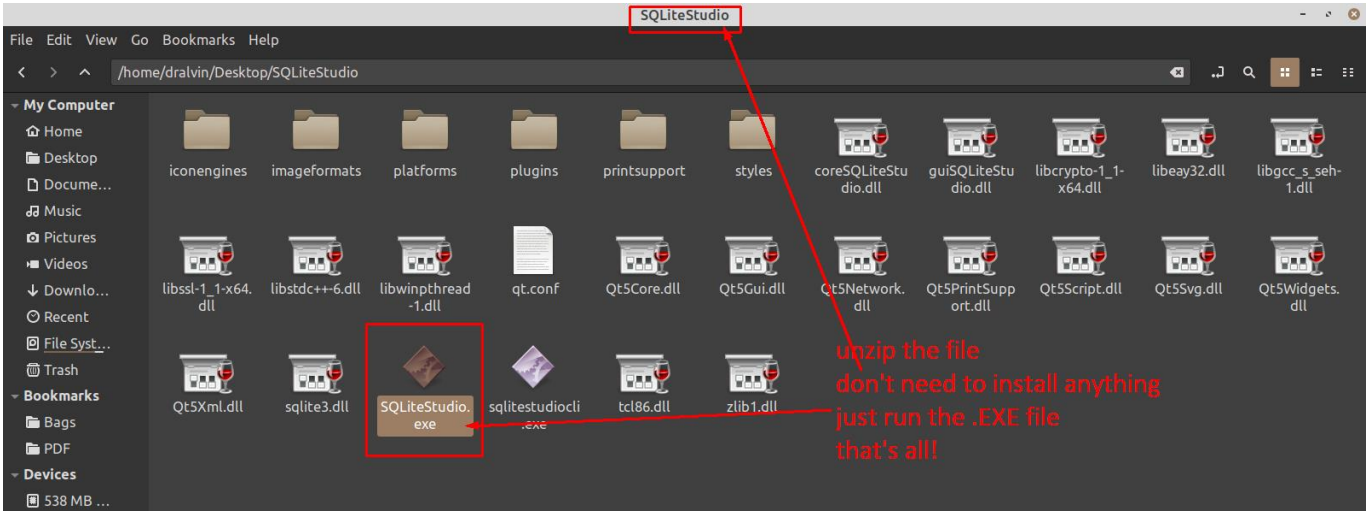
DR. ALVIN'S PUBLICATIONS

LEARNING SQLITE

DR. ALVIN ANG

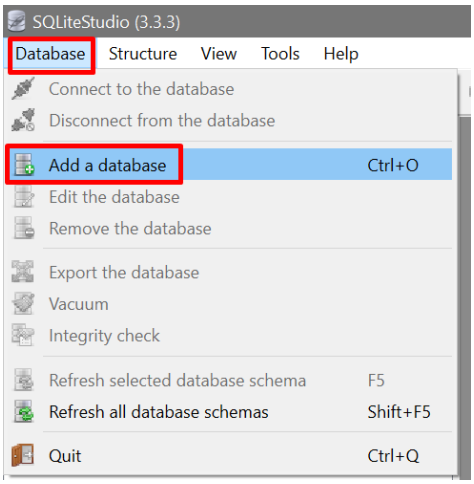
I. USING SQLITESTUDIO

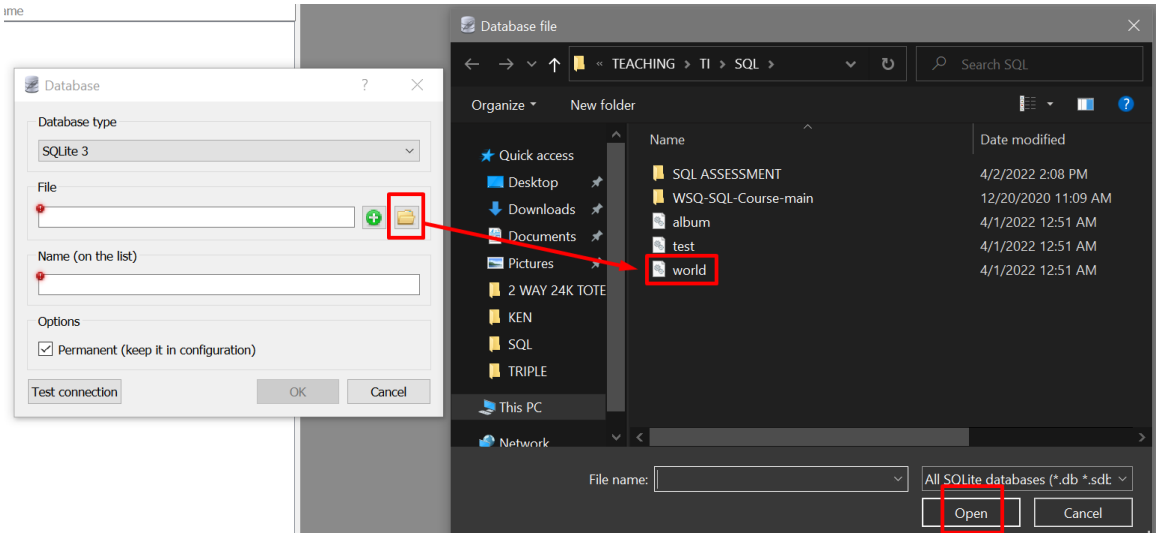
- Go here https://sqlitestudio.pl/

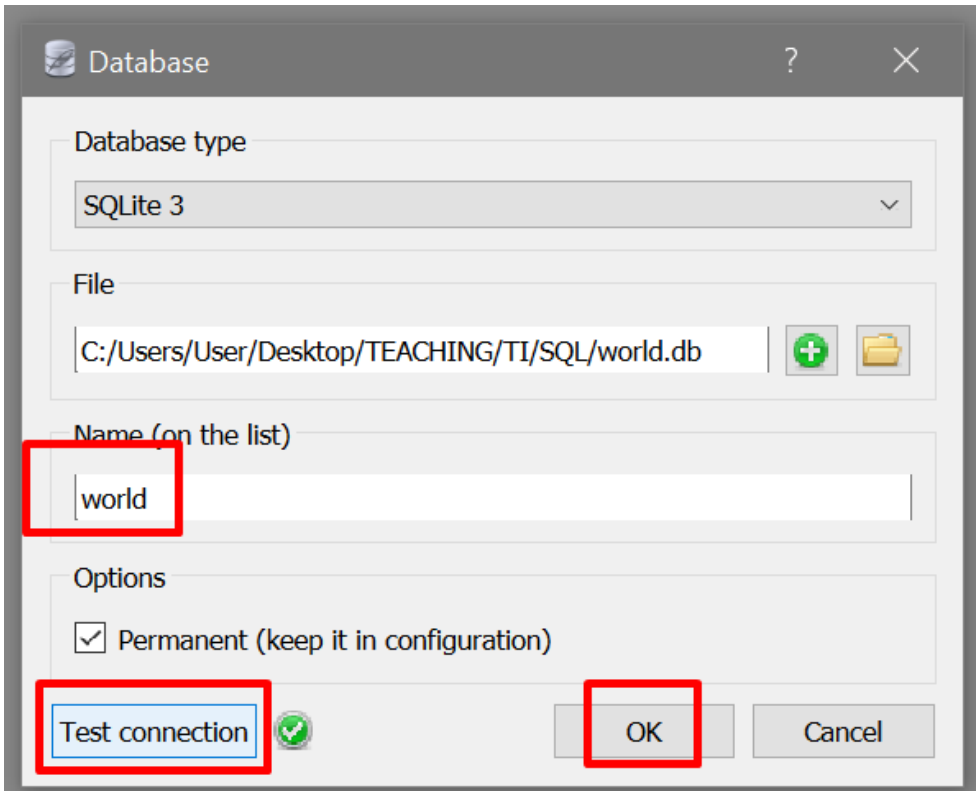


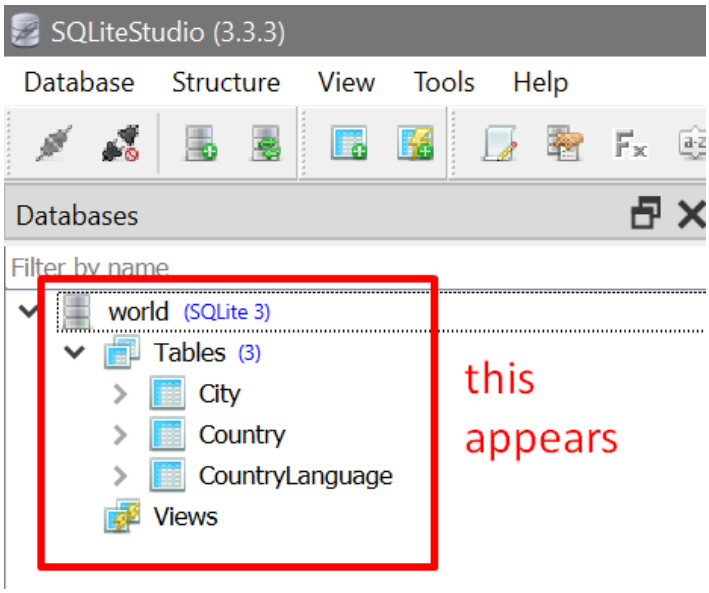
- Run the SQLite studio software.

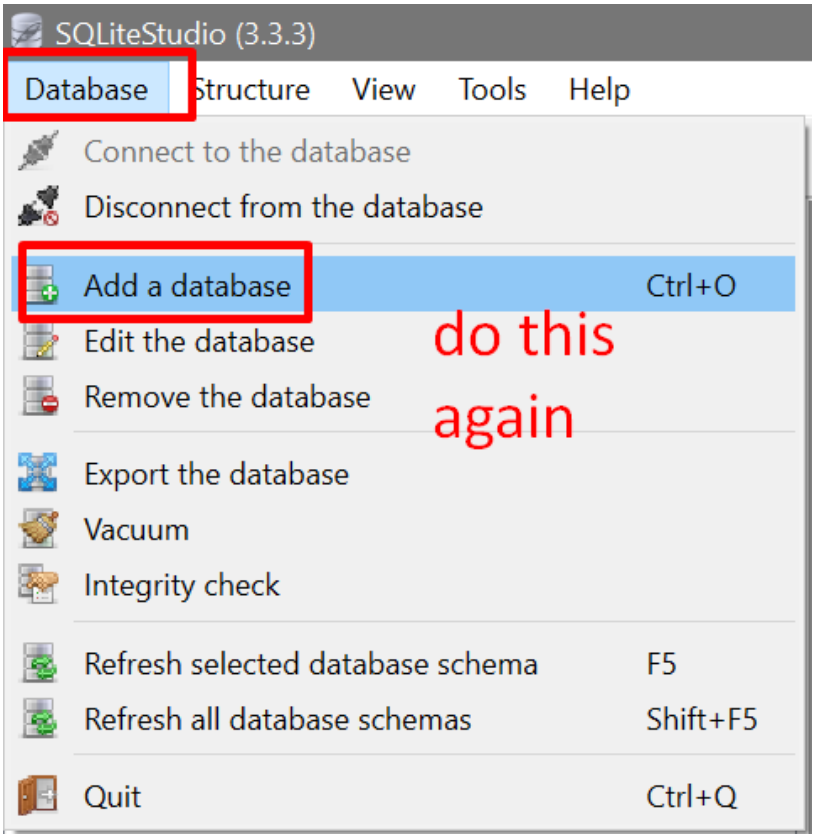
- Go here https://www.alvinang.sg/s/world.db download the file.

