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Crime Reporting System

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Intro

The crime reporting system is created to help the society and the policemen in arresting criminals through reports against a crime. Which is sent by residents to the nearest police station, to start in its turn a response action against the criminal. This database was created to record the whole process from the resident's report till the criminal's arrest containing all the details.

Project Steps

1. Project context analysis.
2. Converting context into ER-diagram.
3. Converting ER-diagram into relational model diagram.
4. Creating a database.
5. Units-testing on database .

NOTE

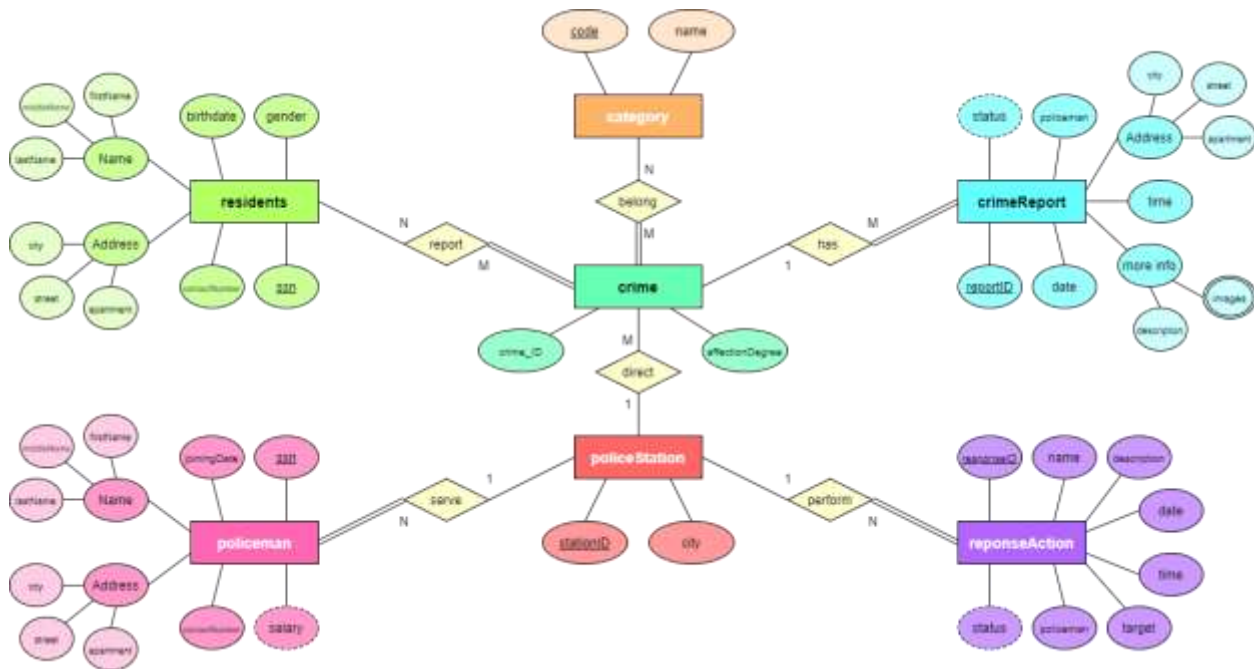
All project files (requirements,ER,SQL queries,data guide) are available for download from the project's Github repository. Click [HERE](#) to access it.

Context Analysis

In this step we read the context of the project carefully, then we extracted 5 nouns and 6 verbs from it. That means 5 entities and 6 relations in the language of ER-diagram. Also, we extracted the attributes of each entity from the detailed requirements.

