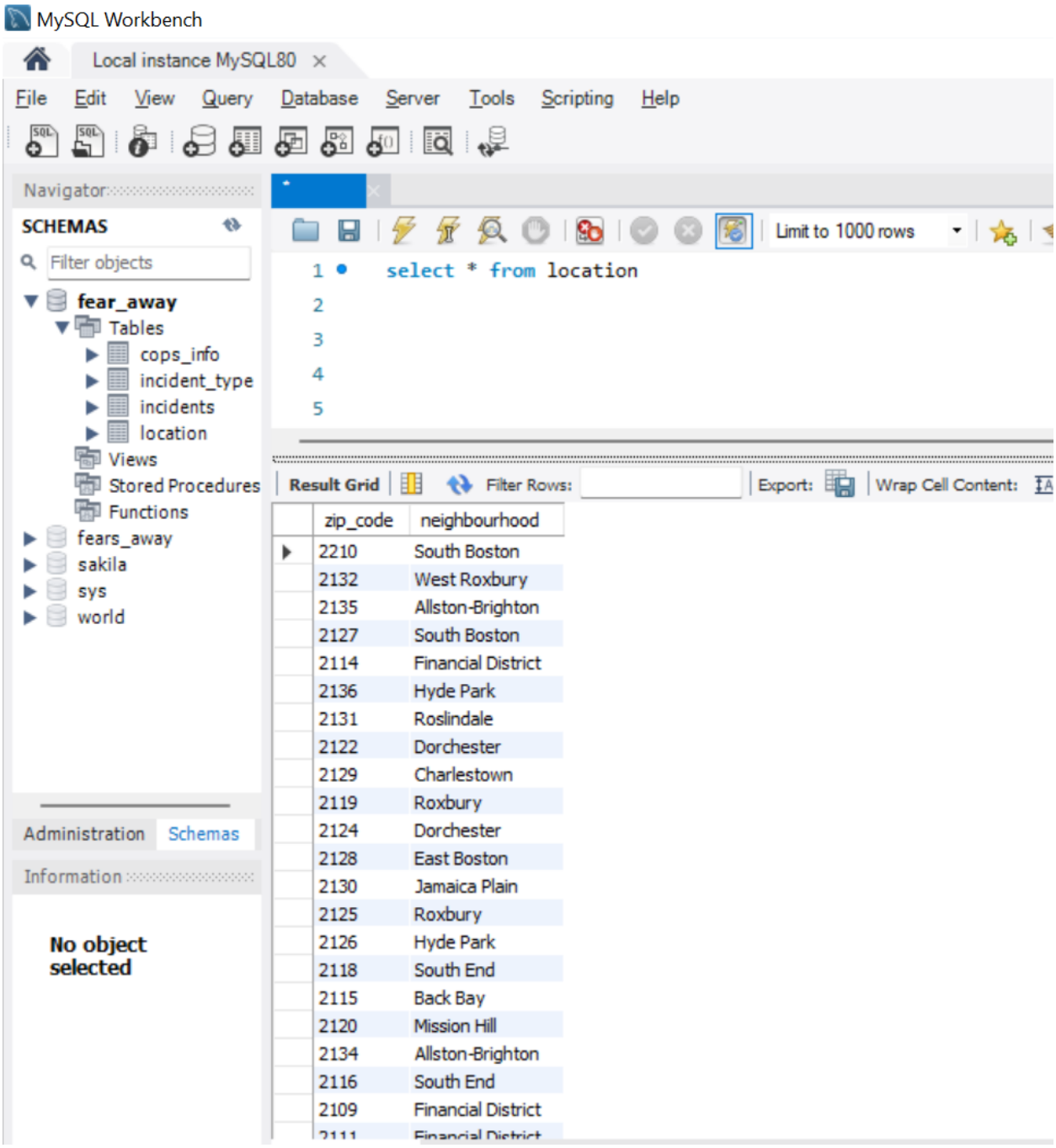
- This table has one primary key which is incident_number
- No column of this table contains multi value attributes.
- There is unique name for every column.
- Two columns of this table do not store similar information.