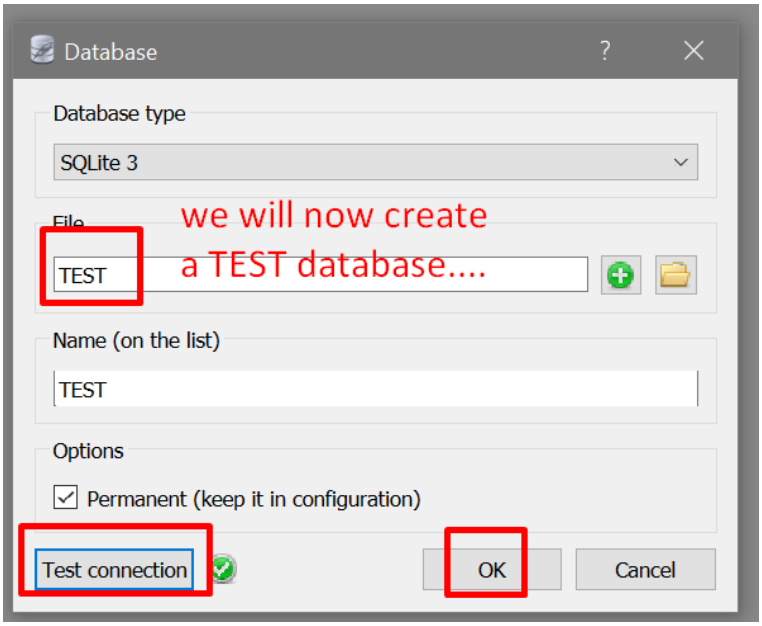


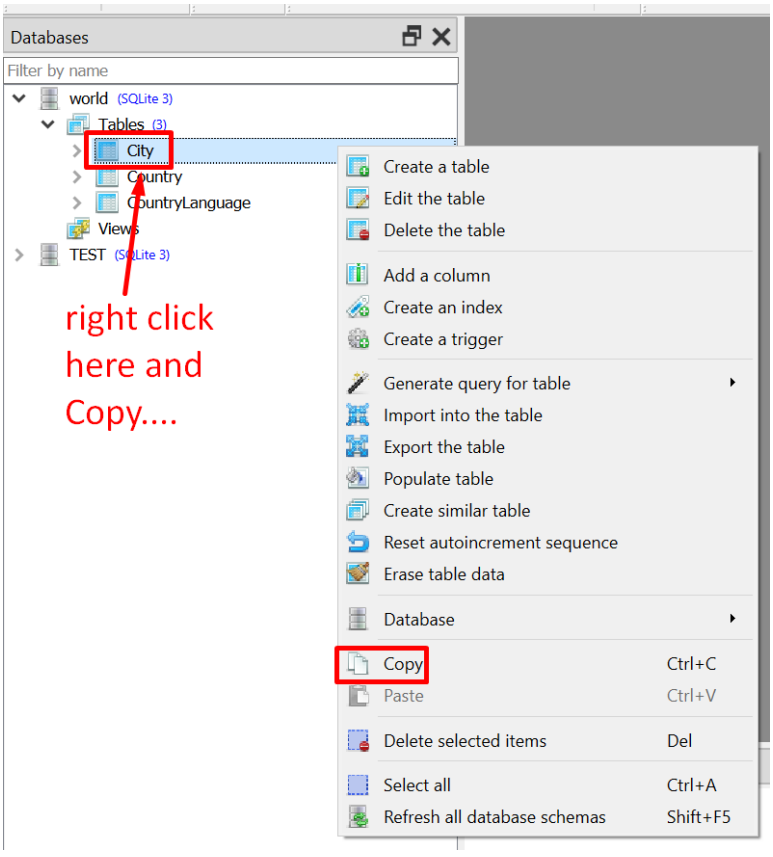


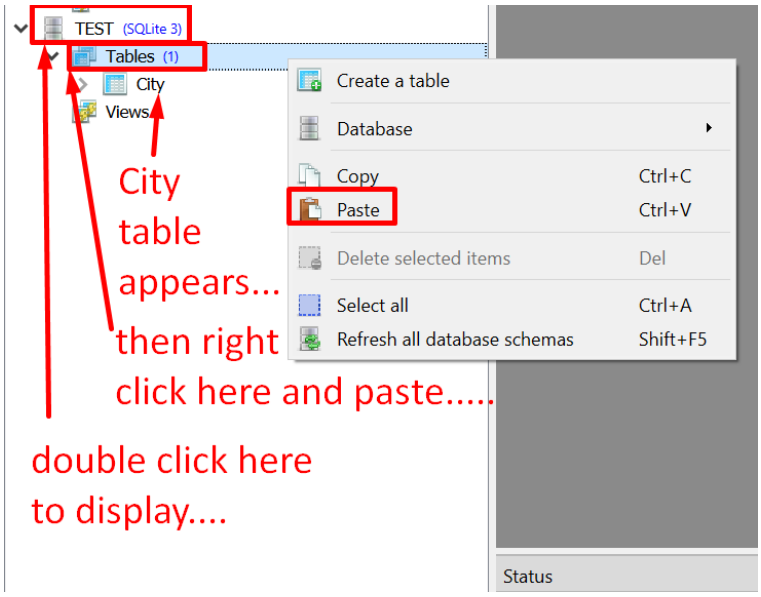


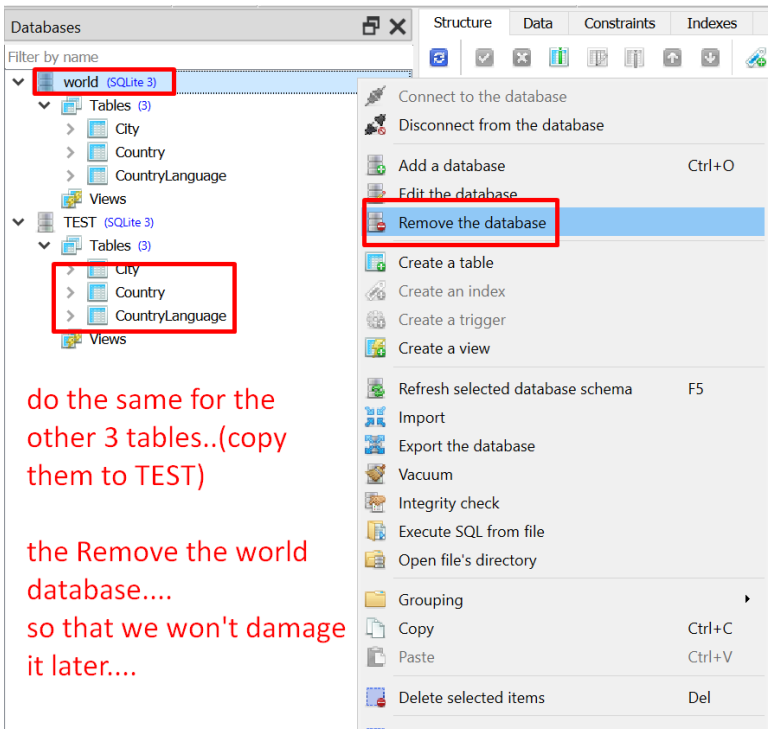


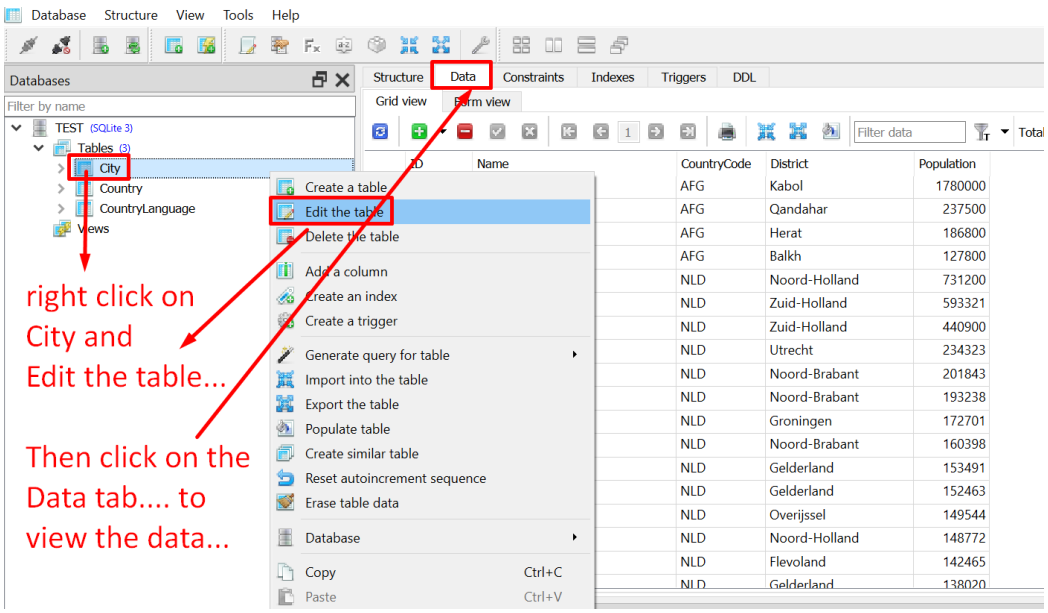


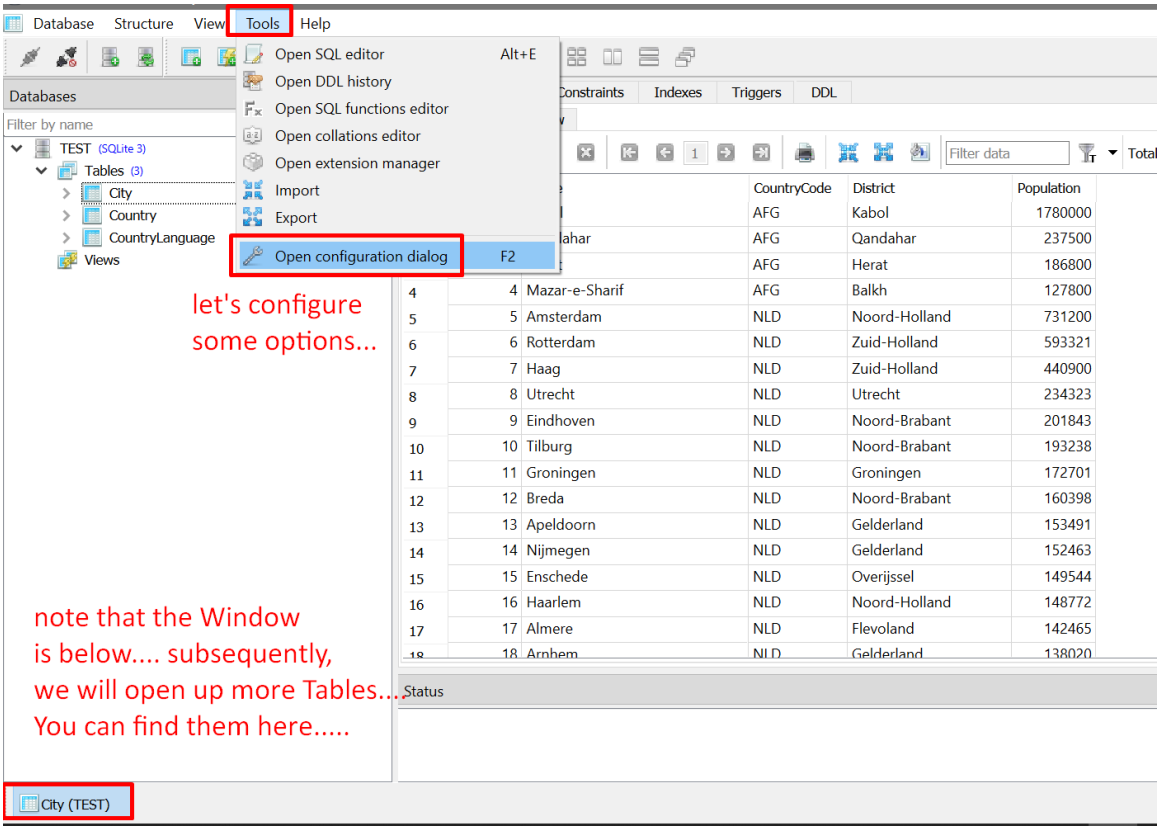


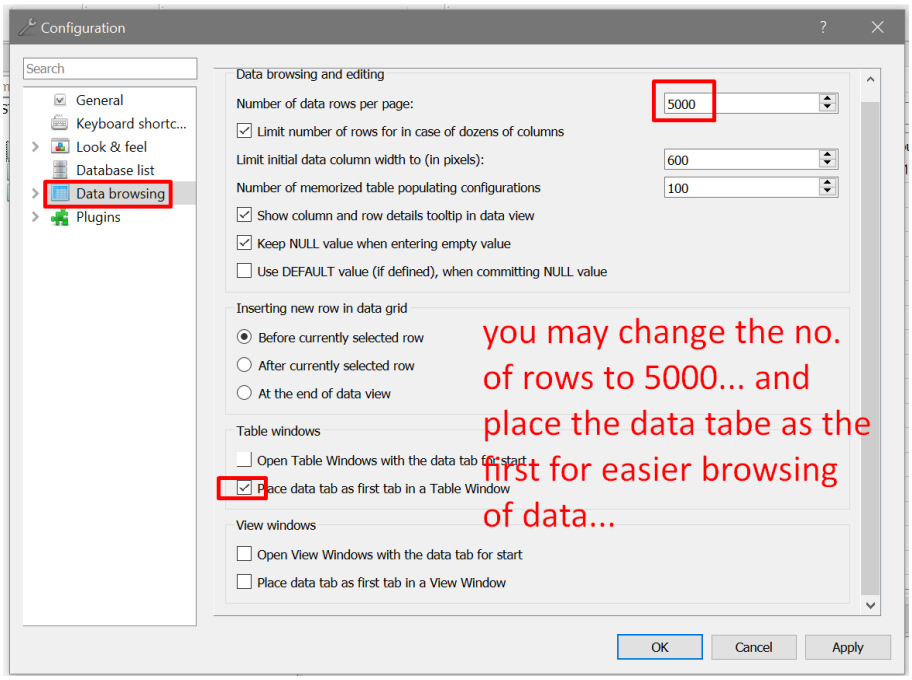


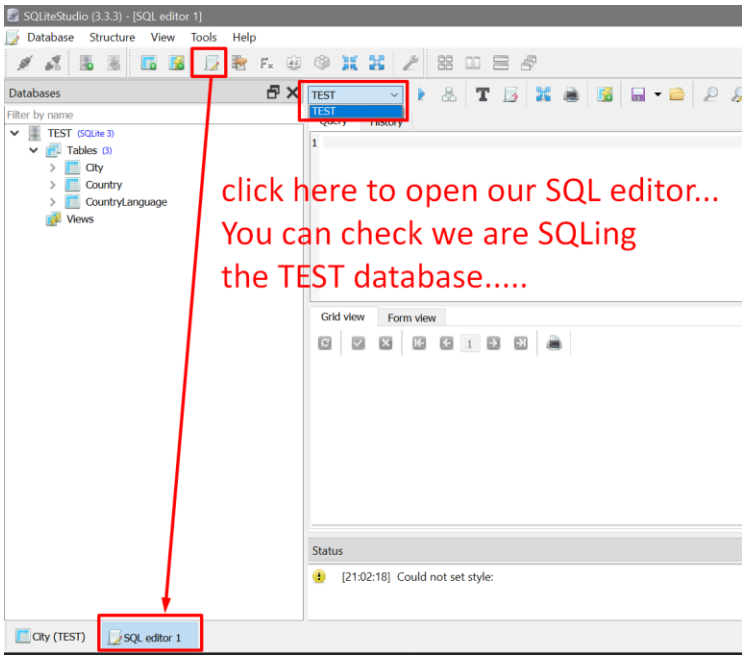




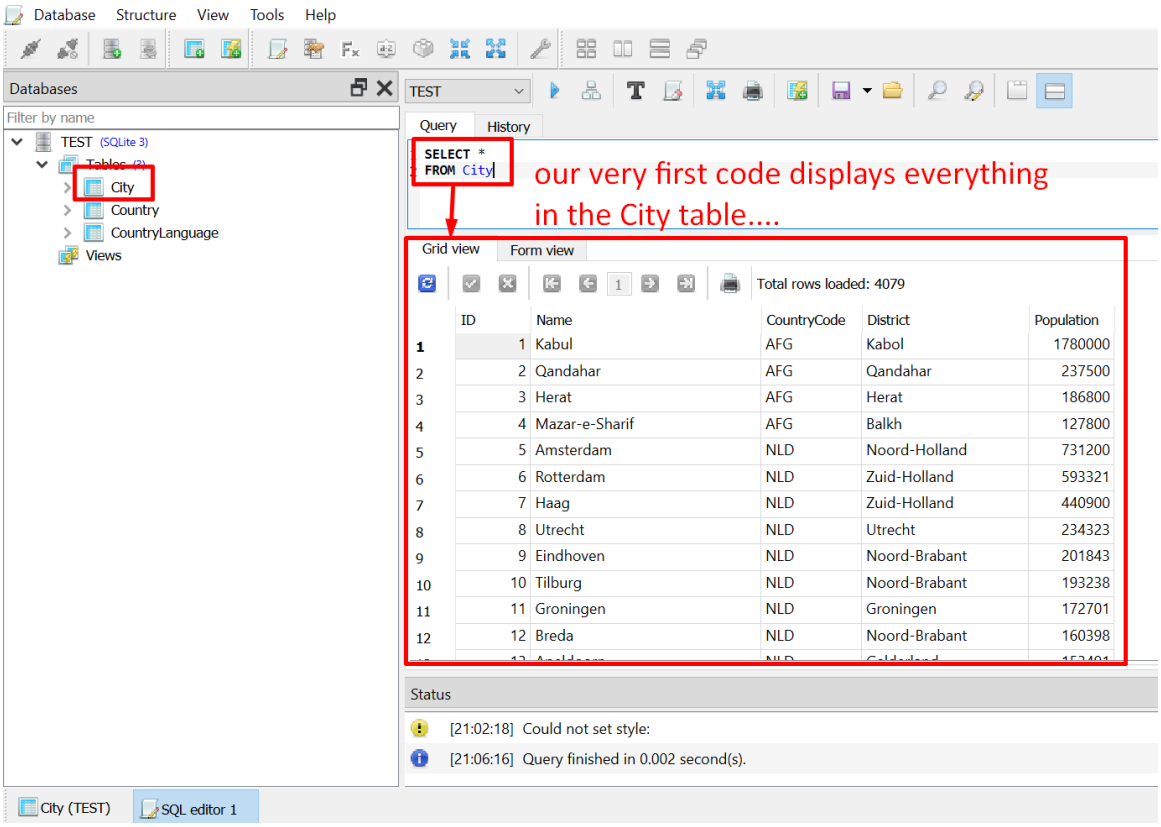




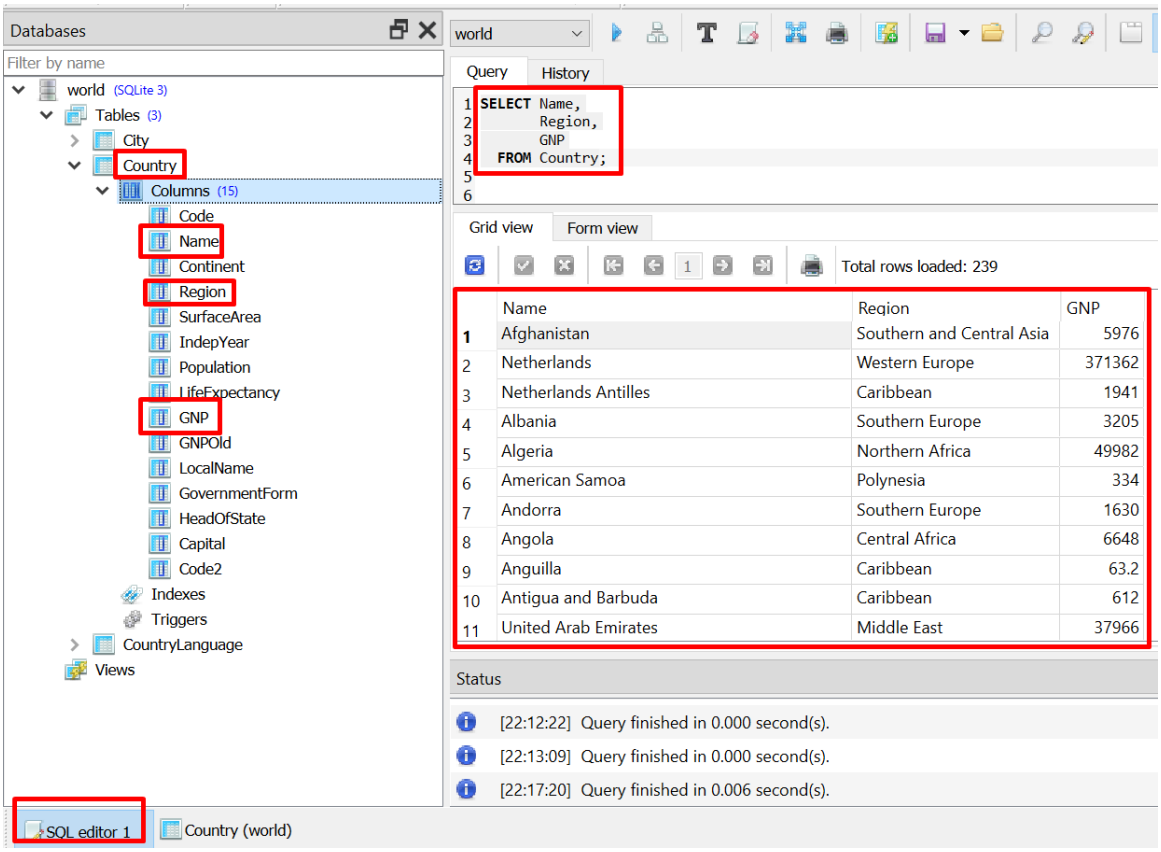




A. SELECT

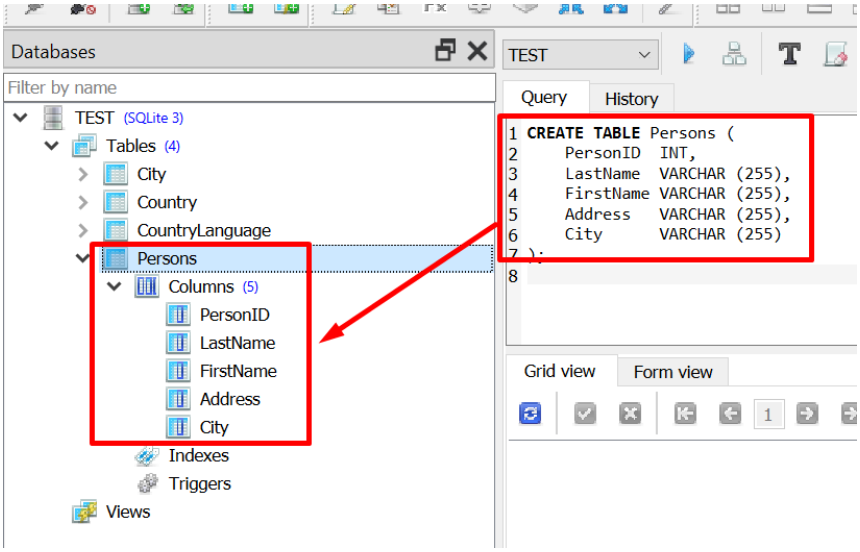



```
SELECT *
FROM City
```

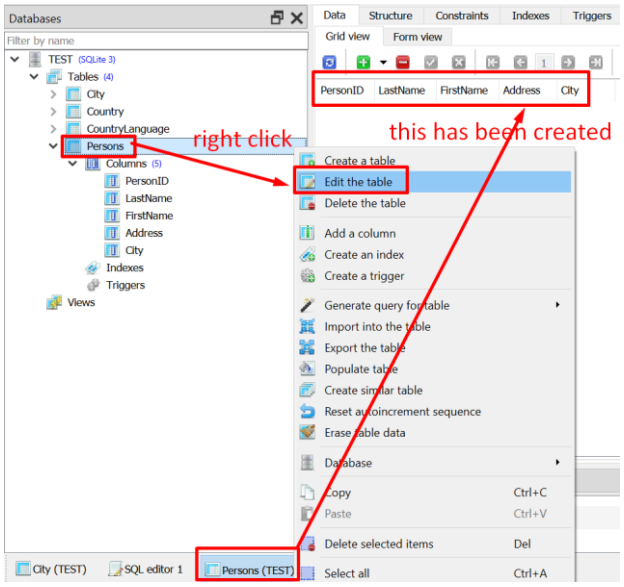


SELECT Name,
Region,
GNP
FROM Country;

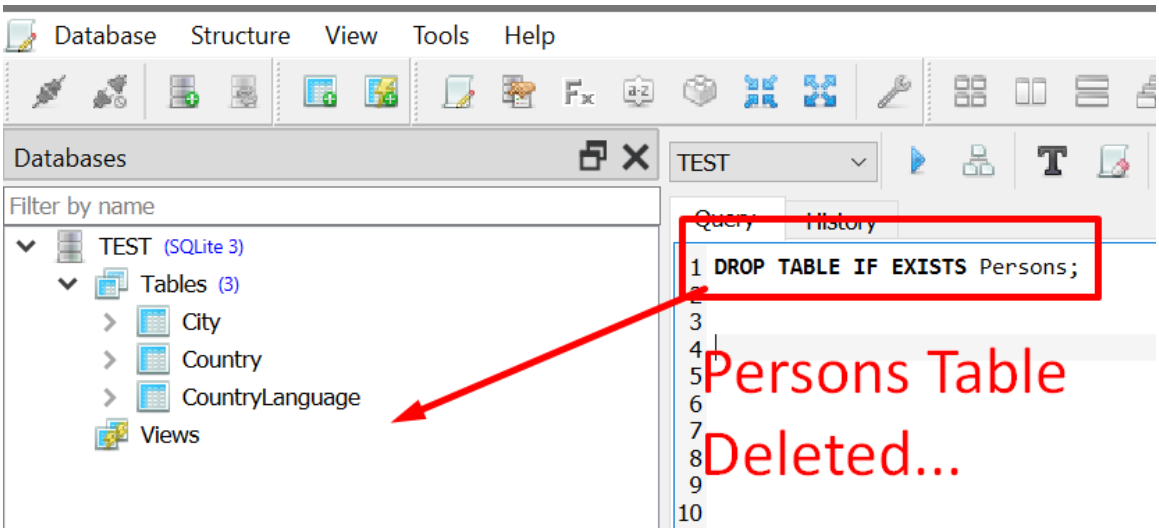
B. CREATE (TABLE)




```
CREATE TABLE Persons (
PersonID   INT,
LastName VARCHAR (255),
FirstName VARCHAR (255),
Address    VARCHAR (255),
City       VARCHAR (255)
);
```



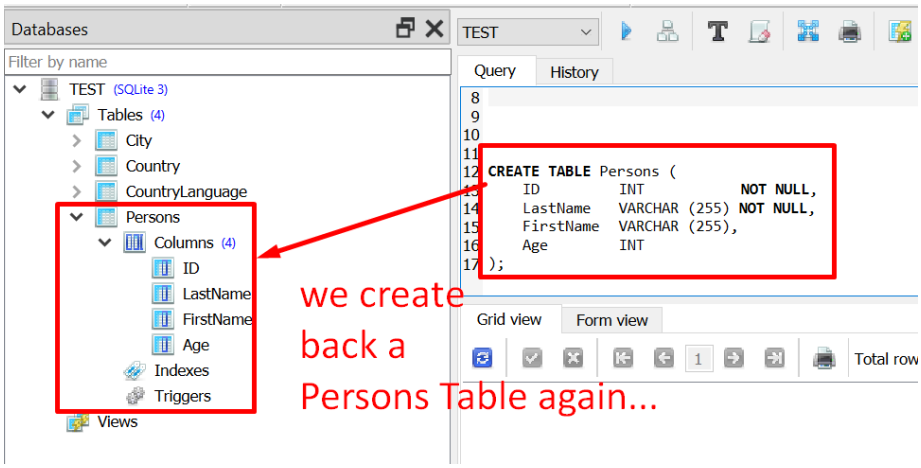
C. DROP (TABLE)



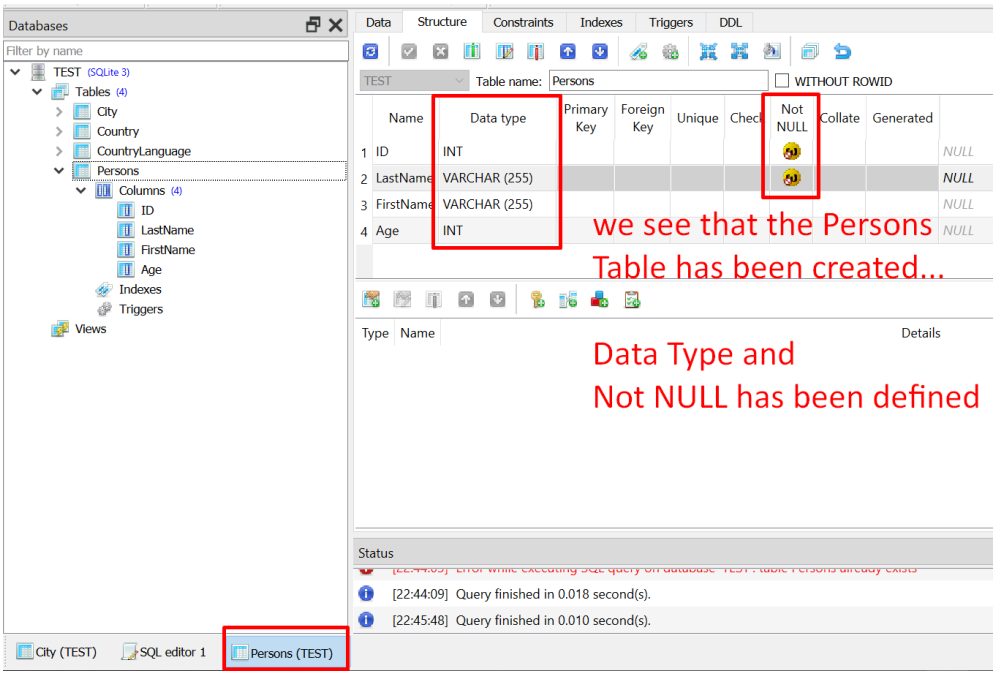
DROP TABLE

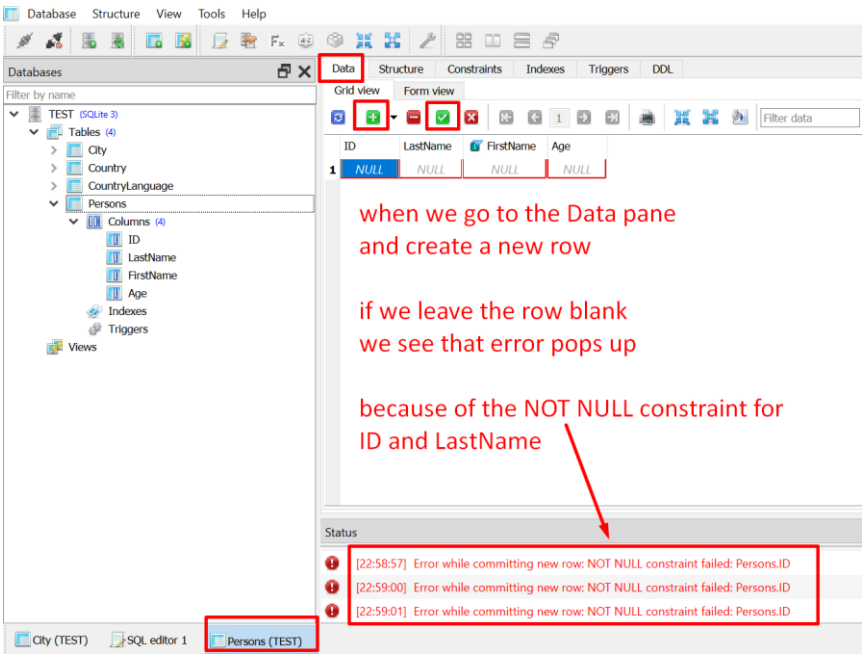
IF EXISTS Persons;

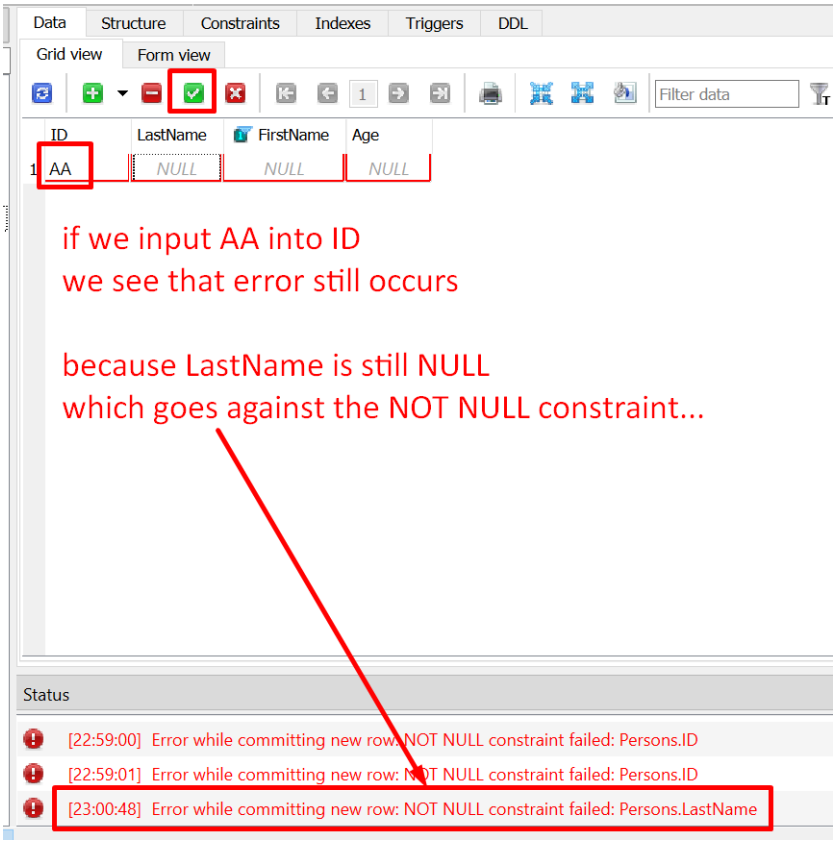
D. NOT NULL

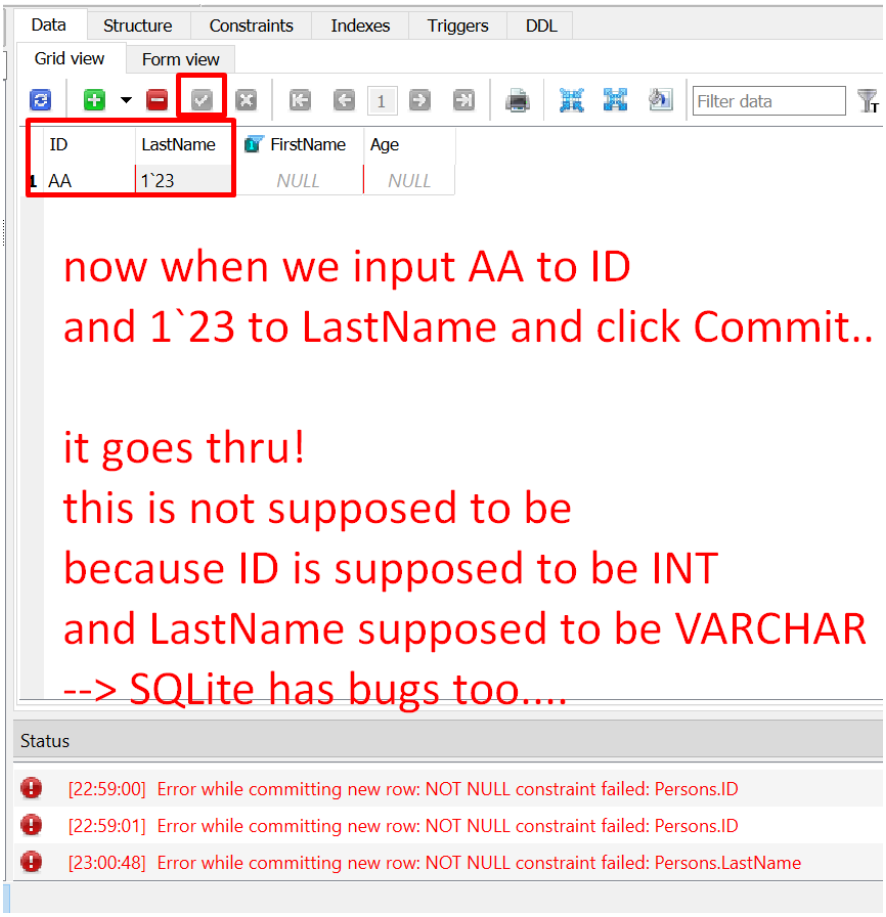



```
CREATE TABLE Persons (
ID          INT             NOT NULL,
LastName VARCHAR (255) NOT NULL,
FirstName VARCHAR (255),
Age INT
);
```