ER-Diagram

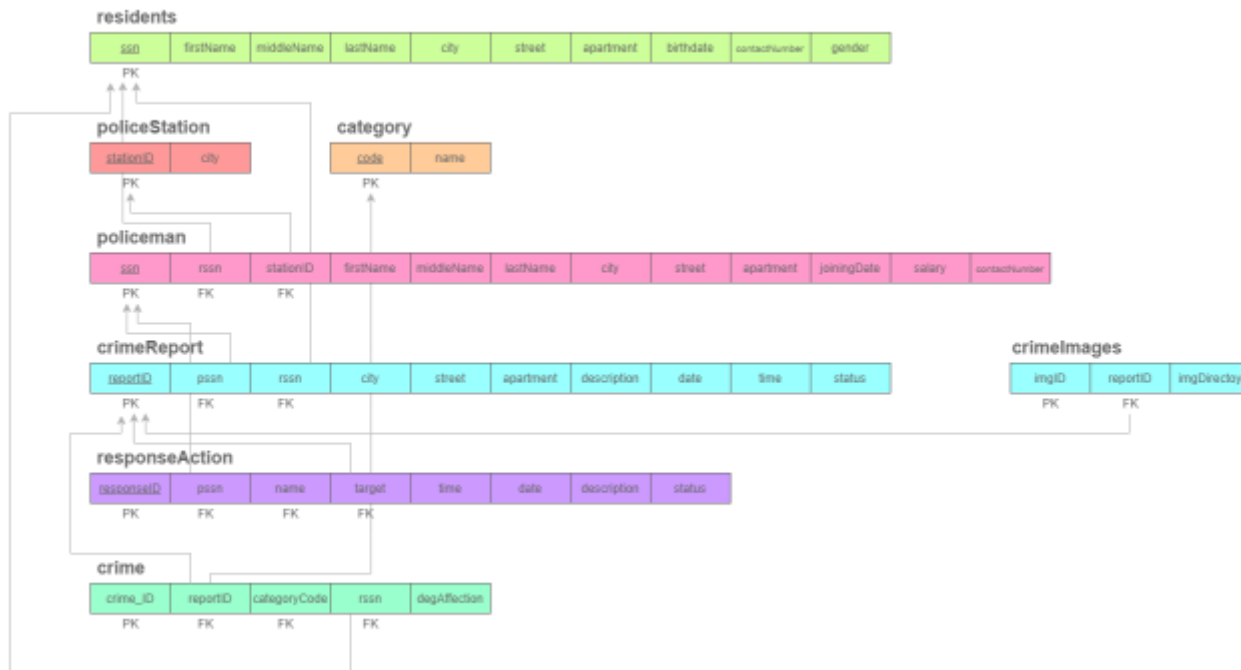
We converted the nouns and the verbs into 5 rectangles and 6 rhombuses and many ellipses. Each ellipse represents an attribute of an entity. Then we connected the attributes with their entities, and the entities with each other by relations to get a logical ER-Diagram. Which is the main rock for building databases.



- Residents report a crime through a crime report
- Each crime belongs to a category
- Each crime is directed by a police station
- The police station performs one or many response action(s)
- Response action(s) are done by policemen who serve in the police station

Relational Model

We converted the relations and entities of the ER-diagram into a relational model depending on the rules of this process. Then we determined the primary key and the foreign key of each. Also, we arranged them one by one from the top to bottom depending on the number of foreign keys at each table. This arrangement helps us create and insert data without errors.



We created two SQL files:

In the first file we created the database and the tables depending on the relational model diagram. We added primary and foreign keys to each table.

```
CREATE DATABASE Crime_Reporting_System;

CREATE TABLE residents(
    ssn                char(10),
    firstName          varchar(20)          NOT NULL,
    middleName         varchar(20)          NOT NULL,
    lastName           varchar(20)          NOT NULL,
    city               varchar(25)          NOT NULL,
    street              varchar(25),
    apartment          int,
    birthdate          date,
    contactNumber      int                  NOT NULL,
    gender              char(1),
    PRIMARY KEY(ssn));

CREATE TABLE policeStation(
    stationID          char(3),
    city               varchar(25)          NOT NULL,
    PRIMARY KEY(stationID));

CREATE TABLE category(
    code               char(3),
    name               varchar(30)          NOT NULL,
    PRIMARY KEY(code));

CREATE TABLE policeman(
    ssn                char(9),
    rsn                char(10),
    stationID          char(3)              NOT NULL,
    firstName          varchar(20)          NOT NULL,
    middleName         varchar(20)          NOT NULL,
    lastName           varchar(20)          NOT NULL,
    city               varchar(25)          NOT NULL,
    street              varchar(25),
    apartment          int,
    joiningDate        date,
    salary              int,
    contactNumber      int                  NOT NULL,
    PRIMARY KEY (ssn));
```

```

CREATE TABLE crimeReport(
    reportID          char(10),
    pssn              char(9)                NOT NULL,
    rssn              char(10)              NOT NULL,
    city              varchar(25)           NOT NULL,
    street            varchar(25),
    apartment         int,
    description        varchar(max)         NOT NULL,
    date              date                  NOT NULL,
    time              time                 NOT NULL,
    status            varchar(max)          NOT NULL,
    PRIMARY KEY (reportID));

```

```

CREATE TABLE crimeImages(
    imageID           char(12),
    reportID          char(10)              NOT NULL,
    imgDirectory      varchar(max)         NOT NULL,
    PRIMARY KEY (imageID));

```

```

CREATE TABLE responseAction(
    responseID        char(8),
    pssn              char(9)                NOT NULL,
    name              varchar(40),
    time              time                 NOT NULL,
    date              date                  NOT NULL,
    description        varchar(max)         NOT NULL,
    target            char(10)              NOT NULL,
    status            varchar(max),
    PRIMARY KEY (responseID));

```

```

CREATE TABLE crime(
    crimeID           char(11)              NOT NULL,
    reportID          char(10)              NOT NULL,
    categoryCode      char(3)              NOT NULL,
    rssn              char(10)              NOT NULL,
    degAffection      varchar(max));

```

--Foreign Keys

```
ALTER TABLE policeman ADD FOREIGN KEY (stationID) REFERENCES  
policeStation(stationID) ON DELETE CASCADE ON UPDATE CASCADE;
```

```
ALTER TABLE crimeReport ADD FOREIGN KEY (pssn) REFERENCES policeman(ssn) ON DELETE  
CASCADE ON UPDATE CASCADE;
```

```
ALTER TABLE crimeReport ADD FOREIGN KEY (rssn) REFERENCES residents(ssn) ON DELETE  
CASCADE ON UPDATE CASCADE;
```

```
ALTER TABLE crimeImages ADD FOREIGN KEY (reportID) REFERENCES crimeReport(reportID)  
ON DELETE CASCADE ON UPDATE CASCADE;
```

```
ALTER TABLE responseAction ADD FOREIGN KEY (pssn) REFERENCES policeman(ssn) ON  
DELETE CASCADE ON UPDATE CASCADE;
```

```
ALTER TABLE responseAction ADD FOREIGN KEY (target) REFERENCES  
crimeReport(reportID);
```

```
ALTER TABLE crime ADD FOREIGN KEY (reportID) REFERENCES crimeReport(reportID) ON  
DELETE CASCADE ON UPDATE CASCADE;
```

```
ALTER TABLE crime ADD FOREIGN KEY (categoryCode) REFERENCES category(code) ON  
DELETE CASCADE ON UPDATE CASCADE;
```

```
ALTER TABLE crime ADD FOREIGN KEY (rssn) REFERENCES residents(ssn);
```