2nd Normal Form

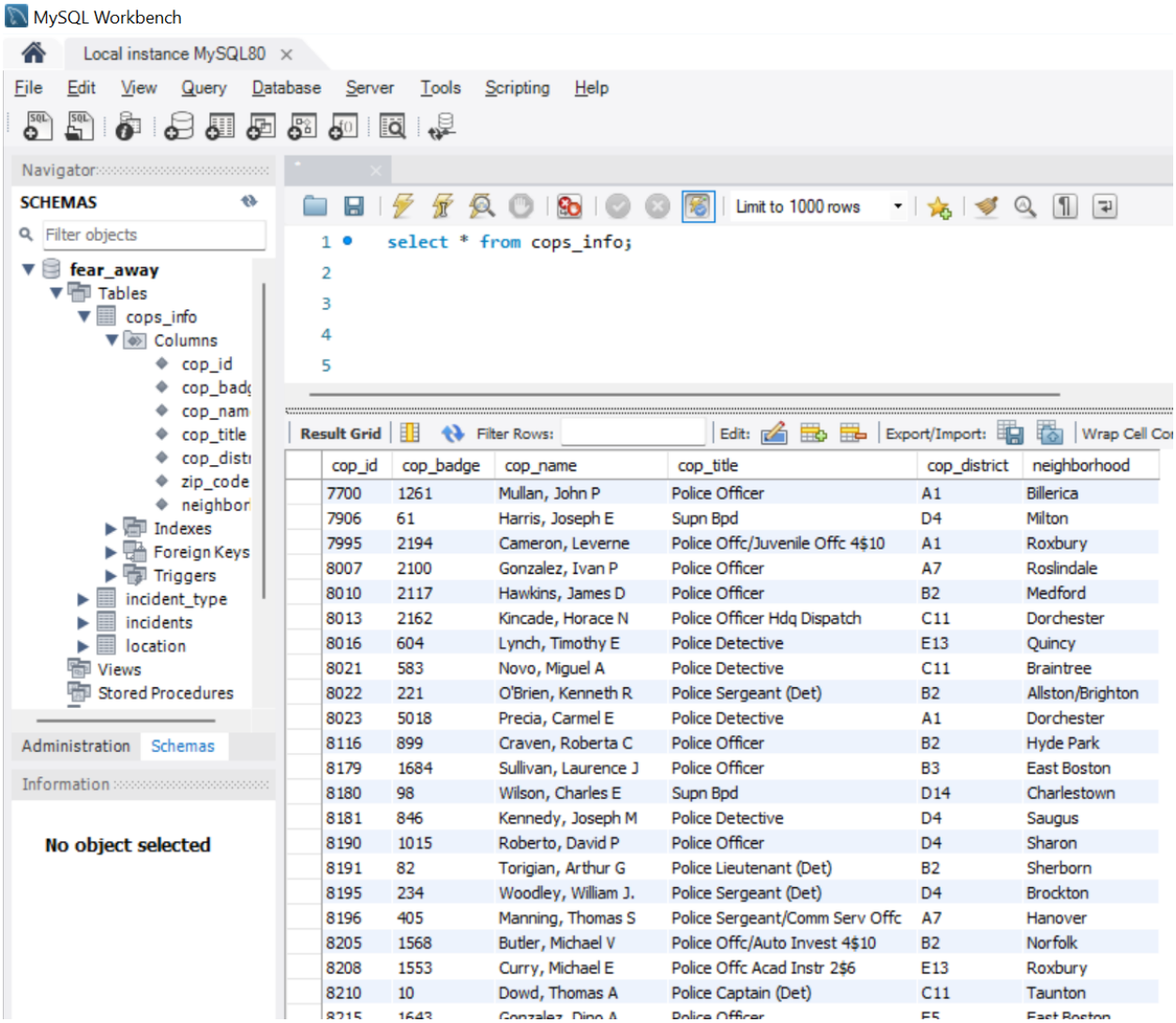
- All requirements for 1st NF are meeting.
- No separate table need to be created as it has no redundant data.
- The tables are related to each other by use of foreign keys-zip.

3rd Normal Form

- All requirements for 2nd NF.
- There is transitional dependency between neighborhood and zip code in order to remove it a new table location is created which stores the data of all the neighborhoods along with their zip codes.
- The cops_info table is altered, and it just contains zip codes.