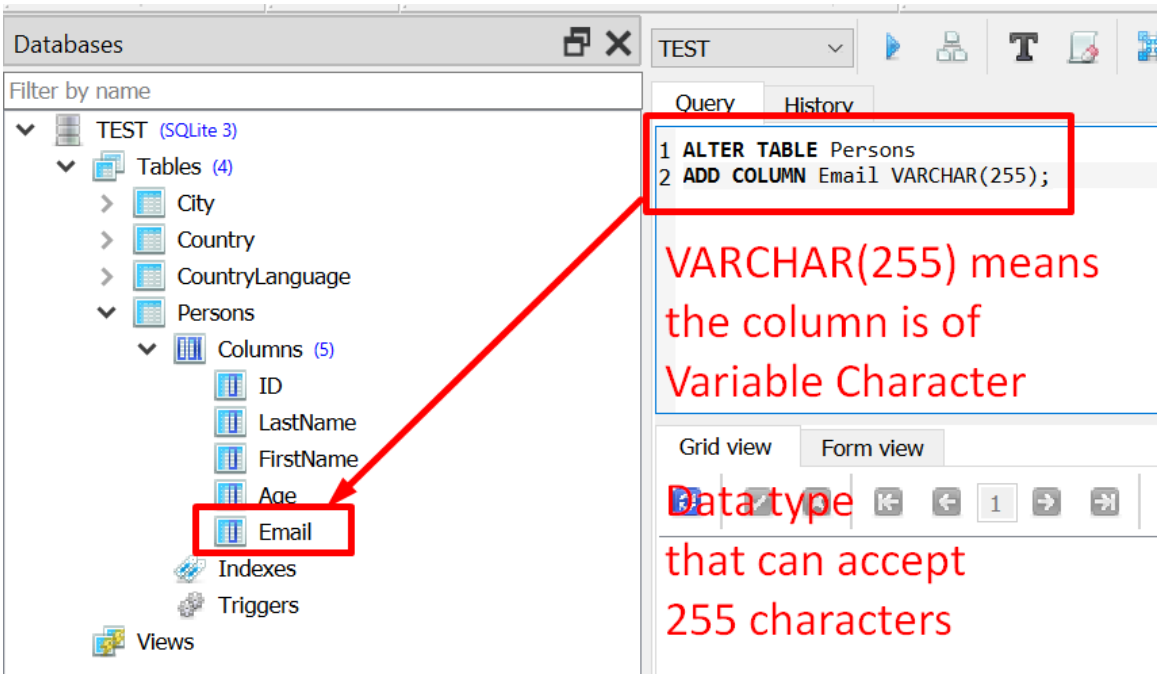






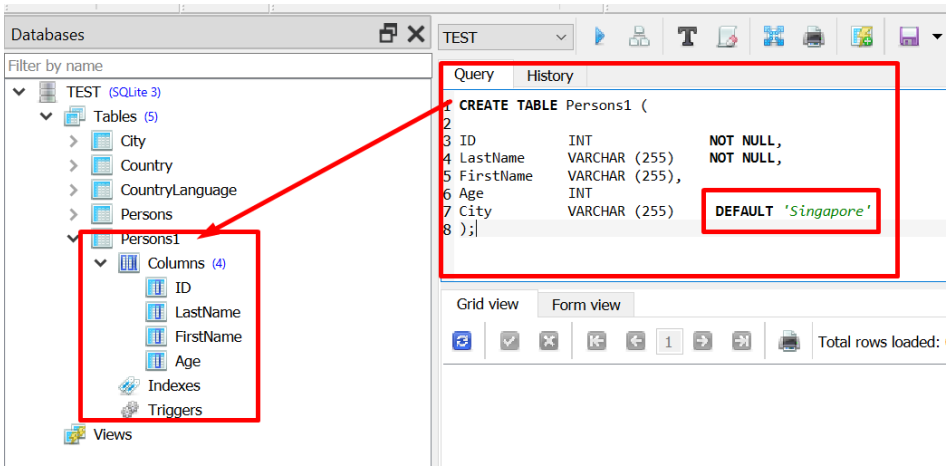


E. ALTER

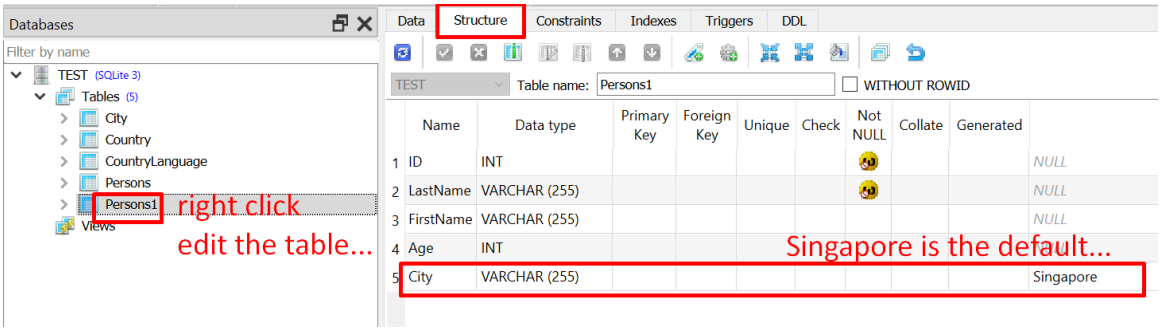


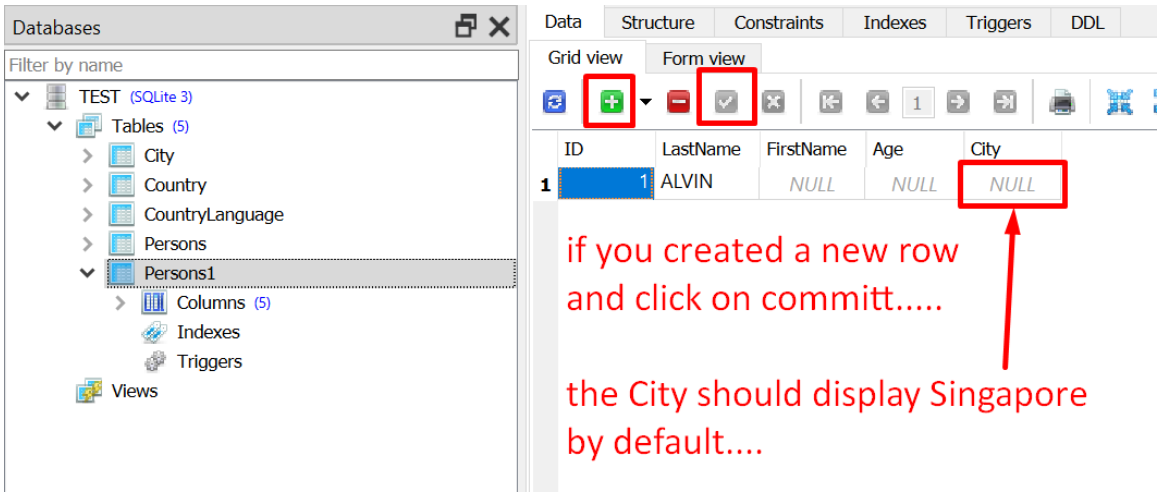
ALTER TABLE Persons
ADD COLUMN Email VARCHAR(255);

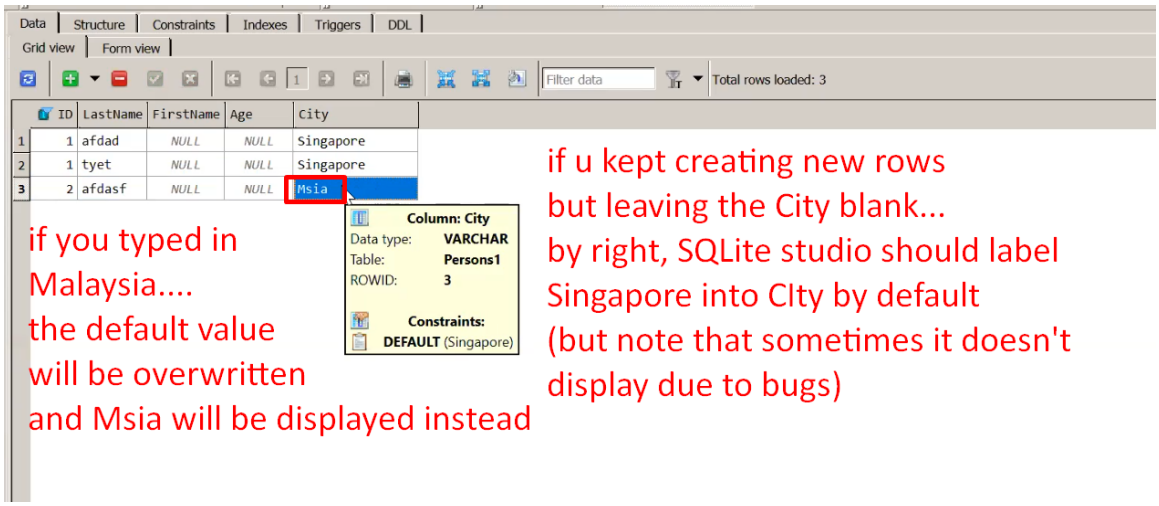
F. DEFAULT



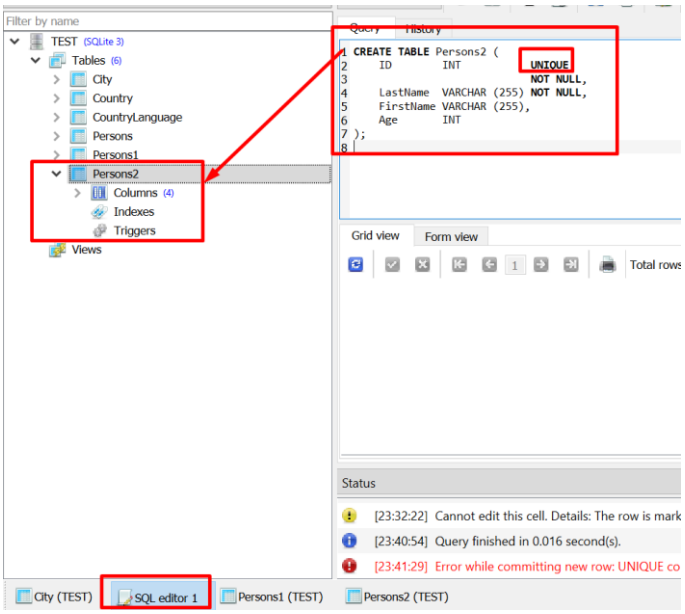

```
CREATE TABLE Persons1 (
    ID          INT                 NOT NULL,
    LastName    VARCHAR (255)       NOT NULL,
    FirstName   VARCHAR (255),
    Age         INT,
    City        VARCHAR (255)       DEFAULT 'Singapore'
);
```



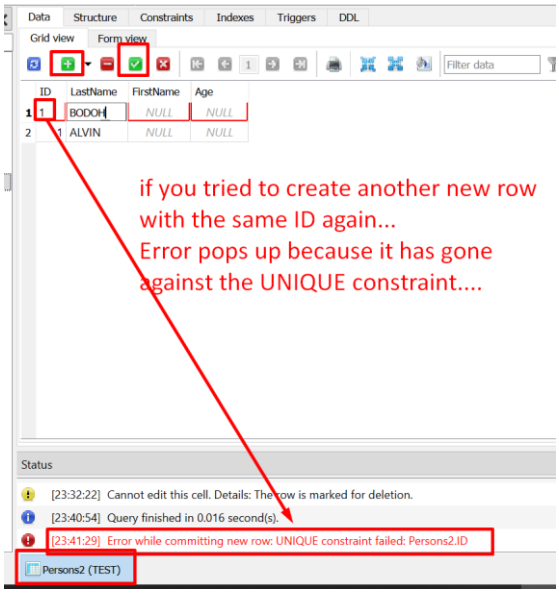




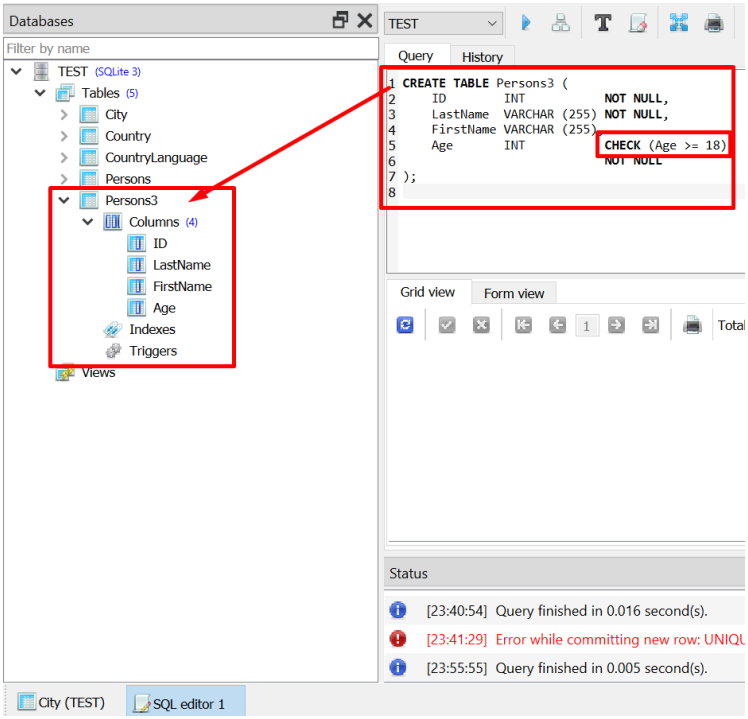
G. UNIQUE



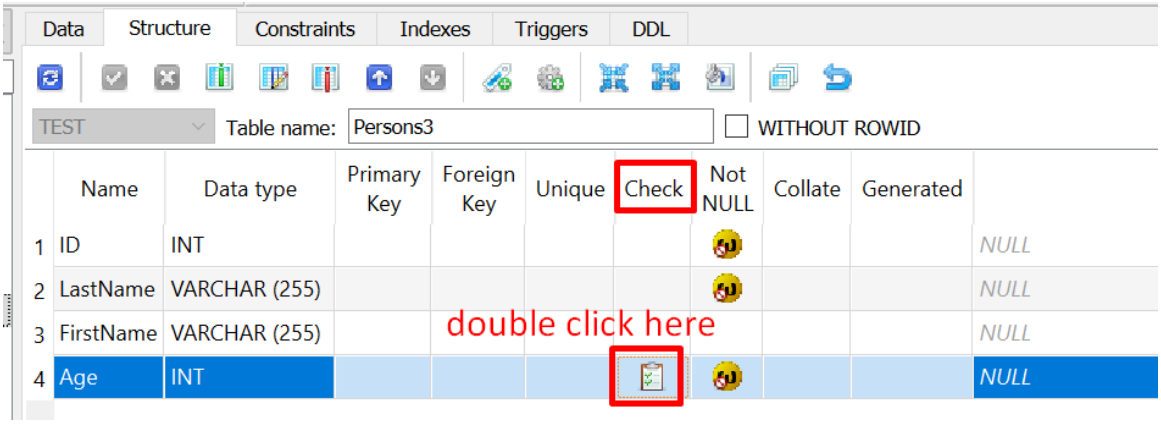

```
CREATE TABLE Persons2 (
    ID          INT UNIQUE          NOT NULL,
    LastName VARCHAR (255)          NOT NULL,
    FirstName VARCHAR (255),
    Age         INT
);
```

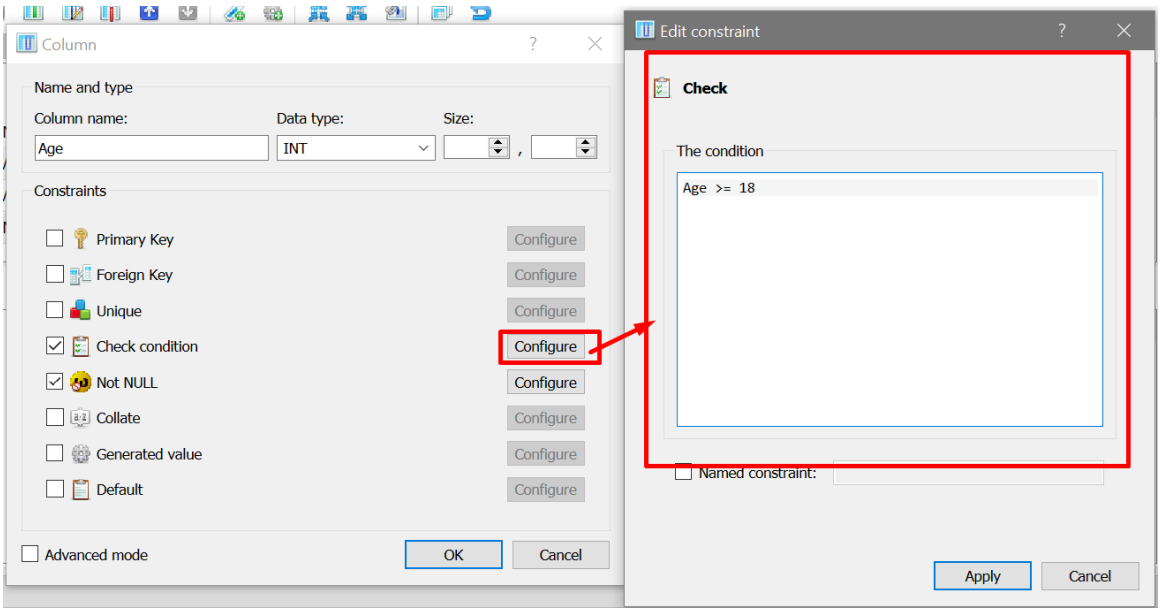


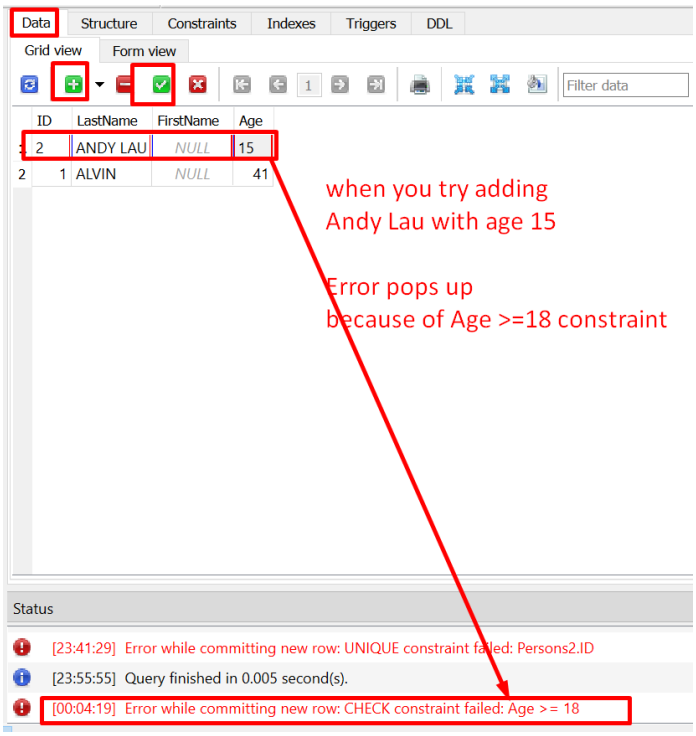
H. CHECK



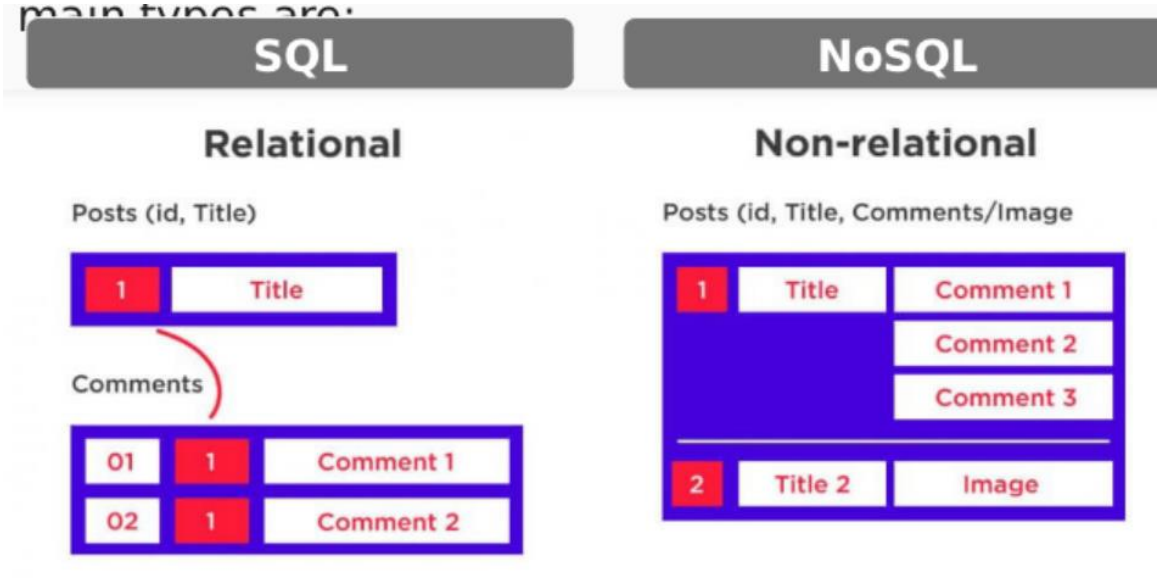

```
CREATE TABLE Persons3 (
    ID          INT                         NOT NULL,
    LastName    VARCHAR (255)               NOT NULL,
    FirstName   VARCHAR (255),
    Age         INT         CHECK (Age >= 18)   NOT NULL
);
```







I. RELATIONAL VS NON RELATIONAL DATABASE

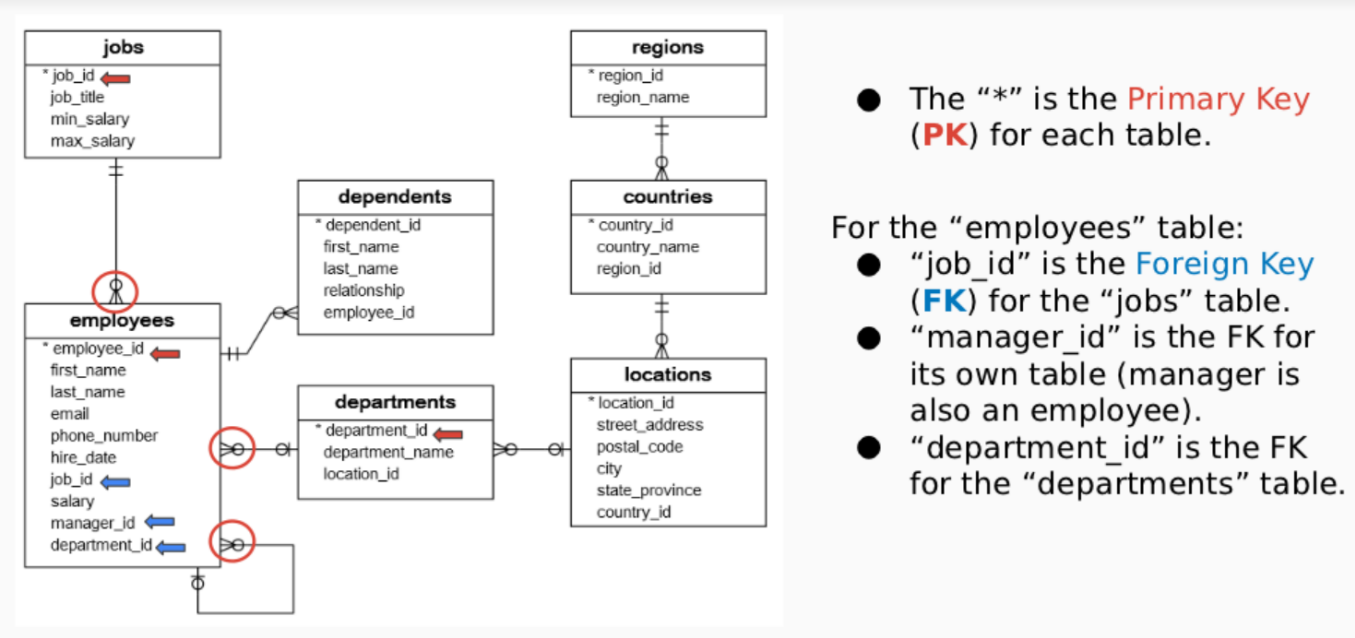


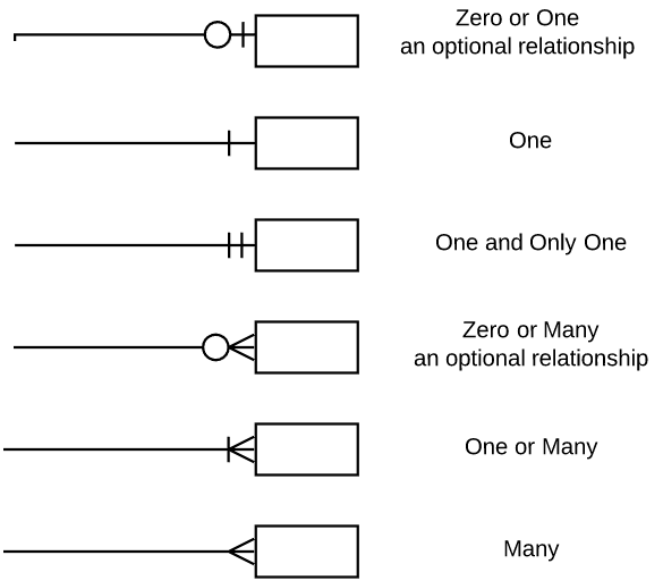
- SQL is a Relational Database because it contains many tables with columns that relate to one another.
- Excel is a Non-Relational Database because it might contain many tables but their columns don't relate to one another.