Data Insertion

In the second file we inserted logical data into the database.

```
INSERT INTO residents
(ssn,firstName,middleName,lastName,city,street,apartment,birthdate,contactNumber,
gender)
VALUES ('3111203764','Mohammad' ,'Youssef','Azzam','Beirut','Ain Al
Mraiseh','7','1996-02-12','81876037','M'),
('3110017318','Dima','Ahmad','Al Hasan','Beirut','Ain Al Mraiseh','9','2000-04-
01','81934489','F'),
('3110013541','Tarek','Anas','Rahbani','Beirut','Ain Al Mraiseh','15','2016-08-
15','70158123','M'),
('3120126981','Ibrahim','Hasan','Itani','Beirut','Hamra','93','1999-11-
12','71124086','M'),
('3120965367','Rana','Jamil','Harb','Beirut','Hamra','41','1934-05-
26','78957216','F'),
('3121678247','William','Georges','Saliba','Beirut','Hamra','29','1983-09-
18','81158610','M'),
('4710011982','Mona','Suleiman','Khalil','Zahle','Maalaka' ,'19','1998-12-
29','78672445','F'),
('4710112436','Andrew','Youssef','Saliba','Zahle','Maalaka' ,'5','1986-11-
04','81876255','M'),
('4710076974','Tony','Issa','Takomijian','Zahle','Maalaka' ,'20','2004-05-
31','03555558','M'),
('4720182689','Ayman','Jad','Maadaranni','Zahle','Wadi Al Arayech','18','2002-10-
19','03124865','M'),
('4720082391','Mansour','Elias','Farah','Zahle','Wadi Al Arayech','14','2000-01-
01','03157914','M'),
('4720105890','Fatima','Mahmoud','Wehbi','Zahle','Wadi Al Arayech','74','1971-03-
26','71195614','F'),
('7310106362','Ghada','Mostafa','Asaad','Tripoli','Bohssas','12','1994-06-
03','78194760','F'),
('7310481702','Ahmad','Salim','Othman','Tripoli','Bohssas','51','1978-05-
25','81175691','M'),
('7310812657','Mariam','Saleh','Shaaban','Tripoli','Bohssas','34','1949-02-
18','81981765','F'),
('7320219183','Ibrahim','Hamed','Barakat','Tripoli','Mina','26','1998-12-
29','71197256','M'),
('7320219348','Tony','Melhem','Rizk','Tripoli','Mina','19','2001-10-
19','70124978','M'),
('7310613751','Huda','Sami','Othman','Tripoli','Mina','62','2009-09-
18','70192475','F'),
('8610130638','George','Toufik ','Boustany','Tyre','Abbasiyye','14','1987-08-
15','03944834','M'),
('8610101238','Ali' ,'Mahmoud','Habash','Tyre','Abbasiyye','11','1999-01-
09','70927842','F'),
```



```
('8610008641','Rama','Ali','Zaiter','Tyre','Abbasiyye','15','1945-05-26','70124961','F'),
('8620099173','Hadi','Yahya','Taleb','Tyre','Borj El Chamali','67','1968-08-09','71197451','M'),
('8610012387','Sara','Hasan','Shamas','Tyre','Borj El Chamali','47','2006-11-16','81917541','F'),
('8610012865','Rami','Saed','Al Sayyed','Tyre','Borj El Chamali','94','1993-10-15','03715841','M');
```

```
INSERT INTO policestation
(stationID,city)
VALUES ('312','Beirut'),
('471','Zahle'),
('733','Tripoli'),
('862','Tyre');
```

```
INSERT INTO category
(code,name)
VALUES ('235','Drug trafficking'),
('547','Murder'),
('554','Kidnapping'),
('603','Identity Theft'),
('605','Blackmailing'),
('201','Robbery'),
('653','Ransomware');
```

```

INSERT INTO policeman
(ssn,rssn,stationID,firstName,middleName,lastName,city,street,apartment,joiningDate,salary,contactNumber)
VALUES ('312196531','3111203764','312','Mohammad'
,'Youssef','Azzam','Beirut','Ain Al Mraiseh','7','2019-07-10','1600','81876037'),
('312042345','3121678247','312','William','Georges','Saliba','Beirut','Hamra','29',
,'2004-04-15','2100','81158610'),
('312074327','4710112621','312','Mamdouh','Shamdeen','Araji','Zahle','Maalaka'
,'37','2007-07-11','1100','81762457'),
('471106411','4710112436','471','Andrew','Youssef','Saliba','Zahle','Maalaka'
,'5','2010-10-04','1200','81876255'),
('471191532','4720082391','471','Mansour','Elias','Farah','Zahle','Wadi Al
Arayech','14','2019-07-26','1000','03157914'),
('471106432','4710115181','471','Andrew','Yousef','Saliba','Zahle','Maalaka'
,'5','2010-10-12','1500','81876255'),
('733134562','7310106362','733','Ghada','Mostafa','Asaad','Tripoli','Bohssas','12',
,'2013-01-29','1400','78194760'),
('733191987','7320219348','733','Tony','Melhem','Rizk','Tripoli','Mina','19','201
9-07-15','800','70124978'),
('733923456','3111201576','733','Hasan','Ali','Hawa','Beirut','Ain Al
Mraiseh','63','1992-04-22','1500','71457488'),
('862198126','8610101238','862','Ali'
,'Mahmoud','Habash','Tyre','Abbasiyye','11','2019-07-05','1000','70927842'),
('862136349','8610012865','862','Rami','Saed','Al Sayyed','Tyre','Borj El
Chamali','94','2013-01-06','1350','03715841'),
('862136824','3121247890','862','George','Toufik'
,'Boustany','Beirut','Hamra','14','2013-01-08','1600','03944834');