Altered table cops_info



cop_id	cop_badge	cop_name	cop_title	cop_district	neighborhood
7700	1261	Mullan, John P	Police Officer	A1	Billerica
7906	61	Harris, Joseph E	Supn Bpd	D4	Milton
7995	2194	Cameron, Leverne	Police Offc/Juvenile Offc 4$10	A1	Roxbury
8007	2100	Gonzalez, Ivan P	Police Officer	A7	Roslindale
8010	2117	Hawkins, James D	Police Officer	B2	Medford
8013	2162	Kincade, Horace N	Police Officer Hdq Dispatch	C11	Dorchester
8016	604	Lynch, Timothy E	Police Detective	E13	Quincy
8021	583	Novo, Miguel A	Police Detective	C11	Braintree
8022	221	O'Brien, Kenneth R	Police Sergeant (Det)	B2	Allston/Brighton
8023	5018	Precia, Carmel E	Police Detective	A1	Dorchester
8116	899	Craven, Roberta C	Police Officer	B2	Hyde Park
8179	1684	Sullivan, Laurence J	Police Officer	B3	East Boston
8180	98	Wilson, Charles E	Supn Bpd	D14	Charlestown
8181	846	Kennedy, Joseph M	Police Detective	D4	Saugus
8190	1015	Roberto, David P	Police Officer	D4	Sharon
8191	82	Torigian, Arthur G	Police Lieutenant (Det)	B2	Sherborn
8195	234	Woodley, William J.	Police Sergeant (Det)	D4	Brockton
8196	405	Manning, Thomas S	Police Sergeant/Comm Serv Offc	A7	Hanover
8205	1568	Butler, Michael V	Police Offc/Auto Invest 4$10	B2	Norfolk
8208	1553	Curry, Michael E	Police Offc Acad Instr 2$6	E13	Roxbury
8210	10	Dowd, Thomas A	Police Captain (Det)	C11	Taunton

Location Table:

Location table contains all the neighborhoods tagged to a zip_code.

- Primary key for this table is zip_code.

1st Normal Form

- This table has one primary key which is incident_number
- No column of this table contains multi value attributes.
- There is unique name for every column.

- Two columns of this table do not store similar information.

2nd Normal Form

- All requirements for 1st NF are meeting.
- No separate table need to be created as it has no redundant data.
- The tables are related to each other by use of foreign keys-zip.

3rd Normal Form

- All requirements for 2nd NF.
- There are no fields in this table which do not depend on primary key of the table.
- There are no fields dependent on the primary key or any another field.

Final SQL

1. Count the total number of incidents occured in boston in last 5 years?

```
SELECT count(incident_number)

FROM incidents

where incident_year between 2018 and 2022;
```

2. List the top 5 neighborhoods in Boston with highest crime incidents?

```
SELECT l.neighborhood, count(i.incident_number) as total_incidents
FROM location l RIGHT JOIN incidents i
ON l.zip_code = i.zip
where i.incident_year = 2022
group by neighborhood
order by count(i.incident_number) desc
limit 5;
```

3. Count the harassment incidents on Boston streets

```
SELECT l.neighborhood, t.incident_type, count(i.incident_number) as total_incidents
FROM incidents i LEFT JOIN incident_type t
ON t.incident_id = i.incident_number
LEFT JOIN location l
ON l.zip_code = i.zip
where t.incident_type = 'Harassment'
group by l.neighborhood
order by count(i.incident_number) desc;
```

4. Who are the cops in charge for Roxbury?

```
SELECT  c.cop_name, c.cop_title, l.neighborhood
FROM cops_info c
left JOIN location l
ON c.zip_code = l.zip_code
where l.neighborhood = 'Roxbury'
order by c.cop_name;
```

5. What is the most recurring incident on Adams Street in a one year period.

```
SELECT count(incident_number), t.incident_type
FROM incidents i LEFT JOIN incident_type t
ON i.location = t.locality
where t.locality = 'ADAMS ST' and incident_year between 2020 and 2021
group by t.incident_type
order by count(i.incident_number) desc
limit 1;
```

6. The above use case determines the highly unsafe street in Boston.

```
SELECT count(i.incident_number) as incident_count, i.location, l.neighbourhood, l.zip_code
FROM  incidents i RIGHT JOIN location l
ON i.zip = l.zip_code
where incident_year <= 2022 and incident_year >=2018
group by i.location, l.neighbourhood, l.zip_code
order by count(incident_number) desc
limit 1;
```