"Order ID"	"Order Date"	"Order Amount"	Customer	"Customer Address"	"Customer Phone"	"Tax Identifier"
1	jun-23	$10 248,15	International Services Ltd	1247 St River Blvd, Charlotte, NC	(555) 478-8741	IS789456
2	jun-27	$14 785,45	World Master Importing Inc.	354 Mountain Hill Rd, Los Angeles, CA	(555) 774-8888	WM321456

- For example, if we created a table to store all our orders like above.
- Everything dumped into 1 table.
- One same customer can make multiple orders.
- But what if he changes his handphone number?
- You need to edit his handphone number many many times!
- Storing all the information in a single table just doesn't work.
- A relational model requires us to define each entity as a separate table and establish relationships between them.
- Relational Model means Tables are related via Primary Key (PK) and Foreign Key (FK).

J. PRIMARY KEY AND FOREIGN KEY





1. JOBS → EMPLOYEES (ONE TO MANY RELATIONSHIP)

- Jobs Table:
    - PK = Job ID, which means that the Job ID is the index column.
    - There's one and only one job id per job.
- Employee Table:
    - Job ID = FK. Can have multiple Job IDs.
    - Each employee can do multiple jobs.
    - Thus, though there is only one Employee ID for each employee, he/she can have multiple Job IDs.
    - Thus, Jobs Table → Employee Table is a One-to-Many Relationship.

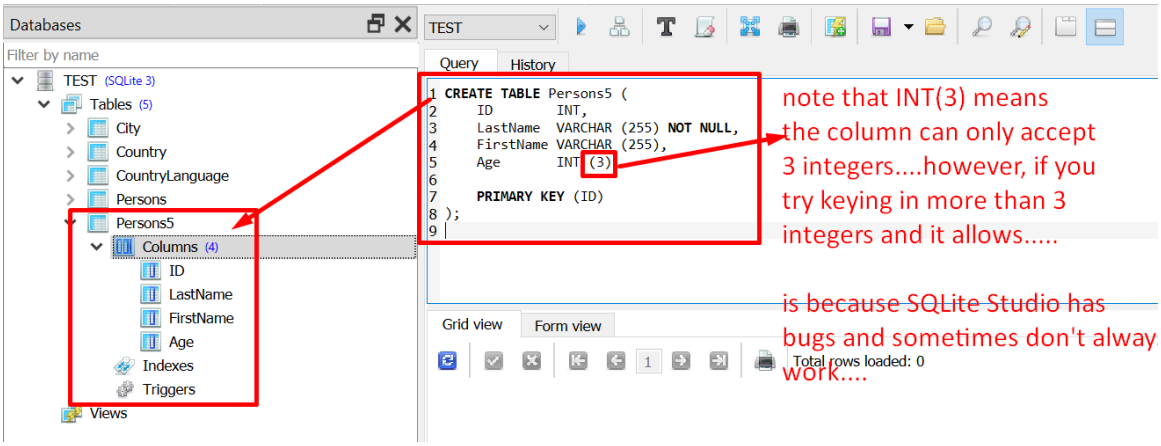
2. EMPLOYEES → DEPENDANTS (ONE TO MANY RELATIONSHIP)

- Employees Table:
    - PK = Employee ID, which means that the Employee ID is the Index Column.
    - There's one and only one Employee ID per employee.
- Dependants Table"
    - Employee ID = FK. Can have multiple Employee IDs.
    - Each dependant can have 2 parents working in the same company.
    - E.g. 1 child can have both father and mother working in the same company.
    - Thus, that 1 Dependant ID might be tied to 2 Employee IDs.

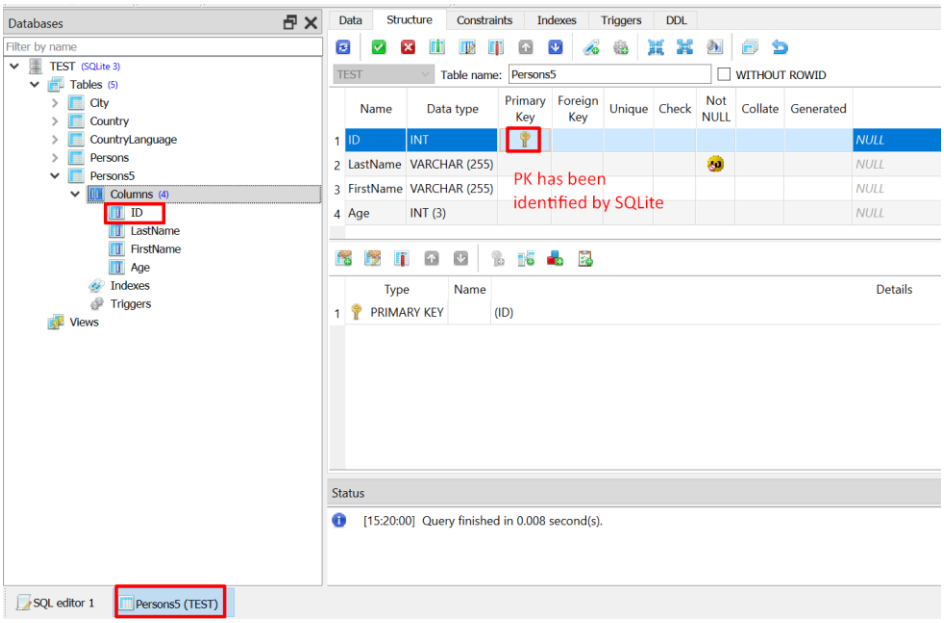
3. EMPLOYEES → EMPLOYEES (ZERO OR ONE TO MANY RELATIONSHIP)

- Employee Table:
    - PK = Employee ID, which means that the Employee ID is the Index Column.
    - There's one and only one Employee ID per employee.
    - Each and every Employee ID is tied to one Manager ID.
    - If one manager is managing a team of employees, his Manager ID will show up many times because its tied to multiple Employee ID.
    - Also, each manager is also an employee of the company.
    - He could have both a Manager ID+ Employee ID too; which means it might show up multiple times.

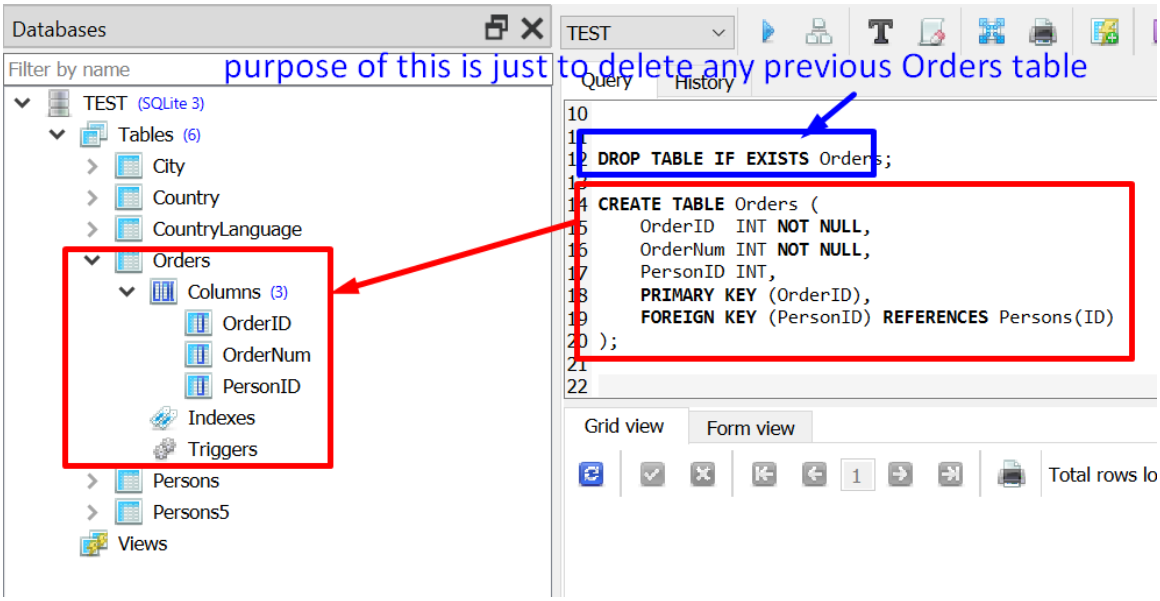
4. CREATING PRIMARY KEY



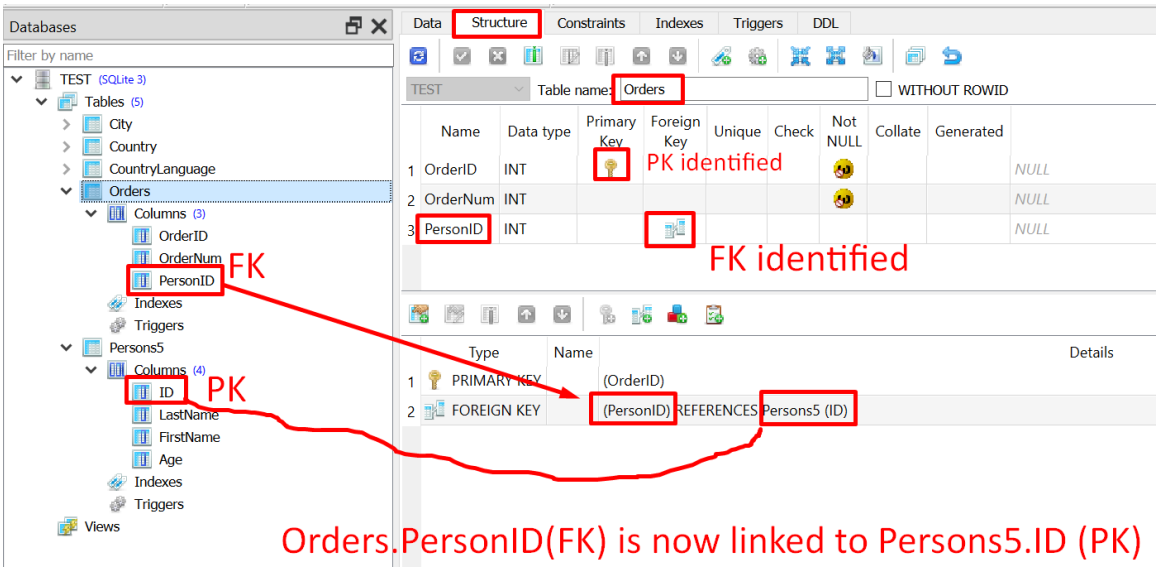

```
CREATE TABLE Persons5 (

    ID          INT,
    LastName    VARCHAR (255)    NOT NULL,
    FirstName   VARCHAR (255),
    Age         INT (3),

    PRIMARY KEY (ID)
);
```

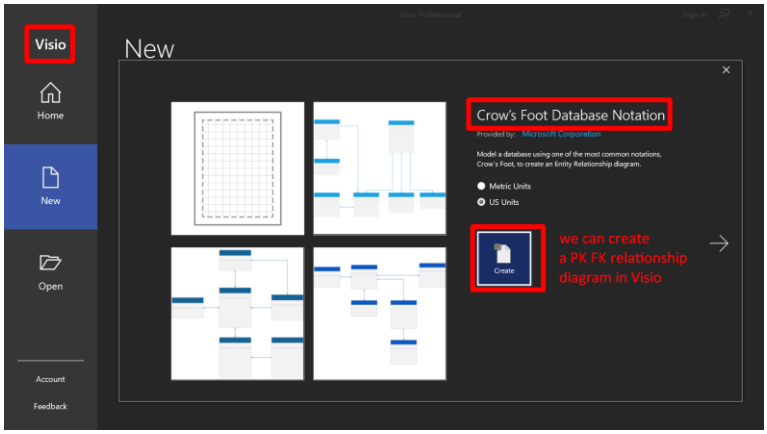


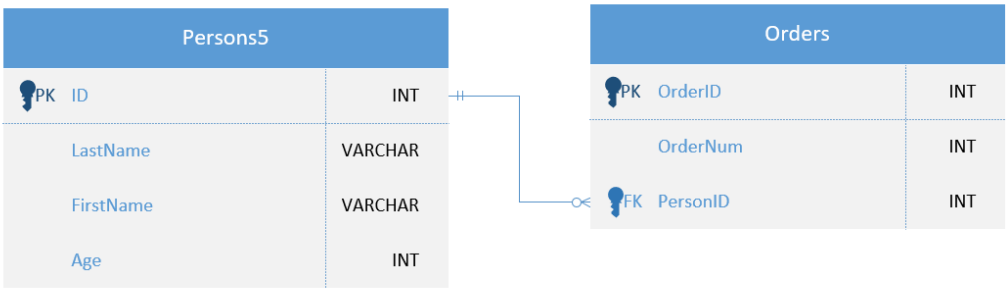
5. CREATING FOREIGN KEY




```
DROP TABLE IF EXISTS Orders;

CREATE TABLE Orders (

    OrderID    INT     NOT NULL,
    OrderNum INT     NOT NULL,
    PersonID   INT,

    PRIMARY KEY (OrderID),
    FOREIGN KEY (PersonID) REFERENCES Persons5(ID)
);
```

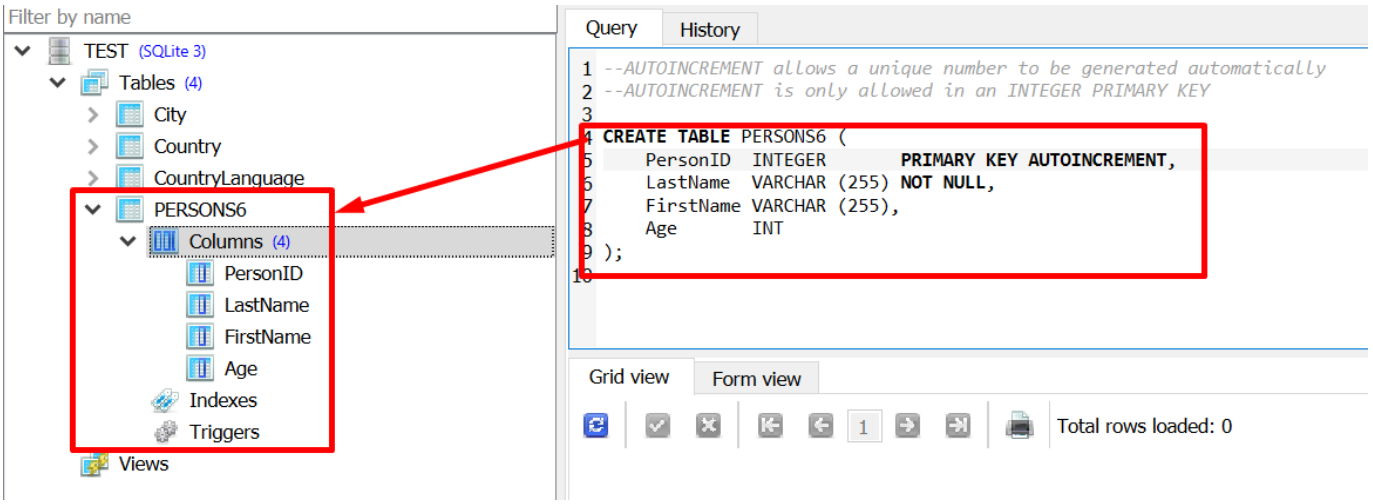






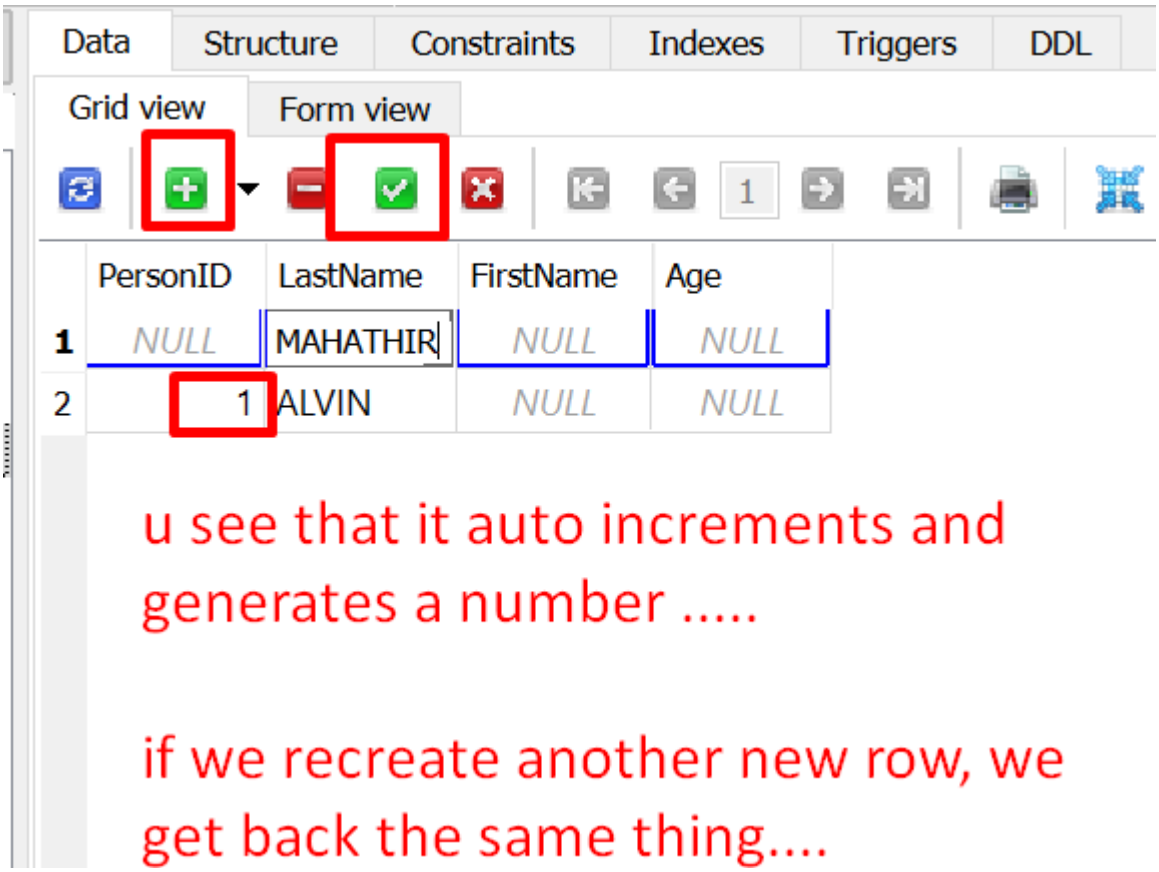
Entity Relationship Diagram

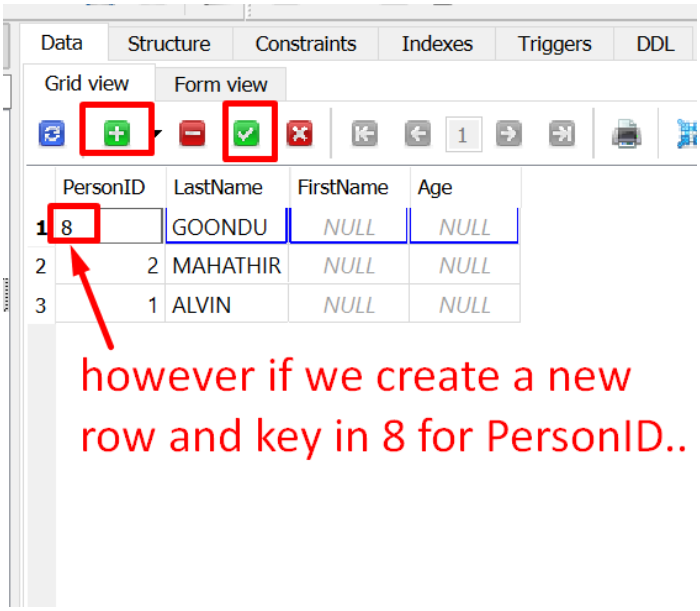
K. AUTO INCREMENT

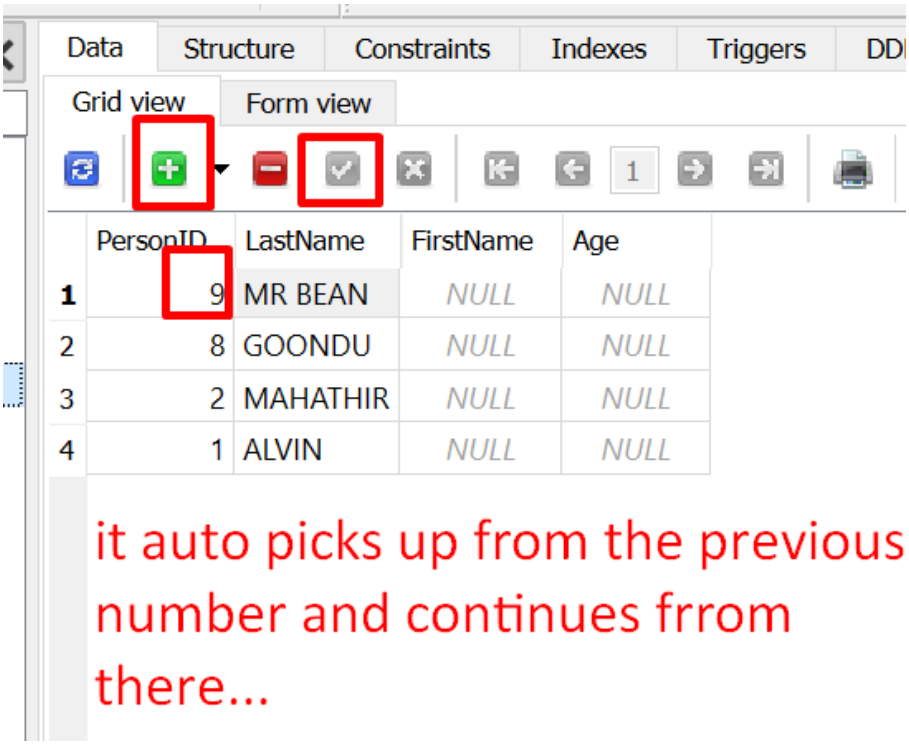


--AUTOINCREMENT allows a unique number to be generated automatically
--AUTOINCREMENT is only allowed in an INTEGER PRIMARY KEY

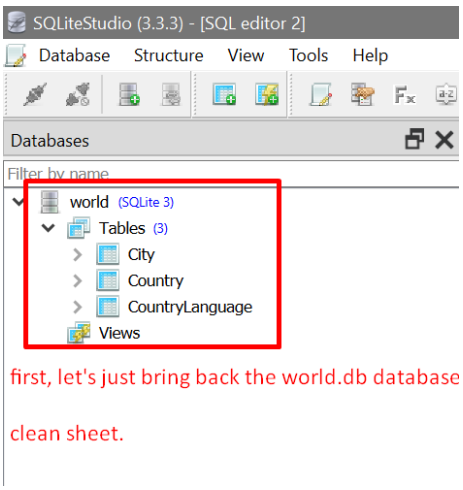
```
CREATE TABLE PERSONS6 (

    PersonID      INTEGER         PRIMARY KEY AUTOINCREMENT,
    LastName      VARCHAR (255) NOT NULL,
    FirstName     VARCHAR (255),
    Age INT
);
```