```

```

INSERT INTO crimeReport
(reportID,pssn,rssn,city,street,apartment,description,date,time,status)
VALUES
('3121901271','312196531','4710011982','Beirut','Ain Al Mraiseh','56','Resident
4710011982 (Mona Khalil) reported that she saw 2 corpses filled with blood near
her friends house','2019-03-14','23:12','Investigation Closed'),
('3122003718','312042345','3110017318','Beirut','Hamra','9','Resident 3110017318
(Dima Al Hasan) received a message from the bank informing her that 9623$ were
deducted from her account due to purchases done at amazon store.','2020-05-
24','13:27','Case under Investigation'),
('3122009431','312042345','3120965367','Beirut','Hamra','41','Resident 3120965367
(Rana harb) reported that her daughter is missing since 2 days. ','2020-06-
28','09:08','Investigation Closed'),
('4711906530','471106432','4710112436','Zahle','Wadi Al Arayech','20','28kg of
Cocaine were caught at Al Masnaa border checkpoint','2019-10-
17','23:14','Investigation Pending Outcome'),
('4711903127','471191532','4720105890','Zahle','Wadi Al Arayech','74','LIU
reported a ransomware attack on its database','2019-01-02','07:30','Investigation
Closed'),
('7331901387','733134562','7310812657','Tripoli','Mina','34','Mariam Shaaban
Reported that her wallet was stolen at the Mina by a 19-year old guy','2019-12-
23','19:59','Case under Investigation'),
('7331902764','733191987','7310481702','Tripoli','Mina','26','An armed robbery at
the house of citizen I.B. which led to his death when resisting the
thieves.','2019-05-09','05:19','Investigation Pending Outcome'),
('7331904857','733923456','7310481702','Tripoli','Bohssas','34','Resident
7310481702 (Ahmad Othman) reported that resident 7310812657 (Mariam Shaaban) was
murdered by one of her relatives.','2019-02-13','23:51','Investigation Closed'),
('7332006125','733923456','8610012865','Tripoli','Bohssas','94','Resident
8610012865 (Rami Al Sayyed) reported that all his files were locked and 1000$ are
required by the hacker to unlock his files','2020-12-29','17:38','Case under
Investigation'),
('8622001255','862198126','8610130638','Tyre','Abbasiyye','23','Resident
8610130638 (George Boustany) received an email threatening him by exposing his
companys sensitive information if he does not pay 50000$ within 24h','2019-12-
06','12:00','Investigation Pending Outcome');