7. Which year marks the highest number of incidents?

```
SELECT count(i.incident_number) as incident_count, i.incident_year
FROM  incidents i RIGHT JOIN location l
ON i.zip = l.zip_code
where i.zip = l.zip_code
group by i.incident_year
order by count(incident_number) desc
limit 1;
```

8. Between what hours of day most incidents happen?

```
SELECT count(i.incident_number) as incident_count, i.incident_hour, l.neighbourhood, l.street
FROM  incidents i RIGHT JOIN location l
ON i.zip = l.zip_code
where i.zip = l.zip_code
group by i.incident_hour, l.neighbourhood
```

```
order by count(incident_number) desc
limit 1;
```

9. How many incidents happen after midnight night?

```
SELECT count(incident_number) from incidents
where incident_hour between 1 and 6
group by incident_hour
order by count(incident_number) desc;
```

VIEWS CREATED FOR THE USECASES

1. Count the total number of incidents occured in boston in last 5 years?

   VIEW: CREATE VIEW total_incidents AS count(incident_number) FROM incidents

   where incident_year between 2018 and 2022;

2. List the top 5 neighborhoods in Boston with highest crime incidents?

   VIEW: CREATE VIEW crime_statistics_nbr AS SELECT l.neighborhood, count(i.incident_number) as total_incidents FROM location l RIGHT JOIN incidents I ON l.zip_code = i.zip where i.incident_year = 2022 group by neighborhood order by count(i.incident_number) desc limit 5;

3. Count the harassment incidents on Boston streets

```
VIEW: CREATE VIEW harassment_stats AS
SELECT l.neighborhood, t.incident_type, count(i.incident_number) as total_incidents
FROM incidents i LEFT JOIN incident_type t
ON t.incident_id = i.incident_number
LEFT JOIN location l
ON l.zip_code = i.zip
where t.incident_type = 'Harassment'
group by l.neighborhood
order by count(i.incident_number) desc;
```

4. Who are the cops in charge for Roxbury nieghbourhood?

```
VIEW: CREATE VIEW cops_info AS
SELECT  c.cop_name, c.cop_title, l.neighborhood
```

```
FROM cops_info c
left JOIN location l
ON c.zip_code = l.zip_code
where l.neighborhood = 'Roxbury'
order by c.cop_name;
```

5. What is the most recurring incident on Adams Street in a one year period.

```
VIEW: CREATE VIEW recur_incidents AS

SELECT count(incident_number), t.incident_type
FROM incidents i LEFT JOIN incident_type t
ON i.location = t.locality
where t.locality = 'ADAMS ST' and incident_year between 2020 and 2021
group by t.incident_type
order by count(i.incident_number) desc limit 1;
```

6. Determine the most unsafe street in Boston.

```
VIEW: CREATE VIEW unsafe_boston AS
SELECT count(i.incident_number) as incident_count, i.location, l.neighbourhood,
l.zip_code
FROM  incidents i RIGHT JOIN location l
ON i.zip = l.zip_code
where incident_year <= 2022 and incident_year >=2018
group by i.location, l.neighbourhood, l.zip_code
order by count(incident_number) desc
limit 1;
```

7. Which year marks the highest number of incidents?

```
VIEW--> CREATE VIEW crime_stats_year AS
SELECT count(i.incident_number) as incident_count, i.incident_year
FROM  incidents i RIGHT JOIN location l
ON i.zip = l.zip_code
where i.zip = l.zip_code
group by i.incident_year
order by count(incident_number) desc
limit 1;
```

8. Between what hours of day most incidents happen?

VIEW--> CREATE VIEW crime_stat_hour AS

```
SELECT count(i.incident_number) as incident_count, i.incident_hour, l.neighbourhood,
FROM  incidents i RIGHT JOIN location l
ON i.zip = l.zip_code
where i.zip = l.zip_code
group by i.incident_hour, l.neighbourhood, l.neighbourhood
order by count(incident_number) desc
limit 1;
```

9. How many incidents happen after midnight night?

```
VIEW--> CREATE VIEW crime_stat_night AS
SELECT count(incident_number) from incidents
where incident_hour between 1 and 6
group by incident_hour
order by count(incident_number) desc;
```