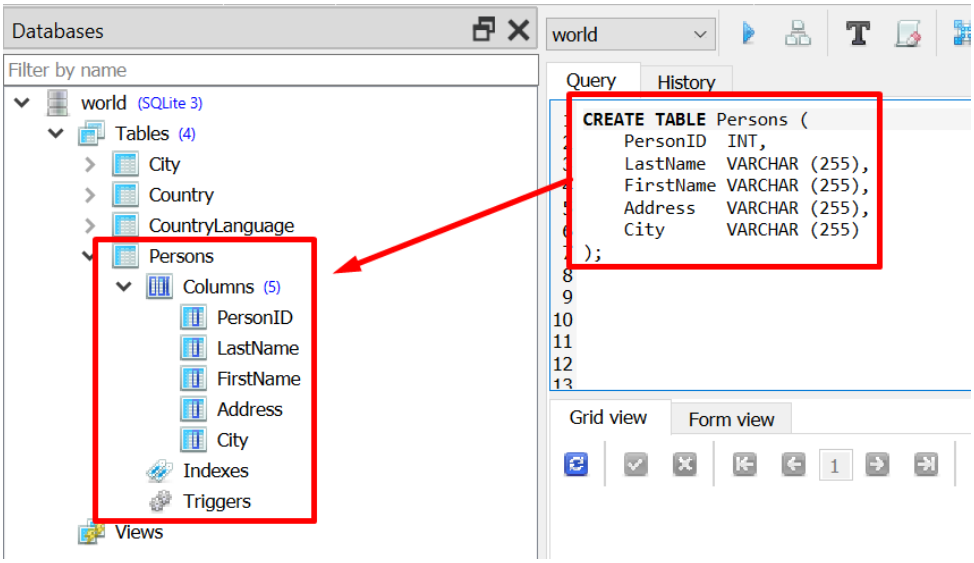




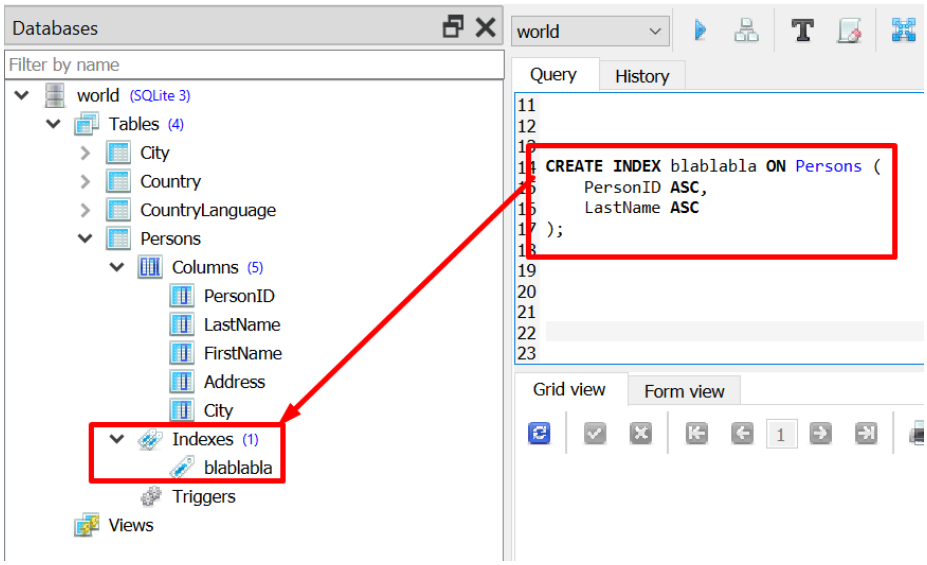


L. CREATE INDEX

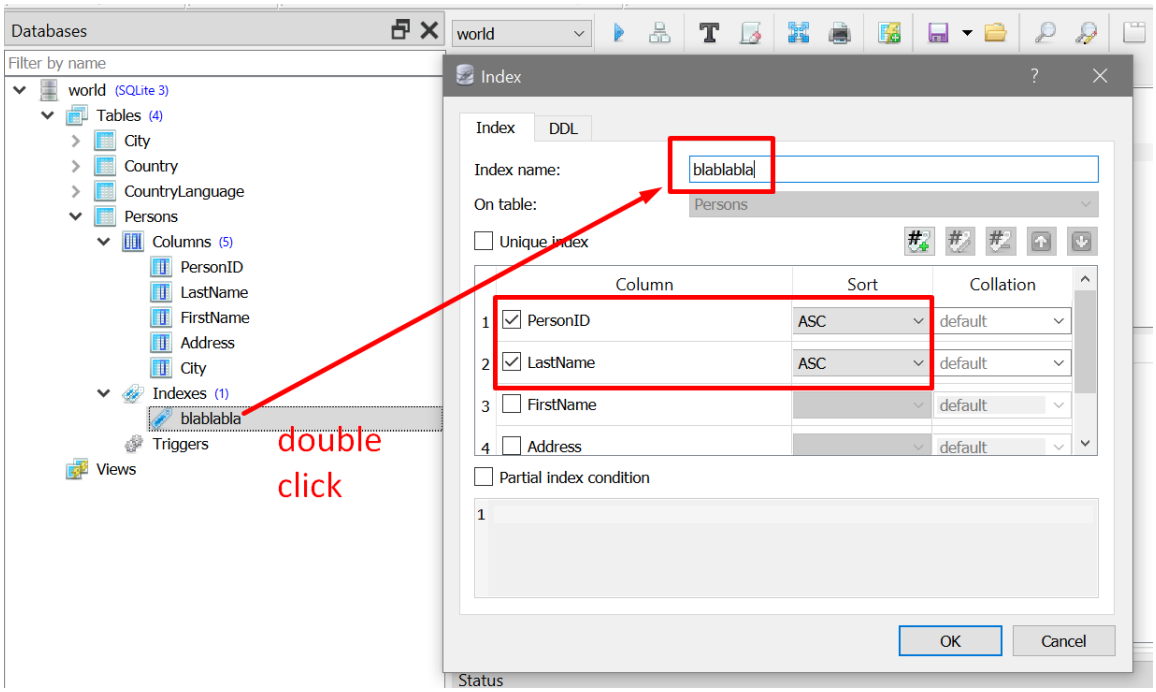




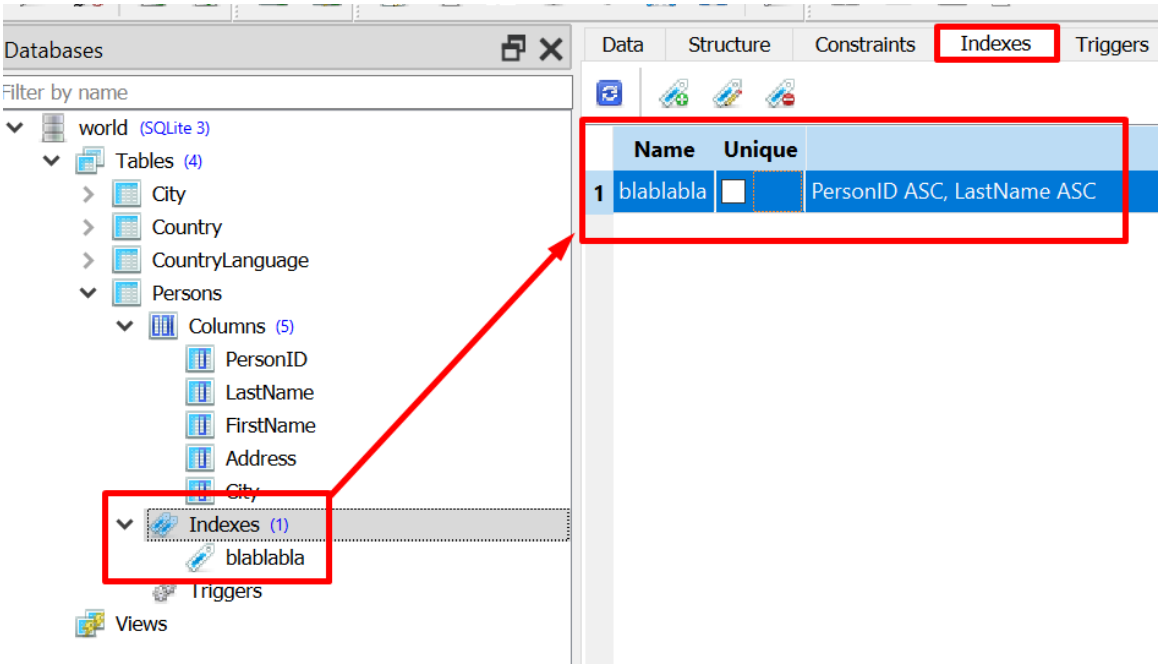

```
CREATE TABLE Persons (
    PersonID    INT,
    LastName    VARCHAR (255),
    FirstName   VARCHAR (255),
    Address     VARCHAR (255),
    City        VARCHAR (255)
);
```



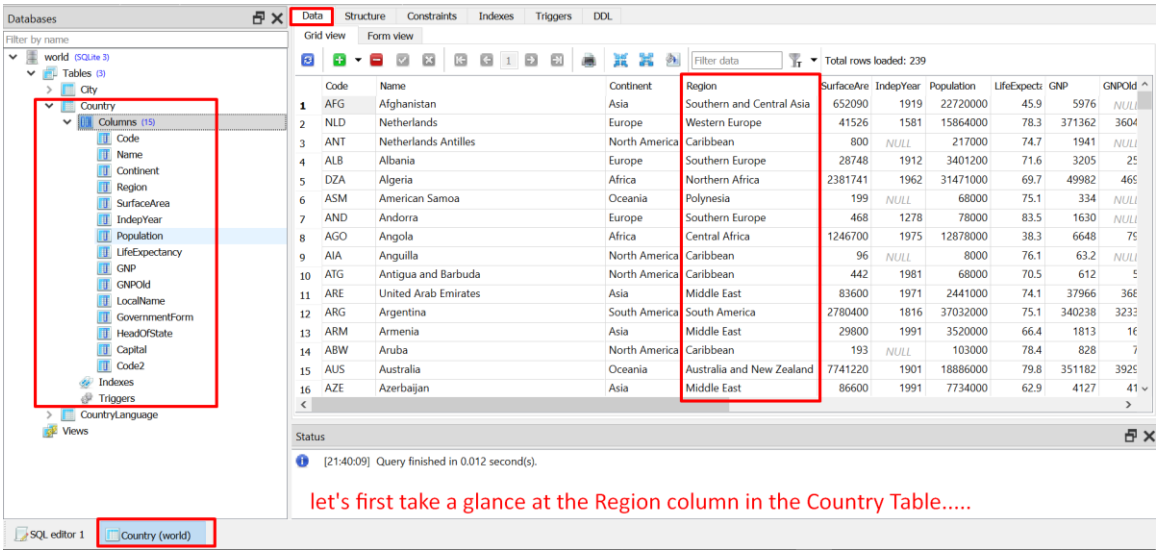

```
CREATE INDEX blablabla ON Persons (

    PersonID ASC,
    LastName ASC

);
```

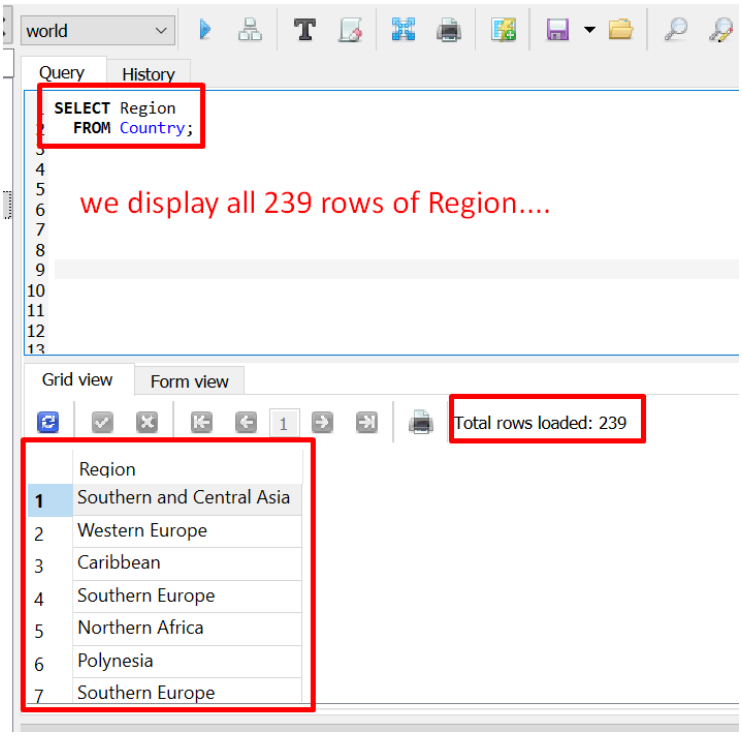


- The CREATE INDEX statement is used to create indexes in tables.
- Indexes are used to retrieve data ÿrom the database more quickly than otherwise.
- The users cannot see the indexes, they are just used to speed up searches/queries.
- In other words, you can't feel nor see the effect of INDEXES.
- They occur backend.

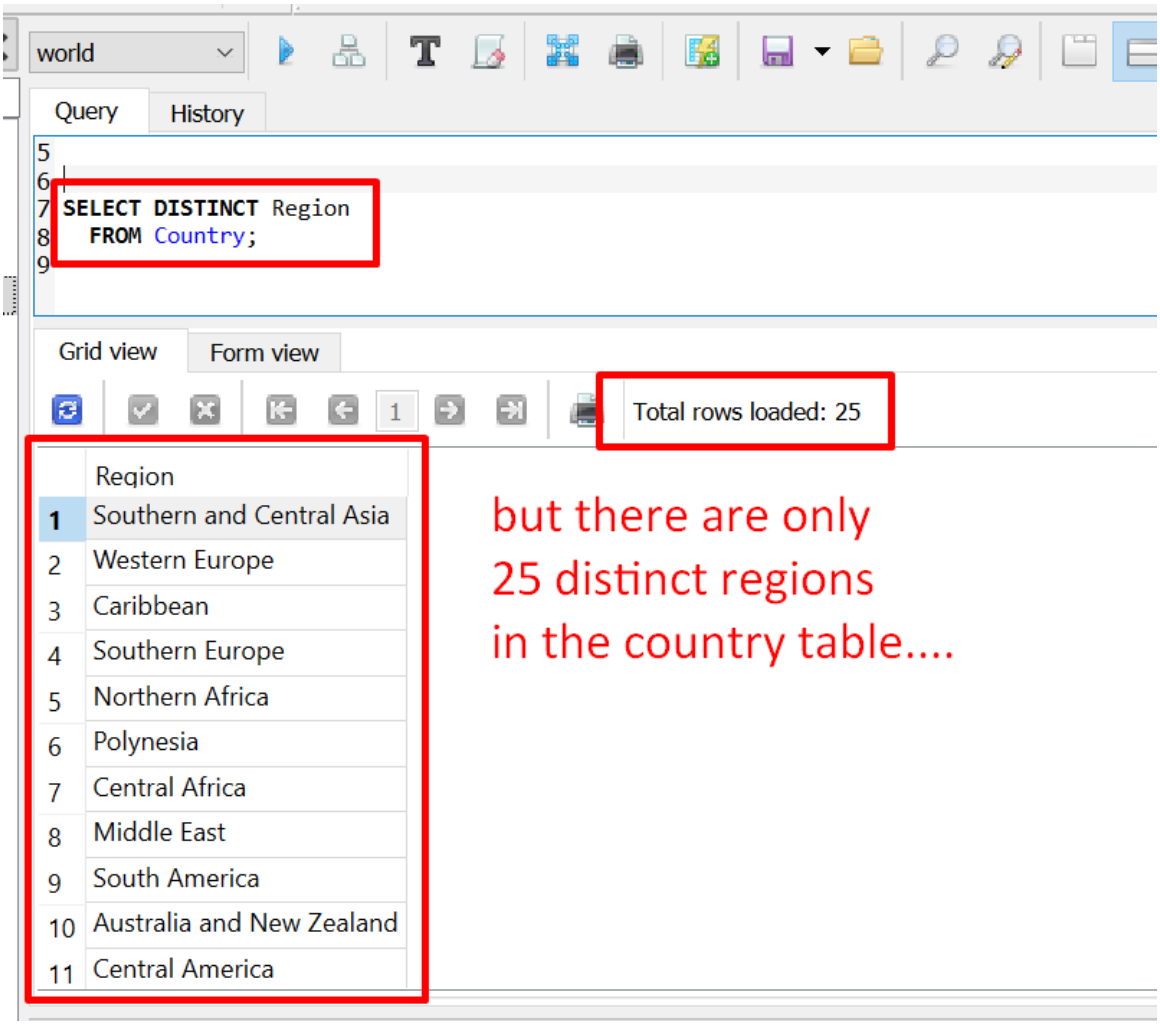


M. DISTINCT



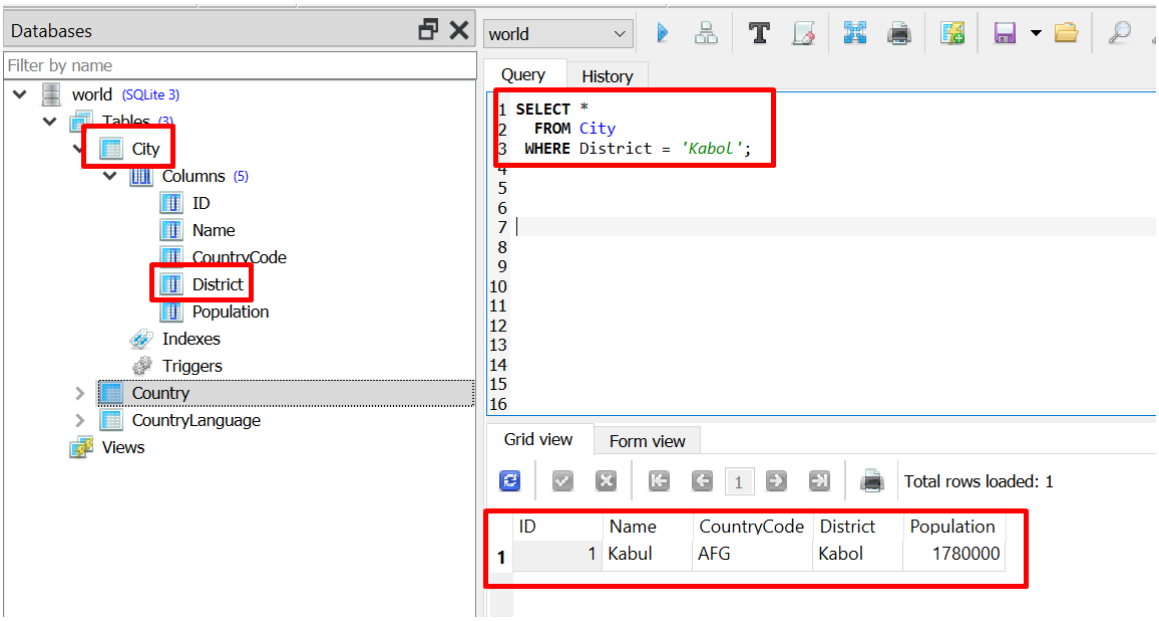


SELECT Region
FROM Country;

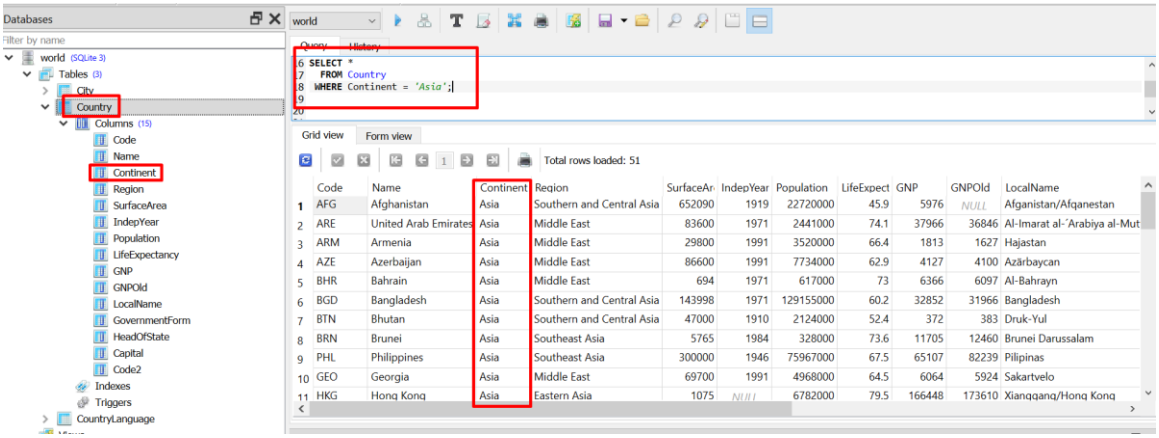


SELECT DISTINCT Region
FROM Country;

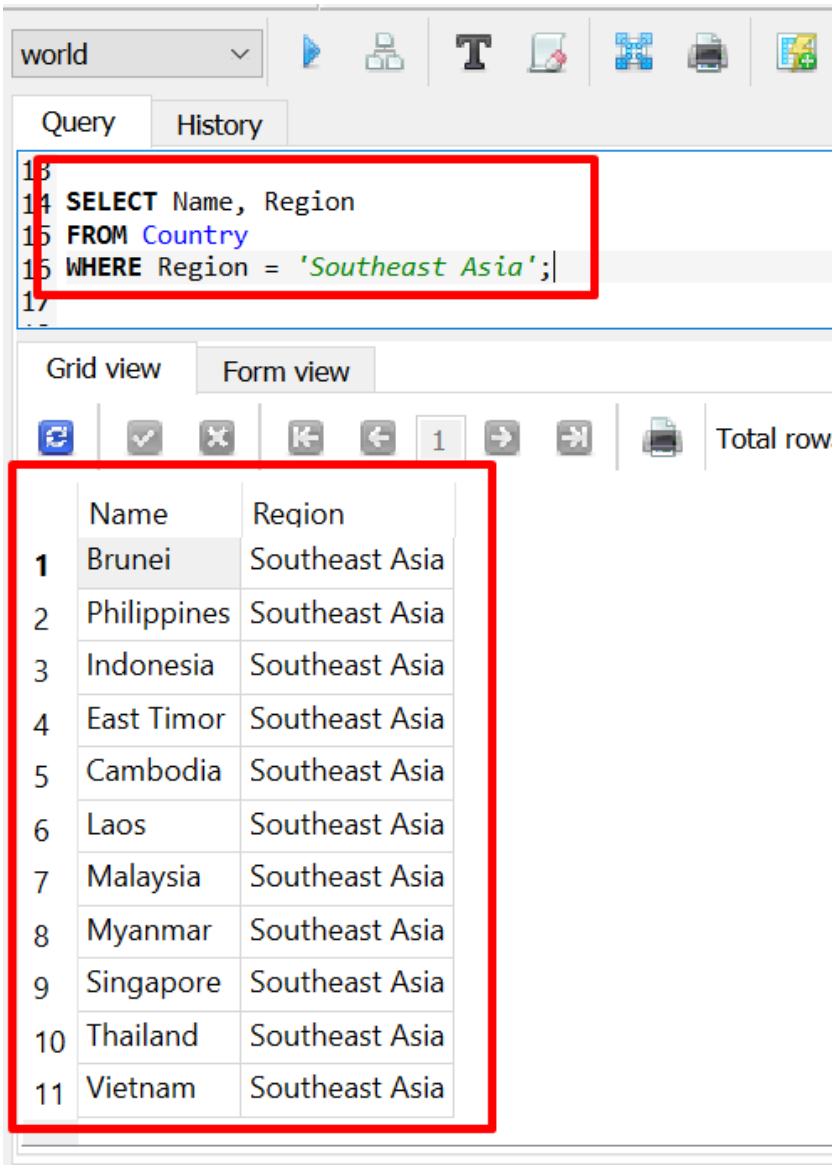
N. WHERE



SELECT *
FROM City
WHERE District = 'Kabol';

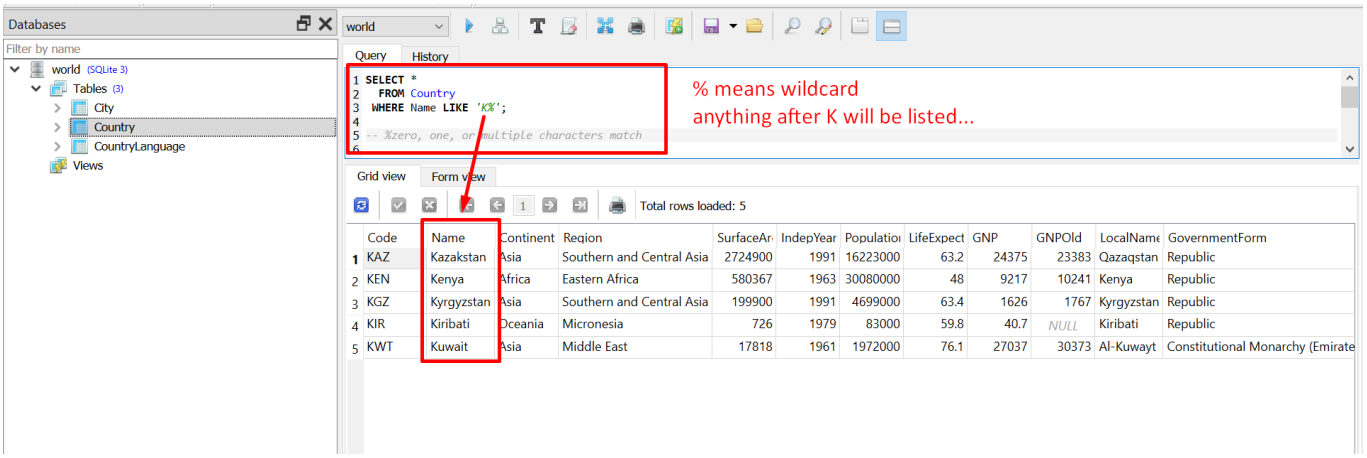


SELECT *
FROM Country
WHERE Continent = 'Asia';