```

```

INSERT INTO crimeImages
(imageID,reportID,imgDirectory)
VALUES
('31219012711','3121901271','/Images/3121901271/1.jpg'),
('31219012712','3121901271','/Images/3121901271/2.jpg'),
('31219012713','3121901271','/Images/3121901271/3.jpg'),
('31219012714','3121901271','/Images/3121901271/4.jpg'),
('31219012715','3121901271','/Images/3121901271/5.jpg'),
('31220037181','3122003718','/Images/3122003718/1.jpg'),
('31220037182','3122003718','/Images/3122003718/2.jpg'),
('31220037183','3122003718','/Images/3122003718/3.jpg'),
('31220037184','3122003718','/Images/3122003718/4.jpg'),
('31220094311','3122009431','/Images/3122009431/1.jpg'),
('31220094312','3122009431','/Images/3122009431/2.jpg'),
('31220094313','3122009431','/Images/3122009431/3.jpg');

```

```

INSERT INTO responseAction
(responseID,pssn,name,time,date,description,target,status)
VALUES
('31261689','312196531','Mohammad Azzam','14:50','2019-04-19','The criminal was arrested','3121901271','Investigation Closed'),
('31296419','312042345','William Saliba','20:14','2020-07-30','Tracking hacker to capture him','3122003718','Case under Investigation'),
('31219642','312042345','William Saliba','09:50','2020-07-05','The police came right away and After searching and checking,the criminal was found','3122009431','Investigation Closed'),
('47118461','471106432','Mansour Farah','04:26','2020-12-20','The police came right away and took the necessary measures','4711906530','Investigation Pending Outcome'),
('47106415','471191532','Andrew Saliba','12:47','2019-08-14','Hacker appeared to be a student, he was handed over to the police','4711903127','Investigation Closed'),
('73305314','733134562','Ghada Asaad','07:59','2020-06-30','The police came and started the investigation','7331901387','Case under Investigation'),
('73305414','733191987','Tony Rizk','10:47','2021-06-06','After searching and checking,the criminal was found','7331902764','Investigation Pending Outcome'),
('73391541','733923456','Hasan Hawa','02:22','2019-02-14','The killer turned himself in after confronting the police for half an hour','7331904857','Investigation Closed'),
('73304825','733923456','Hasan Hawa','18:39','2021-09-19','Hacker Group is being tracked','7332006125','Case under Investigation'),
('86217544','862198126','Ali Habash','14:19','2020-12-03','3 suspects found, gathering more intel to identify the criminal','8622001255','Investigation Pending Outcome');

```

```
INSERT INTO crime
( crimeID , reportID, categoryCode, rsn , degAffection)
VALUES
('73320112345','7331902764','201','7310812657','2 corpses'),
('73320109876','7331901387','201','7310812657','Dima Al Hasan visacard is being
used by someone else'),
('47123545678','4711906530','235','4710112436','Psychological problems for the
victim'),
('73354734987','7331904857','547','7310481702','2 policemen were injured'),
('31254724983','3121901271','547','7310481702','Some students data was lost'),
('31255423490','3122009431','554','4710011982','Passport, ID, and money robbed'),
('31260390347','3122003718','603','3120965367','Broken windows, 1 corpse, 58679$
robbed'),
('86260598326','8622001255','605','8610130638','1 corpse'),
('47165323802','4711903127','653','4720105890','All files lost'),
('73365390483','7332006125','653','8610012865','companys data was exposed');
```

Unit-testing

In this step we checked if the database and tables were created. We also checked if the data was inserted correctly or not using “SELECT” queries.

Simple queries

Step 5.1) Insert a new Category having the following info: code is 314, name is Social Security Threat

```
INSERT INTO category (code,name)
VALUES ('314','Social Security Threat')
```

Step 5.2) Update the name of the policeman whose ssn is 312074327

```
UPDATE policeman
SET firstName='Ahmad',middleName='Yahya',lastName='Saleh'
WHERE ssn='312074327';
```

Step 5.3) List the names of residents in Beirut City

```
SELECT firstName,middleName,lastName
FROM residents
WHERE city='Beirut';
```

Step 5.4) List the name of policemen who joined after 1/1/2019 ordered alphabetically

```
SELECT firstName,middleName,lastName
FROM policeman
WHERE joiningDate >= '2019-01-01'
ORDER BY firstName,middleName ASC;
```

Step 5.5) List the ID and status of the crimes reported to the Policeman named “William Saliba”

```
SELECT DISTINCT crimeID,status
FROM crime,crimeReport,policeman
WHERE crime.reportID=crimeReport.reportID AND crimeReport.pssn=policeman.ssn AND
policeman.firstName='William' AND policeman.lastName='Saliba';
```

Step 5.6) List the number of pending crimes

```
SELECT COUNT(reportID)
FROM crimeReport
WHERE status ='Case under Investigation' OR status ='Investigation Pending Outcome';
```

Step 5.7) The ID of crimes that were reported to “Ghada Asaad” or had an action done by “Ghada Asaad”

```
SELECT crimeID
FROM crime,crimeReport,policeman,responseAction
WHERE crime.reportID=crimeReport.reportID
AND crimeReport.pssn=policeman.ssn
AND crimeReport.pssn=responseAction.pssn
AND policeman.firstName='Ghada'
AND policeman.lastName='Asaad';
```

Step 5.8) The total number of crimes in each city

```
SELECT city,COUNT(crimeID)
FROM crimeReport,crime
WHERE crime.reportID=crimeReport.reportID
GROUP BY city;
```

Step 5.9) The name of residents who have reported more than two crimes

```
SELECT firstName,lastName,COUNT(*)
FROM residents,crimeReport,crime
WHERE residents.ssn=crimeReport.rssn AND crime.reportID=crimeReport.reportID
GROUP BY firstName,lastName
HAVING COUNT(*)>2;
```

Step 5.10) The number of responses for each crime witnessed today

```
SELECT COUNT(*)
FROM responseAction
GROUP BY date
HAVING date='2021-01-06';
```

Step 5.11) The number of crimes in each category

```
SELECT name,COUNT(categoryCode)
FROM category,crime
WHERE category.code=crime.categoryCode
GROUP BY categoryCode,name;
```

Step 5.12) The ID of crimes

```
SELECT crimeID
From crime;
```

Complex queries

We used complex queries to extract useful information about residents, policemen, and crimes.

Complex Query 1 / Retrieve the ssn and names of residents who have not reported a crime.

```
SELECT      ssn,firstName, middleName, lastName
FROM residents
WHERE      NOT EXISTS
          (SELECT * FROM crimeReport WHERE SSN=RSSN)
```

Complex Query 2 / Names of residents who are policemen

```
SELECT firstName,lastname
FROM residents
INTERSECT
SELECT firstName,lastName
FROM policeman;
```

Complex Query 3 / Names of policemen who didn't make a response Action

```
SELECT firstName,lastName
FROM policeman
WHERE ssn IN (SELECT ssn
              FROM policeman
              EXCEPT
              SELECT pssn
              FROM responseAction);
```

Complex Query 4 / ID and Names of policemen who received a crime Report

```
SELECT DISTINCT ssn,firstName,lastName
FROM policeman
RIGHT JOIN crimeReport
ON policeman.ssn=crimeReport.pssn;
```

Complex Query 5 / ID, city and description of crimes reported on 2019-05

```
SELECT reportID,city,description
FROM crimeReport
WHERE date LIKE '2019-05-%'
UNION
SELECT reportID,city,description
FROM crimeReport
WHERE date LIKE '2020-05-%'
```


Features and Improvements that might be added

- API

We may create an API for statistical purposes

- GUI

Then we can link the API to graphical user interfaces (app, website).

- Extending

We can work on extending the database to cover more police stations.

- More Data

Data about police cars, residents' smart appliances that can be used in cyber crimes.