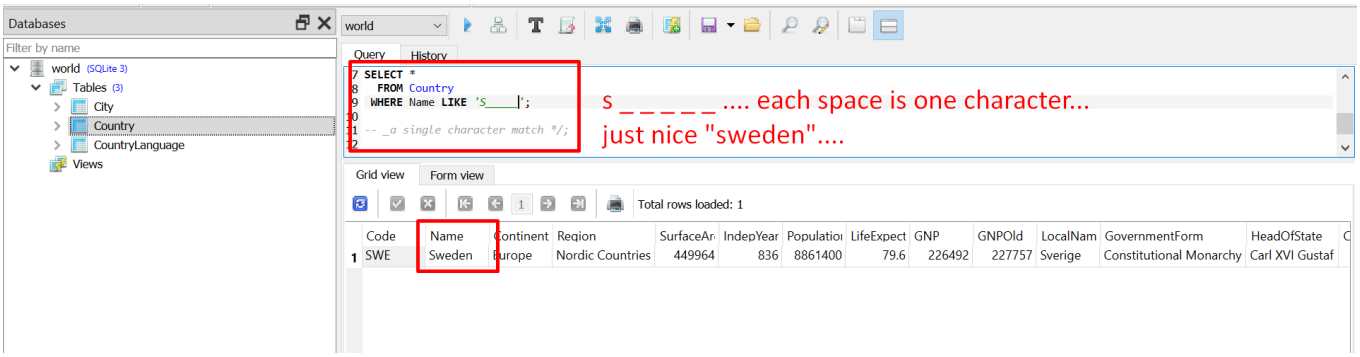

```
SELECT Name, Region
FROM Country
WHERE Region = 'Southeast Asia';
```

1. LIKE



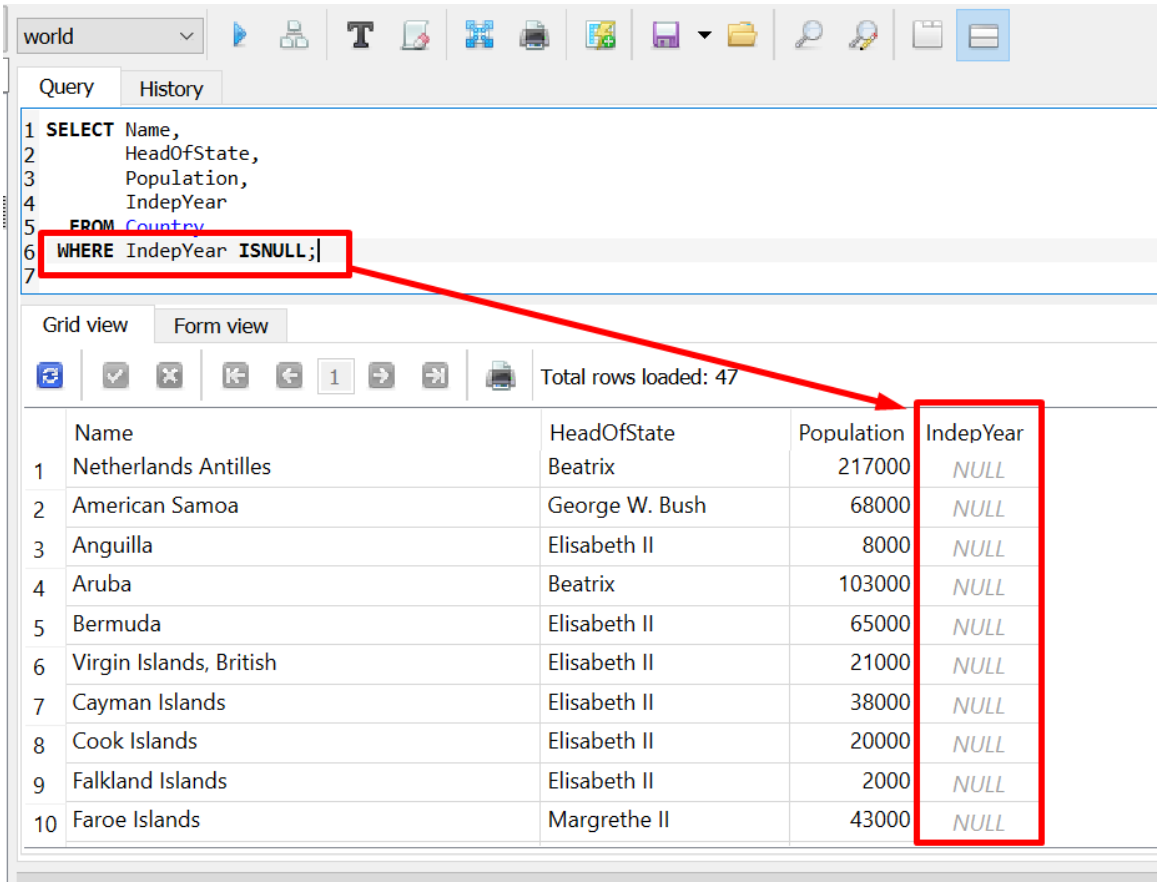
SELECT *
FROM Country
WHERE Name

LIKE 'K%';

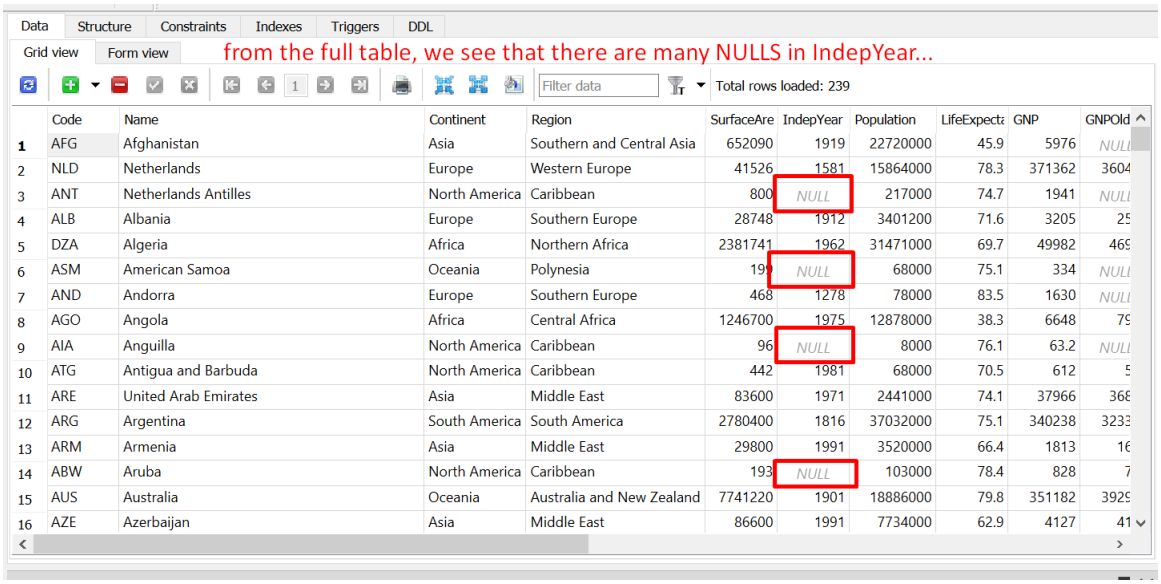


SELECT *
FROM Country
WHERE Name
LIKE 'S_____';

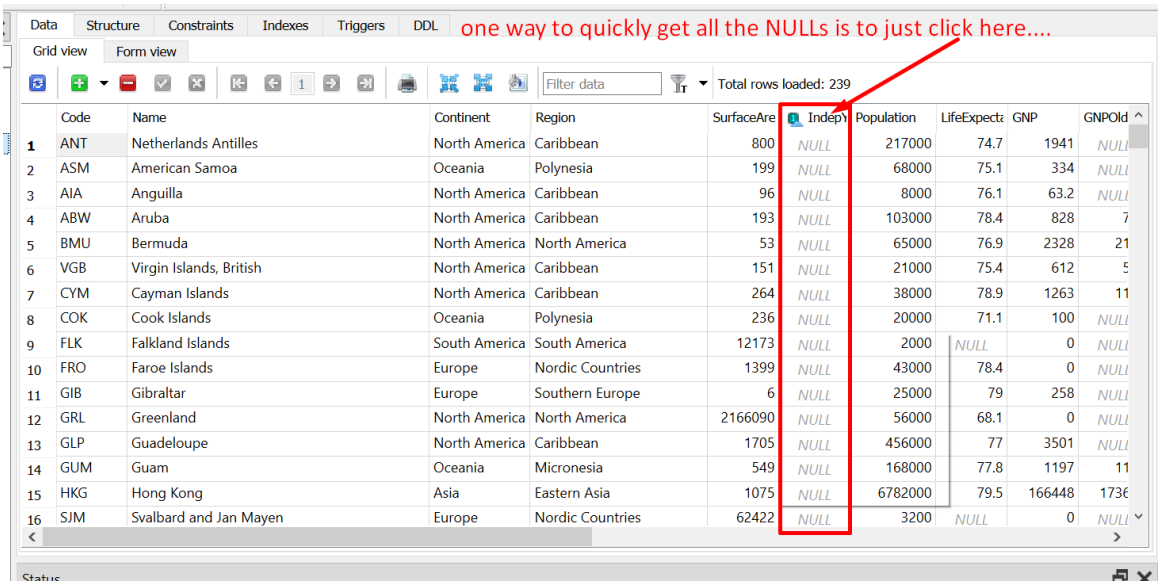
2. IS NULL




```
SELECT   Name,
         HeadOfState,
         Population,
         IndepYear

FROM     Country
WHERE    IndepYear ISNULL;
```

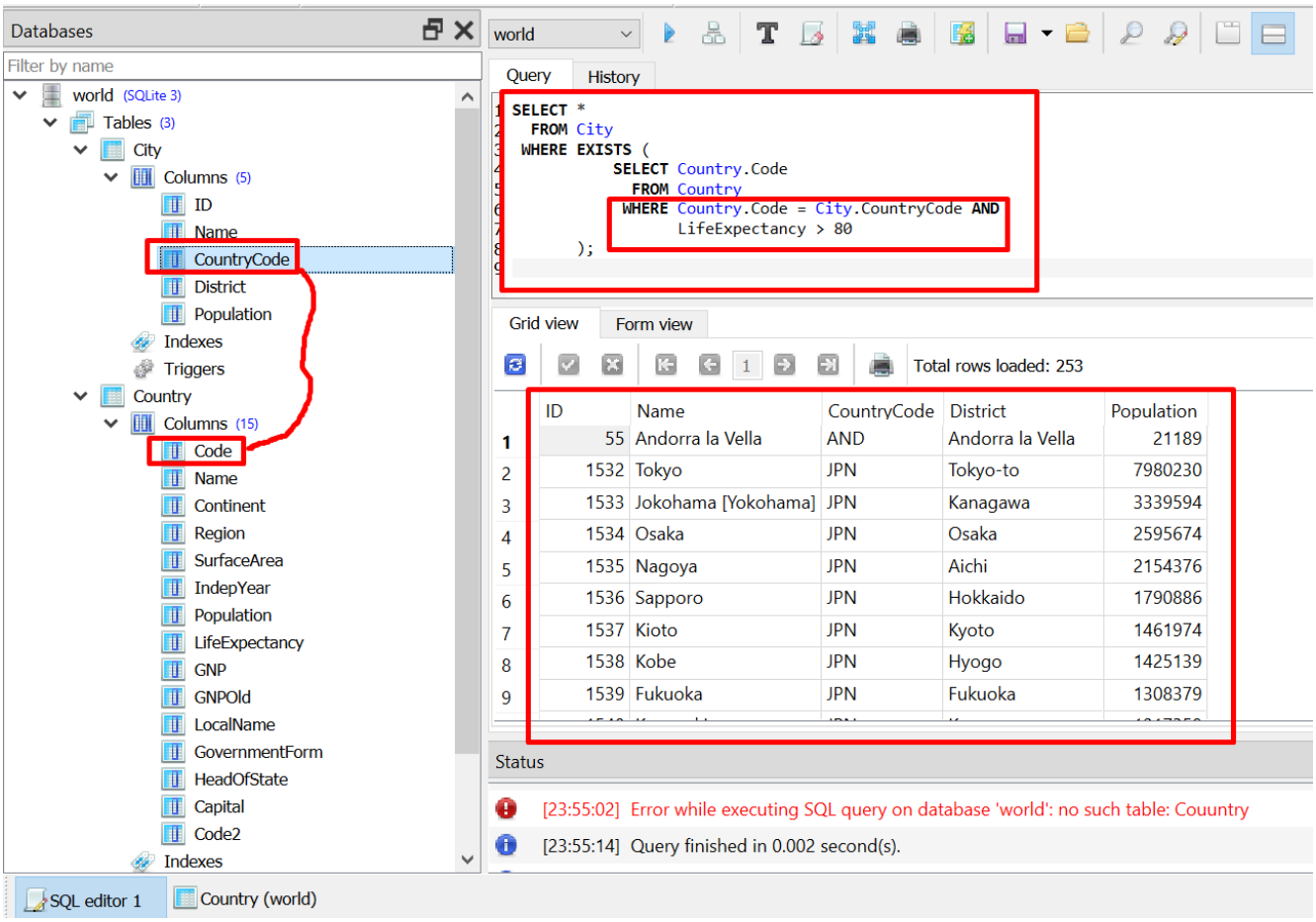


	Code	Name	Continent	Region	SurfaceAre	IndepYear	Population	LifeExpecta	GNP	GNPOld
1	AFG	Afghanistan	Asia	Southern and Central Asia	652090	1919	22720000	45.9	5976	NULL
2	NLD	Netherlands	Europe	Western Europe	41526	1581	15864000	78.3	371362	3604
3	ANT	Netherlands Antilles	North America	Caribbean	800	NULL	217000	74.7	1941	NULL
4	ALB	Albania	Europe	Southern Europe	28748	1912	3401200	71.6	3205	25
5	DZA	Algeria	Africa	Northern Africa	2381741	1962	31471000	69.7	49982	469
6	ASM	American Samoa	Oceania	Polynesia	199	NULL	68000	75.1	334	NULL
7	AND	Andorra	Europe	Southern Europe	468	1278	78000	83.5	1630	NULL
8	AGO	Angola	Africa	Central Africa	1246700	1975	12878000	38.3	6648	79
9	AIA	Anguilla	North America	Caribbean	96	NULL	8000	76.1	63.2	NULL
10	ATG	Antigua and Barbuda	North America	Caribbean	442	1981	68000	70.5	612	5
11	ARE	United Arab Emirates	Asia	Middle East	83600	1971	2441000	74.1	37966	368
12	ARG	Argentina	South America	South America	2780400	1816	37032000	75.1	340238	3233
13	ARM	Armenia	Asia	Middle East	29800	1991	3520000	66.4	1813	16
14	ABW	Aruba	North America	Caribbean	193	NULL	103000	78.4	828	7
15	AUS	Australia	Oceania	Australia and New Zealand	7741220	1901	18886000	79.8	351182	3929
16	AZE	Azerbaijan	Asia	Middle East	86600	1991	7734000	62.9	4127	41



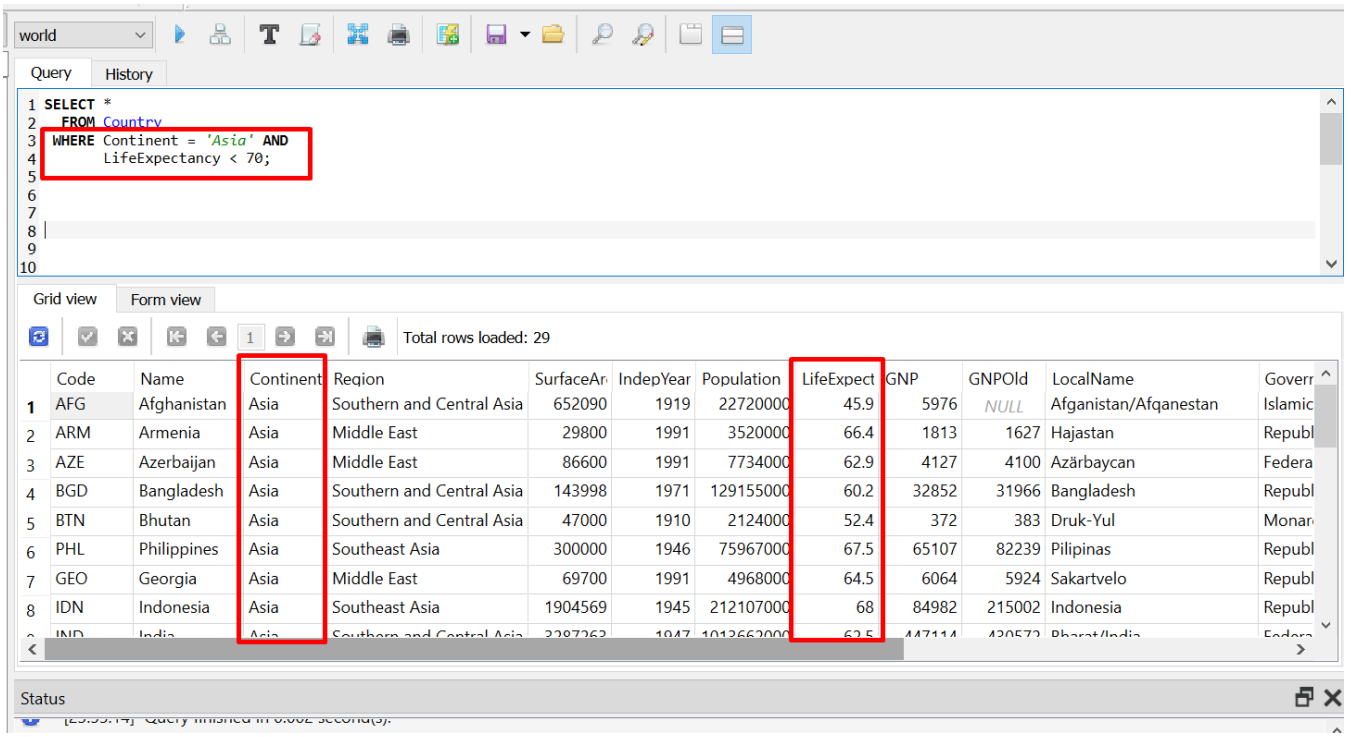
	Code	Name	Continent	Region	SurfaceAre	IndepY	Population	LifeExpecta	GNP	GNPOld
1	ANT	Netherlands Antilles	North America	Caribbean	800	NULL	217000	74.7	1941	NULL
2	ASM	American Samoa	Oceania	Polynesia	199	NULL	68000	75.1	334	NULL
3	AIA	Anguilla	North America	Caribbean	96	NULL	8000	76.1	63.2	NULL
4	ABW	Aruba	North America	Caribbean	193	NULL	103000	78.4	828	7
5	BMU	Bermuda	North America	North America	53	NULL	65000	76.9	2328	21
6	VGB	Virgin Islands, British	North America	Caribbean	151	NULL	21000	75.4	612	5
7	CYM	Cayman Islands	North America	Caribbean	264	NULL	38000	78.9	1263	11
8	COK	Cook Islands	Oceania	Polynesia	236	NULL	20000	71.1	100	NULL
9	FLK	Falkland Islands	South America	South America	12173	NULL	2000	NULL	0	NULL
10	FRO	Faroe Islands	Europe	Nordic Countries	1399	NULL	43000	78.4	0	NULL
11	GIB	Gibraltar	Europe	Southern Europe	6	NULL	25000	79	258	NULL
12	GRL	Greenland	North America	North America	2166090	NULL	56000	68.1	0	NULL
13	GLP	Guadeloupe	North America	Caribbean	1705	NULL	456000	77	3501	NULL
14	GUM	Guam	Oceania	Micronesia	549	NULL	168000	77.8	1197	11
15	HKG	Hong Kong	Asia	Eastern Asia	1075	NULL	6782000	79.5	166448	1736
16	SJM	Svalbard and Jan Mayen	Europe	Nordic Countries	62422	NULL	3200	NULL	0	NULL

3. EXISTS




```
SELECT   *
FROM     City
WHERE    EXISTS
(
    SELECT   Country.Code
    FROM     Country
    WHERE    Country.Code = City.CountryCode
    AND      LifeExpectancy > 80
);
```

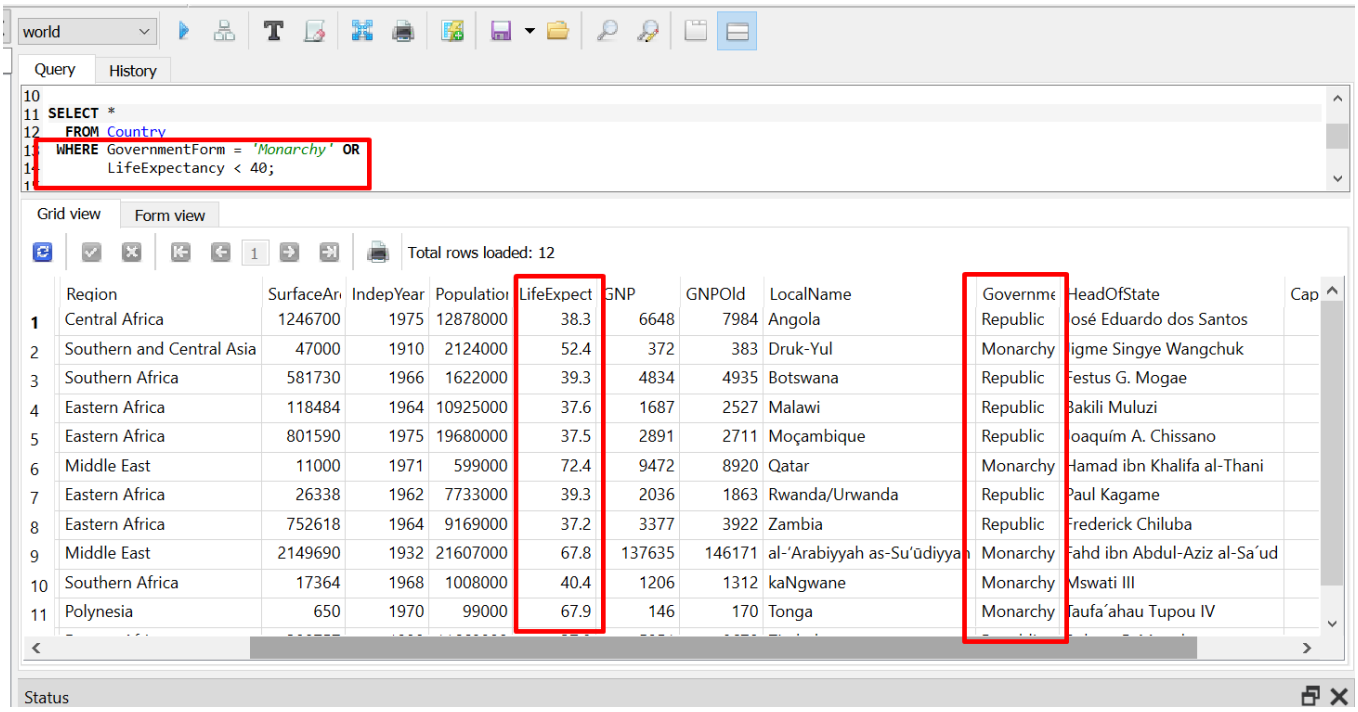
4. AND



	Code	Name	Continent	Region	SurfaceAr	IndepYear	Population	LifeExpect	GNP	GNPOld	LocalName	Goverr
1	AFG	Afghanistan	Asia	Southern and Central Asia	652090	1919	22720000	45.9	5976	NULL	Afganistan/Afqanestan	Islamic
2	ARM	Armenia	Asia	Middle East	29800	1991	3520000	66.4	1813	1627	Hajastan	Republ
3	AZE	Azerbaijan	Asia	Middle East	86600	1991	7734000	62.9	4127	4100	Azärbaycan	Federa
4	BGD	Bangladesh	Asia	Southern and Central Asia	143998	1971	129155000	60.2	32852	31966	Bangladesh	Republ
5	BTN	Bhutan	Asia	Southern and Central Asia	47000	1910	2124000	52.4	372	383	Druk-Yul	Monar
6	PHL	Philippines	Asia	Southeast Asia	300000	1946	75967000	67.5	65107	82239	Pilipinas	Republ
7	GEO	Georgia	Asia	Middle East	69700	1991	4968000	64.5	6064	5924	Sakartvelo	Republ
8	IDN	Indonesia	Asia	Southeast Asia	1904569	1945	212107000	68	84982	215002	Indonesia	Republ

```
SELECT   *
FROM     Country
WHERE    Continent = 'Asia' AND
LifeExpectancy < 70;
```

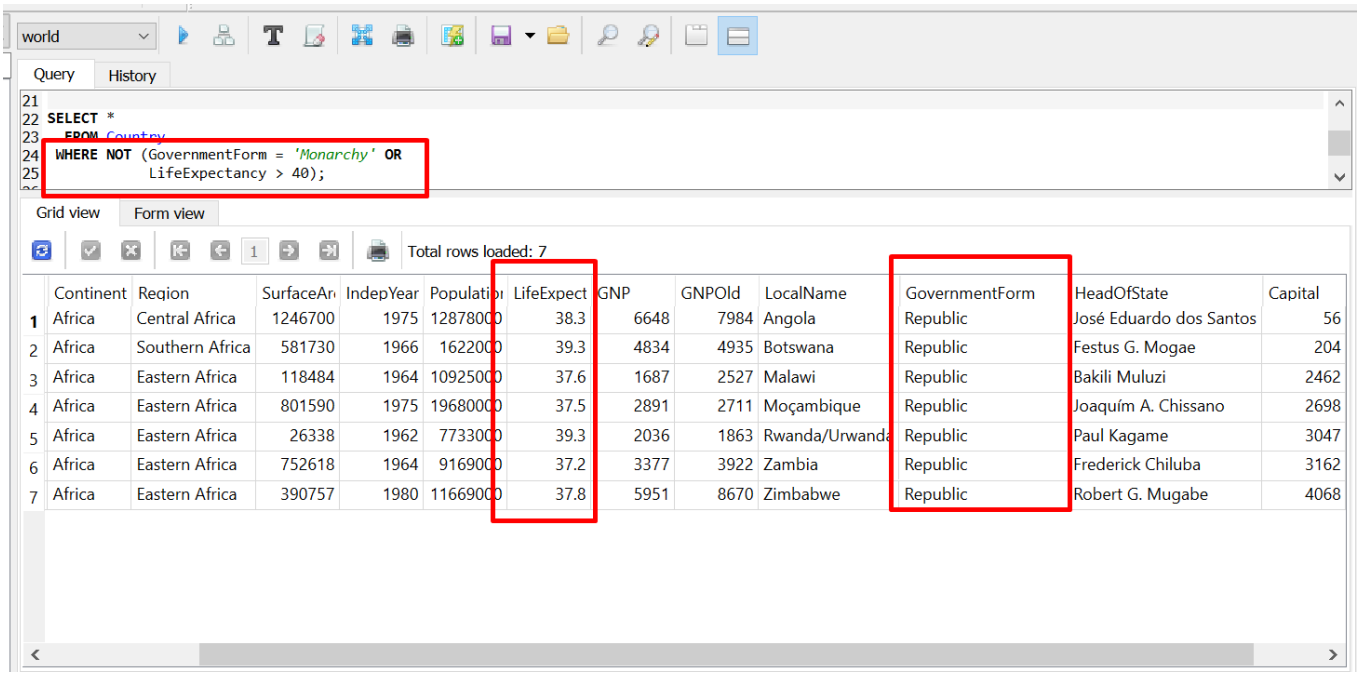
5. OR



	Region	SurfaceAr	IndepYear	Populatio	LifeExpect	GNP	GNPOld	LocalName	Governme	HeadOfState	Cap
1	Central Africa	1246700	1975	12878000	38.3	6648	7984	Angola	Republic	José Eduardo dos Santos	
2	Southern and Central Asia	47000	1910	2124000	52.4	372	383	Druk-Yul	Monarchy	Jigme Singye Wangchuk	
3	Southern Africa	581730	1966	1622000	39.3	4834	4935	Botswana	Republic	Festus G. Mogae	
4	Eastern Africa	118484	1964	10925000	37.6	1687	2527	Malawi	Republic	Bakili Muluzi	
5	Eastern Africa	801590	1975	19680000	37.5	2891	2711	Moçambique	Republic	Joaquím A. Chissano	
6	Middle East	11000	1971	599000	72.4	9472	8920	Qatar	Monarchy	Hamad ibn Khalifa al-Thani	
7	Eastern Africa	26338	1962	7733000	39.3	2036	1863	Rwanda/Urwanda	Republic	Paul Kagame	
8	Eastern Africa	752618	1964	9169000	37.2	3377	3922	Zambia	Republic	Frederick Chiluba	
9	Middle East	2149690	1932	21607000	67.8	137635	146171	al-'Arabiyyah as-Su'ūdiyya	Monarchy	Fahd ibn Abdul-Aziz al-Sa'ud	
10	Southern Africa	17364	1968	1008000	40.4	1206	1312	kaNgwane	Monarchy	Mswati III	
11	Polynesia	650	1970	99000	67.9	146	170	Tonga	Monarchy	Taufa'ahau Tupou IV	

```
SELECT   *
FROM     Country
WHERE    GovernmentForm = 'Monarchy' OR
LifeExpectancy < 40;
```

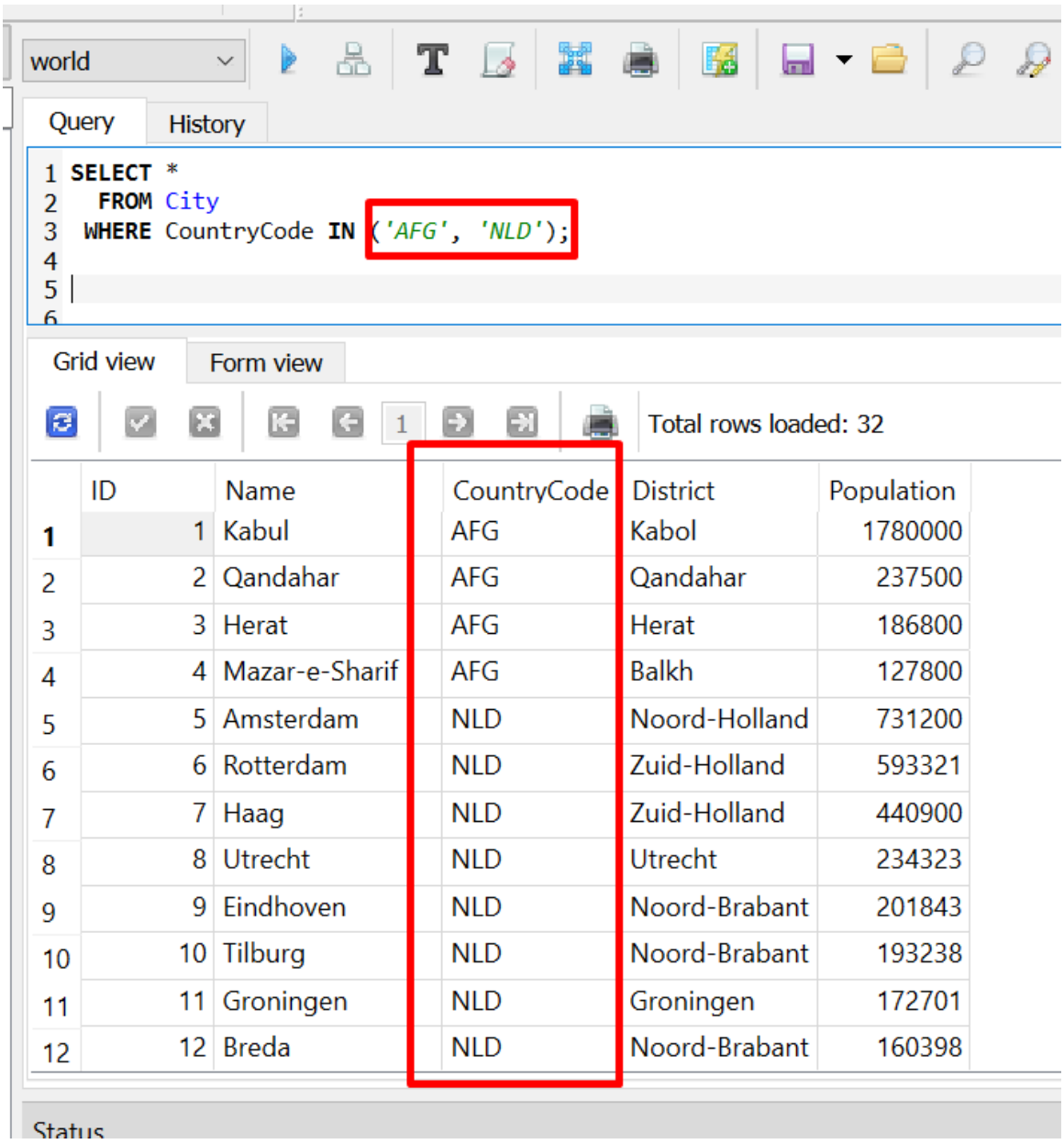
6. NOT



	Continent	Region	SurfaceAr	IndepYear	Populatio	LifeExpect	GNP	GNPOld	LocalName	GovernmentForm	HeadOfState	Capital
1	Africa	Central Africa	1246700	1975	12878000	38.3	6648	7984	Angola	Republic	José Eduardo dos Santos	56
2	Africa	Southern Africa	581730	1966	1622000	39.3	4834	4935	Botswana	Republic	Festus G. Mogae	204
3	Africa	Eastern Africa	118484	1964	10925000	37.6	1687	2527	Malawi	Republic	Bakili Muluzi	2462
4	Africa	Eastern Africa	801590	1975	19680000	37.5	2891	2711	Moçambique	Republic	Joaquím A. Chissano	2698
5	Africa	Eastern Africa	26338	1962	7733000	39.3	2036	1863	Rwanda/Urwanda	Republic	Paul Kagame	3047
6	Africa	Eastern Africa	752618	1964	9169000	37.2	3377	3922	Zambia	Republic	Frederick Chiluba	3162
7	Africa	Eastern Africa	390757	1980	11669000	37.8	5951	8670	Zimbabwe	Republic	Robert G. Mugabe	4068

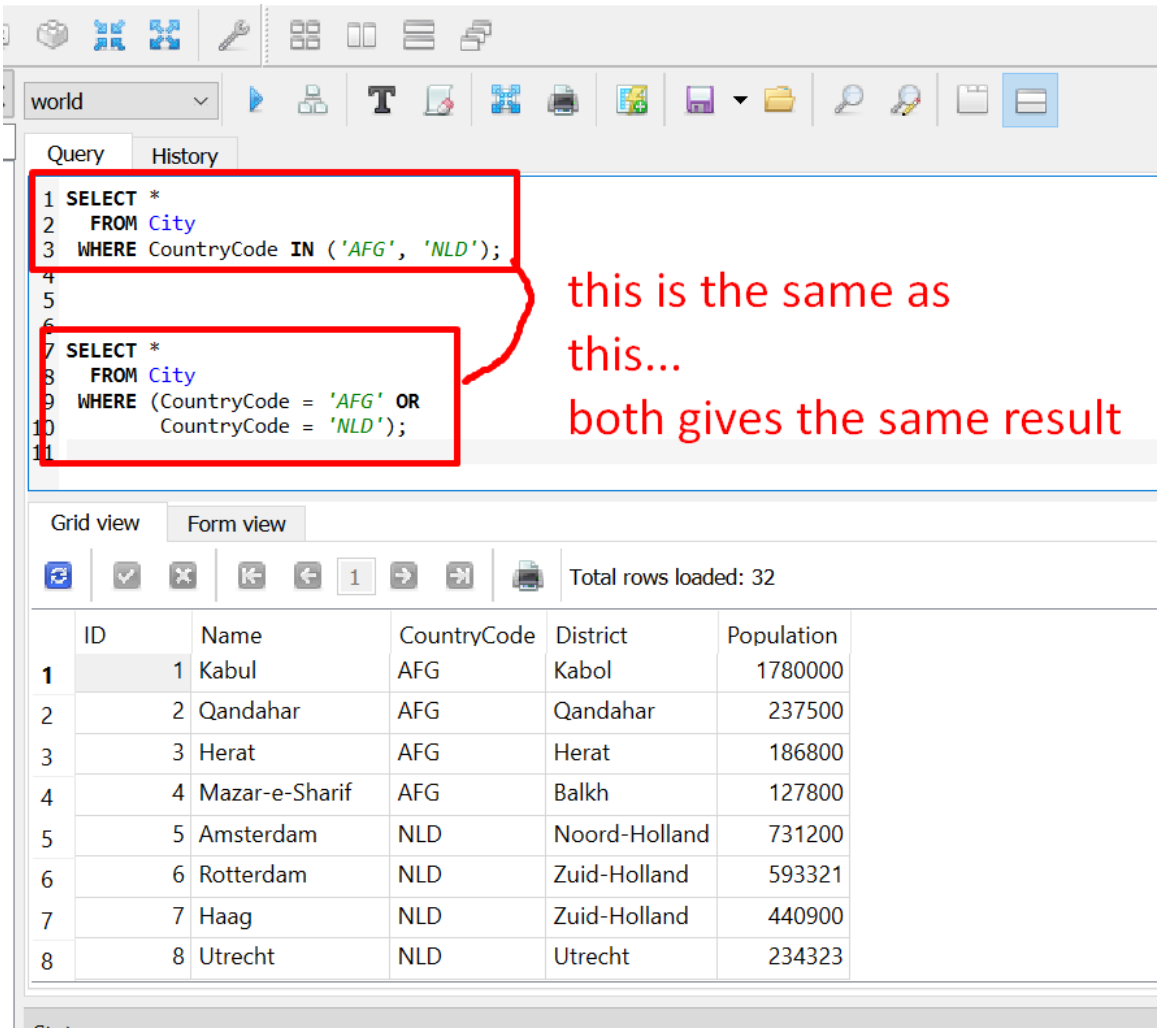
```
SELECT   *
FROM     Country
WHERE NOT
(
         GovernmentForm = 'Monarchy' OR
         LifeExpectancy > 40
);
```

7. IN



	ID	Name	CountryCode	District	Population
1	1	Kabul	AFG	Kabol	1780000
2	2	Qandahar	AFG	Qandahar	237500
3	3	Herat	AFG	Herat	186800
4	4	Mazar-e-Sharif	AFG	Balkh	127800
5	5	Amsterdam	NLD	Noord-Holland	731200
6	6	Rotterdam	NLD	Zuid-Holland	593321
7	7	Haag	NLD	Zuid-Holland	440900
8	8	Utrecht	NLD	Utrecht	234323
9	9	Eindhoven	NLD	Noord-Brabant	201843
10	10	Tilburg	NLD	Noord-Brabant	193238
11	11	Groningen	NLD	Groningen	172701
12	12	Breda	NLD	Noord-Brabant	160398

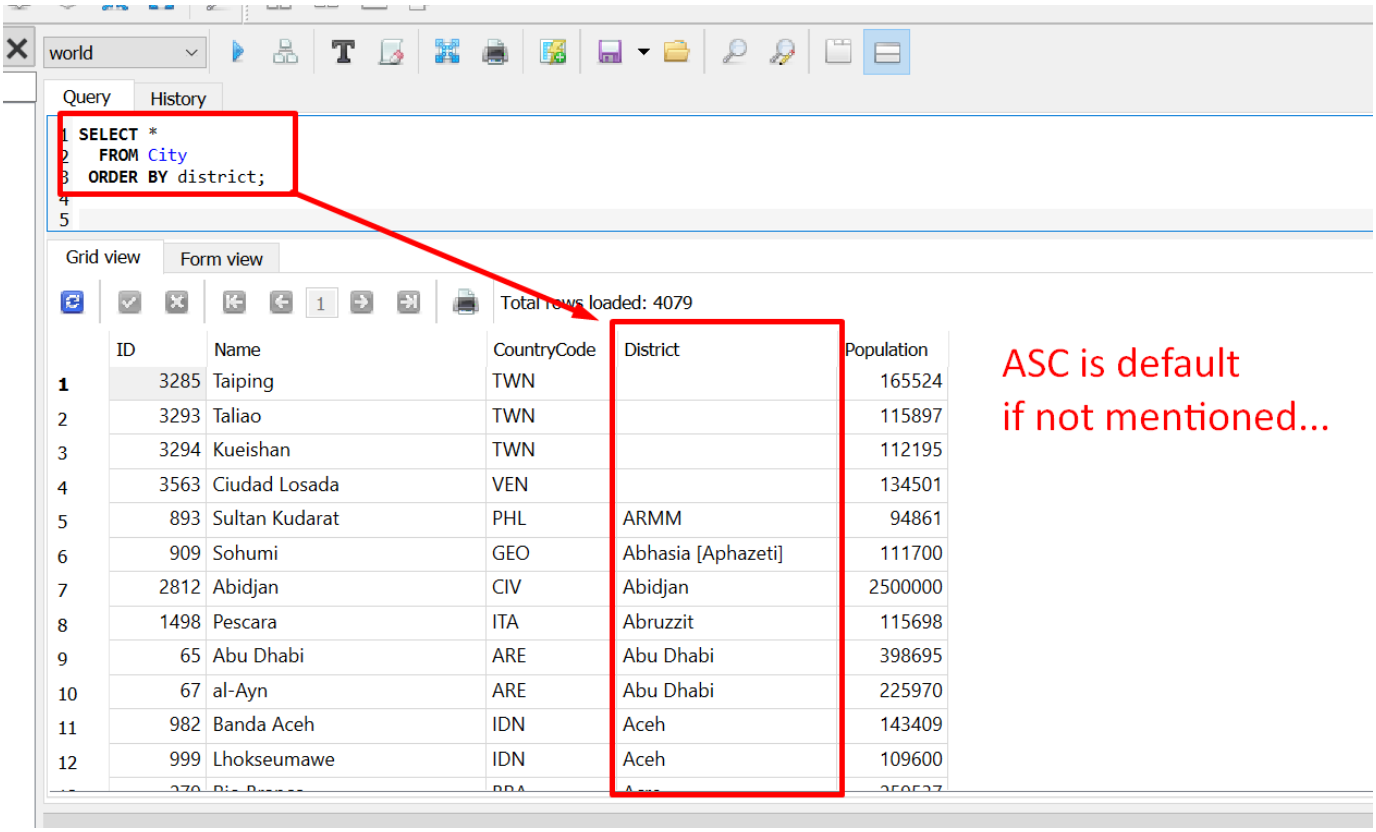
```
SELECT   *
FROM     City
WHERE    CountryCode IN ('AFG', 'NLD');
```



	ID	Name	CountryCode	District	Population
1	1	Kabul	AFG	Kabol	1780000
2	2	Qandahar	AFG	Qandahar	237500
3	3	Herat	AFG	Herat	186800
4	4	Mazar-e-Sharif	AFG	Balkh	127800
5	5	Amsterdam	NLD	Noord-Holland	731200
6	6	Rotterdam	NLD	Zuid-Holland	593321
7	7	Haag	NLD	Zuid-Holland	440900
8	8	Utrecht	NLD	Utrecht	234323

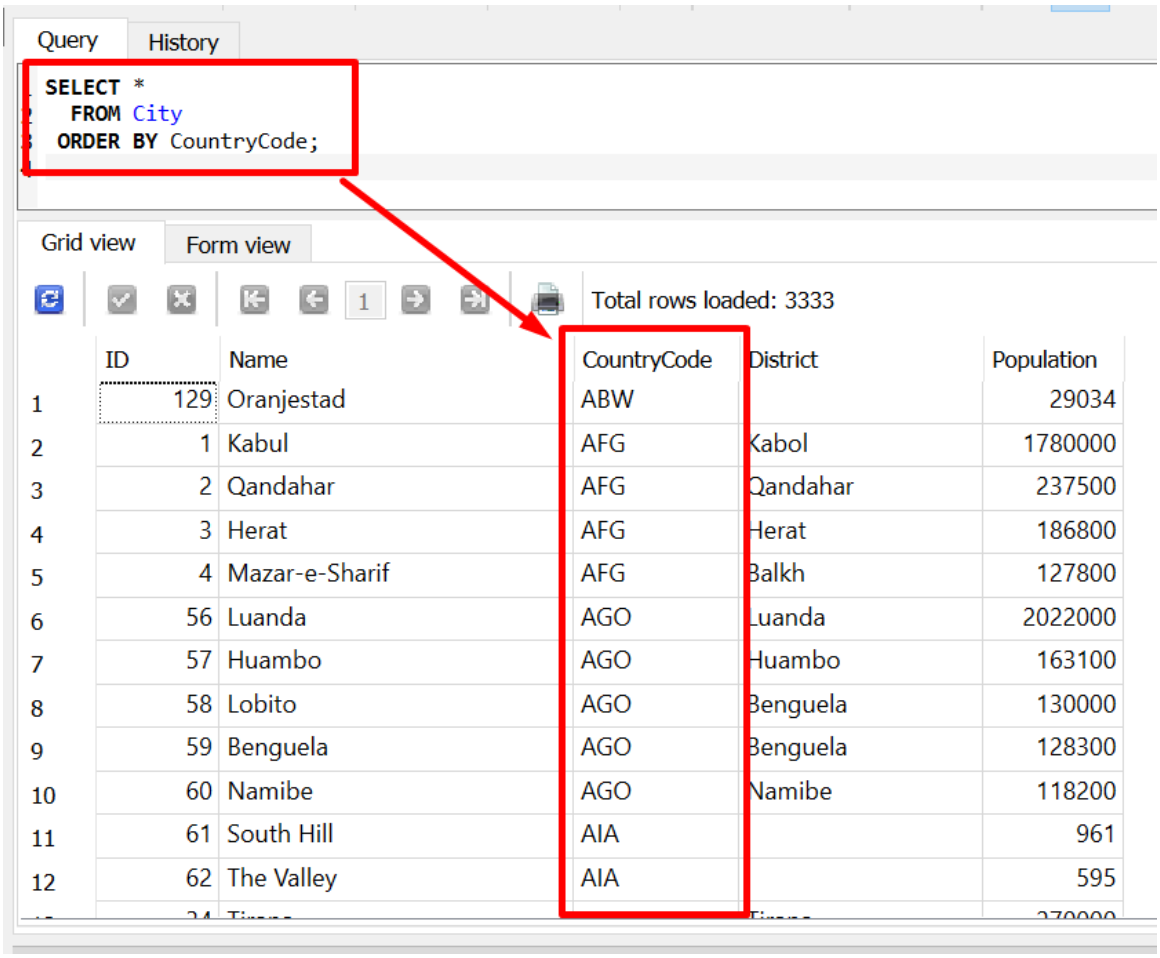
```
SELECT   *
FROM     City
WHERE    (CountryCode = 'AFG' OR
          CountryCode = 'NLD');
```

O. ORDER BY



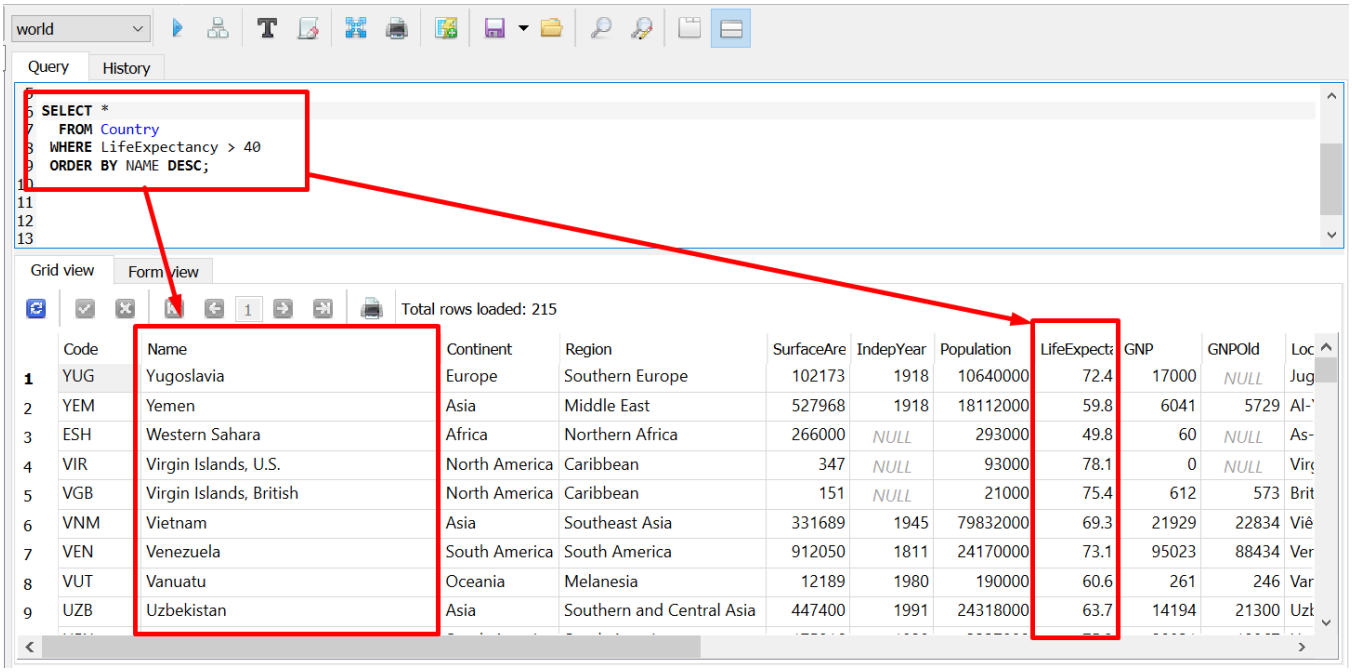
	ID	Name	CountryCode	District	Population
1	3285	Taiping	TWN		165524
2	3293	Taliao	TWN		115897
3	3294	Kueishan	TWN		112195
4	3563	Ciudad Losada	VEN		134501
5	893	Sultan Kudarat	PHL	ARMM	94861
6	909	Sohumi	GEO	Abhasia [Aphazeti]	111700
7	2812	Abidjan	CIV	Abidjan	2500000
8	1498	Pescara	ITA	Abruzzit	115698
9	65	Abu Dhabi	ARE	Abu Dhabi	398695
10	67	al-Ayn	ARE	Abu Dhabi	225970
11	982	Banda Aceh	IDN	Aceh	143409
12	999	Lhokseumawe	IDN	Aceh	109600

```
SELECT *
FROM City
ORDER BY district;
```



	ID	Name	CountryCode	District	Population
1	129	Oranjestad	ABW		29034
2	1	Kabul	AFG	Kabol	1780000
3	2	Qandahar	AFG	Qandahar	237500
4	3	Herat	AFG	Herat	186800
5	4	Mazar-e-Sharif	AFG	Balkh	127800
6	56	Luanda	AGO	Luanda	2022000
7	57	Huambo	AGO	Huambo	163100
8	58	Lobito	AGO	Benguela	130000
9	59	Benguela	AGO	Benguela	128300
10	60	Namibe	AGO	Namibe	118200
11	61	South Hill	AIA		961
12	62	The Valley	AIA		595

```
SELECT *
FROM City
ORDER BY CountryCode;
```



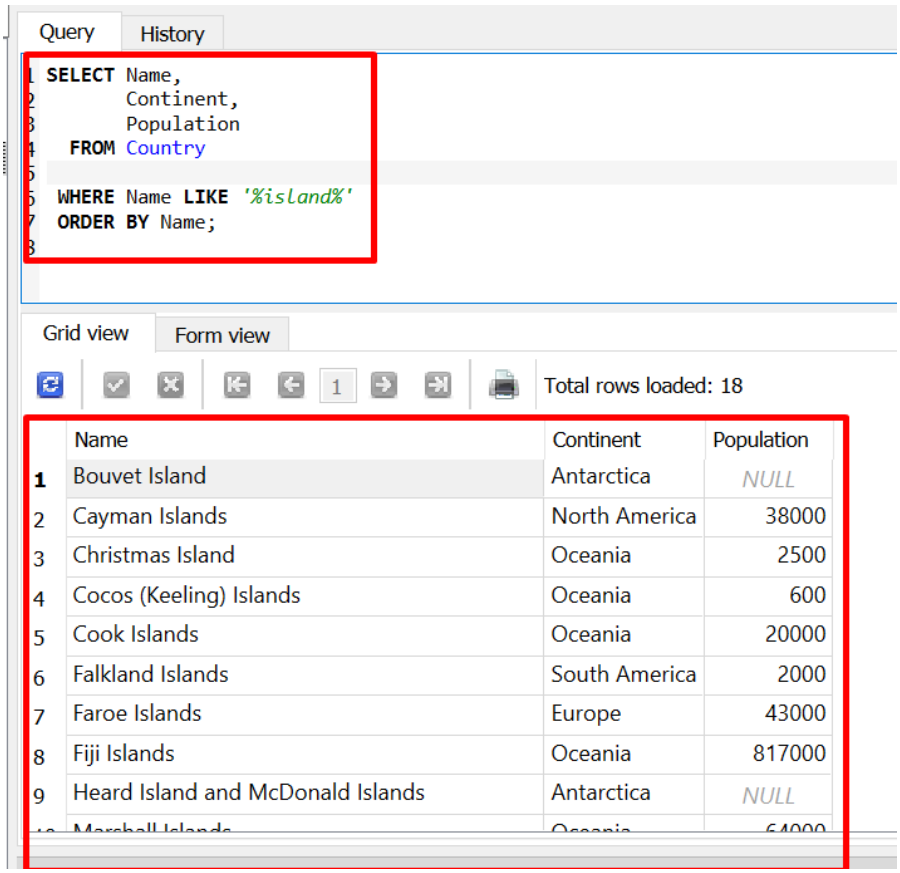
	Code	Name	Continent	Region	SurfaceAre	IndepYear	Population	LifeExpecta	GNP	GNPOld	Loc
1	YUG	Yugoslavia	Europe	Southern Europe	102173	1918	10640000	72.4	17000	NULL	Jug
2	YEM	Yemen	Asia	Middle East	527968	1918	18112000	59.8	6041	5729	Al-
3	ESH	Western Sahara	Africa	Northern Africa	266000	NULL	293000	49.8	60	NULL	As-
4	VIR	Virgin Islands, U.S.	North America	Caribbean	347	NULL	93000	78.1	0	NULL	Virg
5	VGB	Virgin Islands, British	North America	Caribbean	151	NULL	21000	75.4	612	573	Brit
6	VNM	Vietnam	Asia	Southeast Asia	331689	1945	79832000	69.3	21929	22834	Viê
7	VEN	Venezuela	South America	South America	912050	1811	24170000	73.1	95023	88434	Ver
8	VUT	Vanuatu	Oceania	Melanesia	12189	1980	190000	60.6	261	246	Var
9	UZB	Uzbekistan	Asia	Southern and Central Asia	447400	1991	24318000	63.7	14194	21300	Uzb

```
SELECT      *
FROM        Country
WHERE       LifeExpectancy > 40
ORDER BY    NAME DESC;
```

1. ACTIVITY QUESTION: ORDER BY / OPERATORS

https://www.alvinang.sg/s/world.db

- Select Name, Continent, and Population from Country
- Where the Name is like ISLAND
- Order by Name



	Name	Continent	Population
1	Bouvet Island	Antarctica	NULL
2	Cayman Islands	North America	38000
3	Christmas Island	Oceania	2500
4	Cocos (Keeling) Islands	Oceania	600
5	Cook Islands	Oceania	20000
6	Falkland Islands	South America	2000
7	Faroe Islands	Europe	43000
8	Fiji Islands	Oceania	817000
9	Heard Island and McDonald Islands	Antarctica	NULL

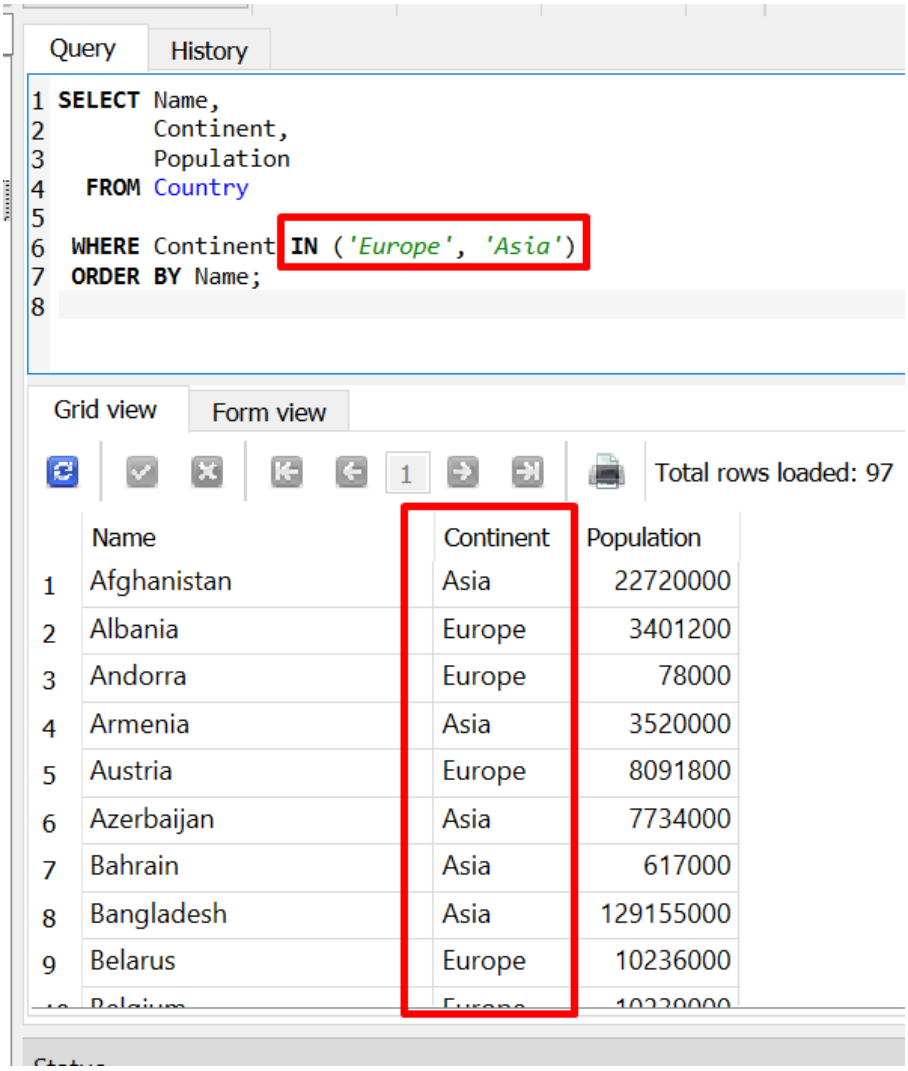
2. ACTIVITY ANSWER: ORDER BY / OPERATORS

```
SELECT    Name,
          Continent,
          Population
FROM      Country

WHERE     Name      LIKE '%island%'
ORDER BY  Name;
```

3. ACTIVITY QUESTION: ORDER BY / OPERATORS

https://www.alvinang.sg/s/world.db

- Select Name, Continent, and Population
- From Country
- Where Continent is in Europe and Asia
- Order by Name



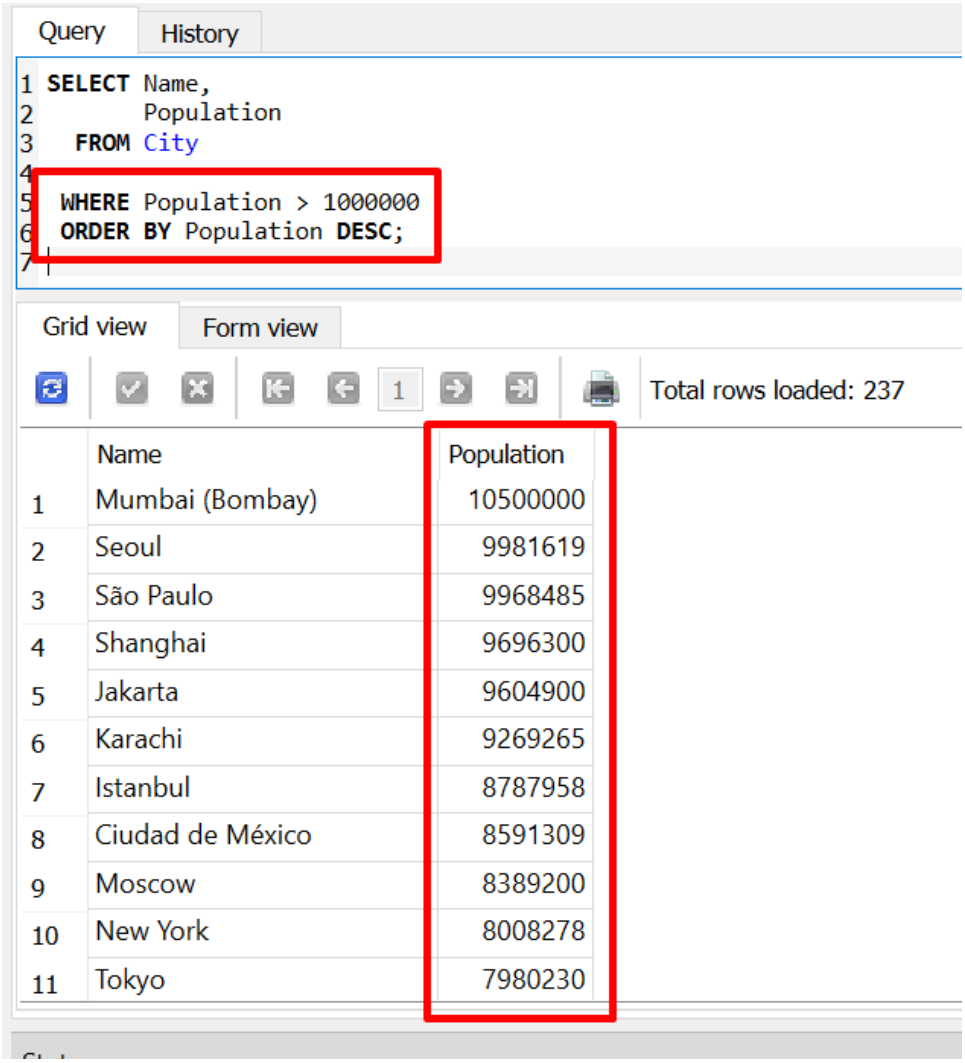
4. ACTIVITY ANSWER: ORDER BY / OPERATORS

```
SELECT      Name,
            Continent,
            Population
FROM        Country

WHERE       Continent IN ('Europe', 'Asia')
ORDER BY    Name;
```

5. ACTIVITY QUESTION: ORDER BY / OPERATORS

https://www.alvinang.sg/s/world.db

- Retrieve all the City Names
- With Population more than 1 million and
- Order By Ascending Order

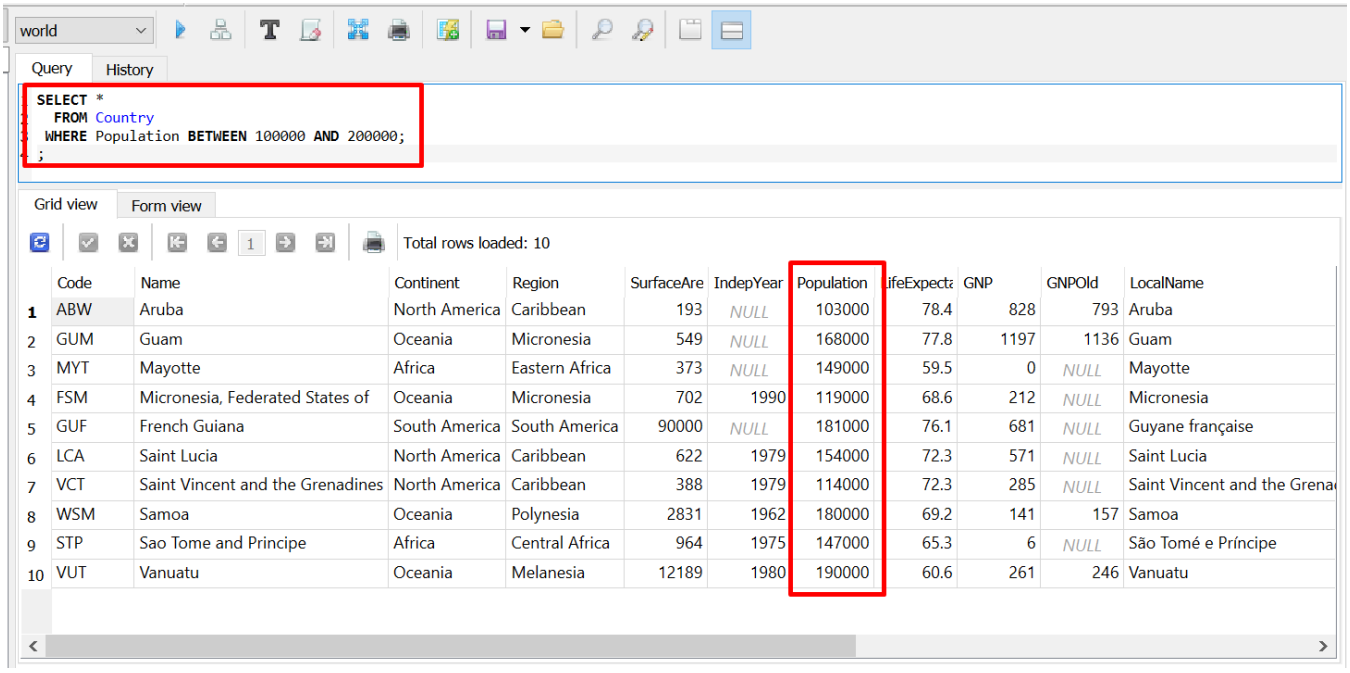


	Name	Population
1	Mumbai (Bombay)	10500000
2	Seoul	9981619
3	São Paulo	9968485
4	Shanghai	9696300
5	Jakarta	9604900
6	Karachi	9269265
7	Istanbul	8787958
8	Ciudad de México	8591309
9	Moscow	8389200
10	New York	8008278
11	Tokyo	7980230

6. ACTIVITY ANSWER: ORDER BY / OPERATORS

```
SELECT      Name,
            Population
FROM        City

WHERE       Population > 1000000
ORDER BY    Population DESC;
```

P. BETWEEN

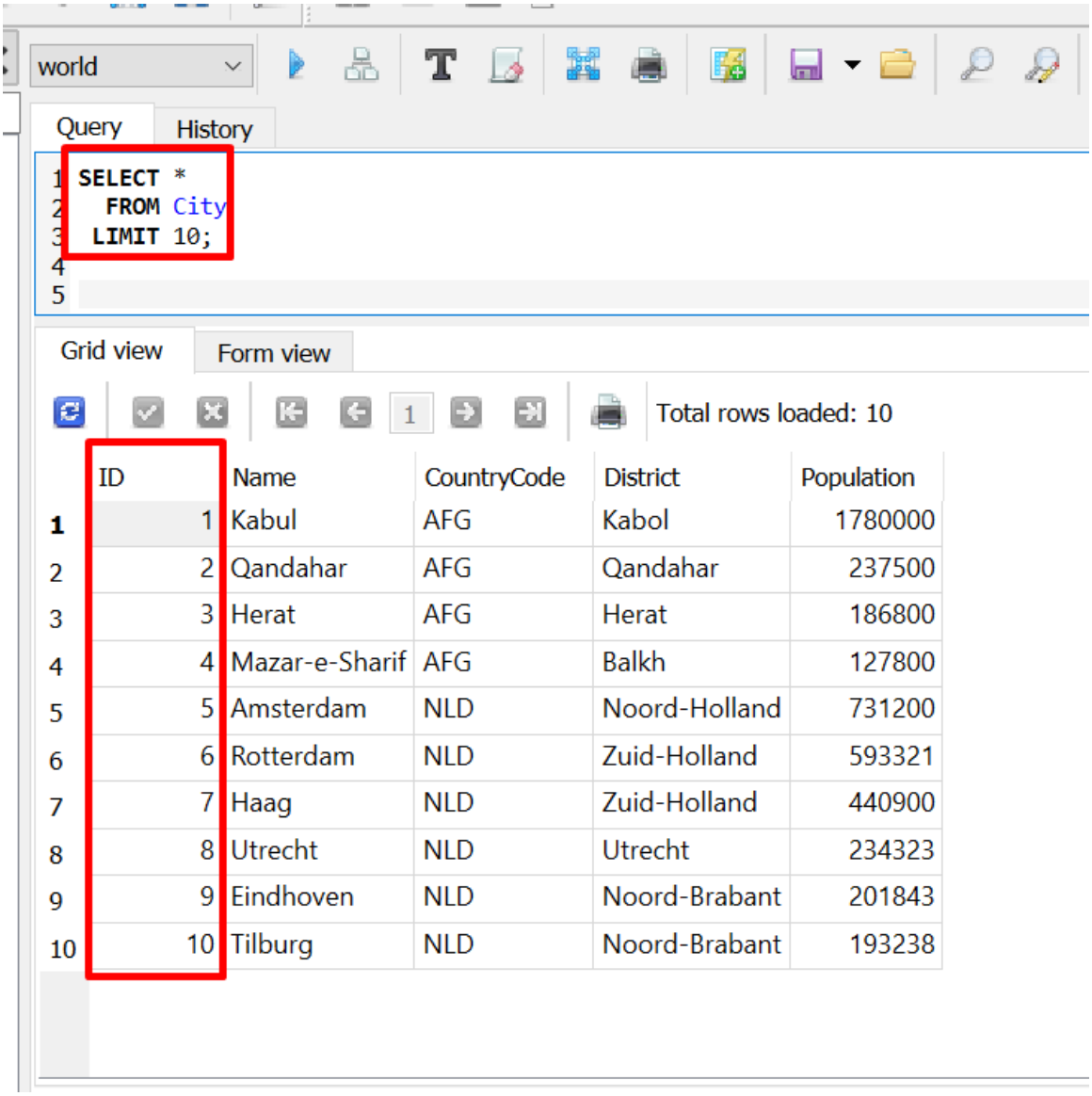


	Code	Name	Continent	Region	SurfaceAre	IndepYear	Population	LifeExpecta	GNP	GNPOld	LocalName
1	ABW	Aruba	North America	Caribbean	193	NULL	103000	78.4	828	793	Aruba
2	GUM	Guam	Oceania	Micronesia	549	NULL	168000	77.8	1197	1136	Guam
3	MYT	Mayotte	Africa	Eastern Africa	373	NULL	149000	59.5	0	NULL	Mayotte
4	FSM	Micronesia, Federated States of	Oceania	Micronesia	702	1990	119000	68.6	212	NULL	Micronesia
5	GUF	French Guiana	South America	South America	90000	NULL	181000	76.1	681	NULL	Guyane française
6	LCA	Saint Lucia	North America	Caribbean	622	1979	154000	72.3	571	NULL	Saint Lucia
7	VCT	Saint Vincent and the Grenadines	North America	Caribbean	388	1979	114000	72.3	285	NULL	Saint Vincent and the Grena
8	WSM	Samoa	Oceania	Polynesia	2831	1962	180000	69.2	141	157	Samoa
9	STP	Sao Tome and Principe	Africa	Central Africa	964	1975	147000	65.3	6	NULL	São Tomé e Príncipe
10	VUT	Vanuatu	Oceania	Melanesia	12189	1980	190000	60.6	261	246	Vanuatu

```
SELECT *
FROM Country
WHERE Population BETWEEN 100000 AND 200000;
```

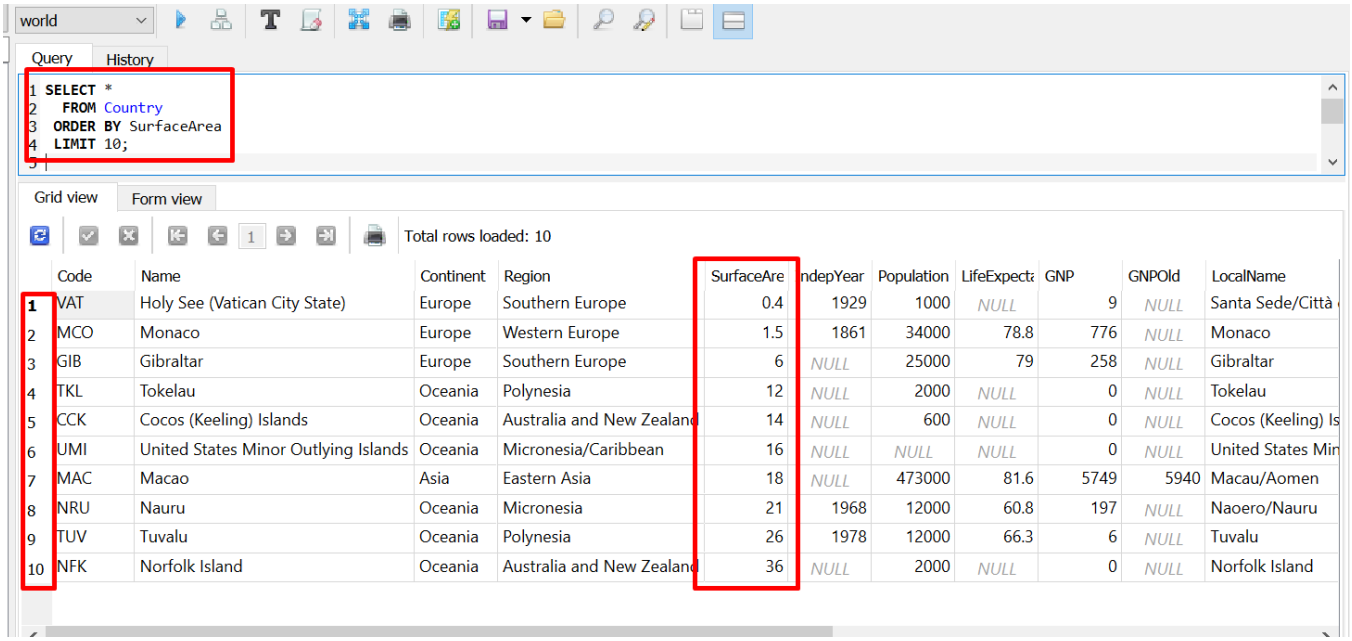
Q. LIMIT

https://www.alvinang.sg/s/world.db



	ID	Name	CountryCode	District	Population
1	1	Kabul	AFG	Kabol	1780000
2	2	Qandahar	AFG	Qandahar	237500
3	3	Herat	AFG	Herat	186800
4	4	Mazar-e-Sharif	AFG	Balkh	127800
5	5	Amsterdam	NLD	Noord-Holland	731200
6	6	Rotterdam	NLD	Zuid-Holland	593321
7	7	Haag	NLD	Zuid-Holland	440900
8	8	Utrecht	NLD	Utrecht	234323
9	9	Eindhoven	NLD	Noord-Brabant	201843
10	10	Tilburg	NLD	Noord-Brabant	193238

```
SELECT *
FROM City
LIMIT 10;
```



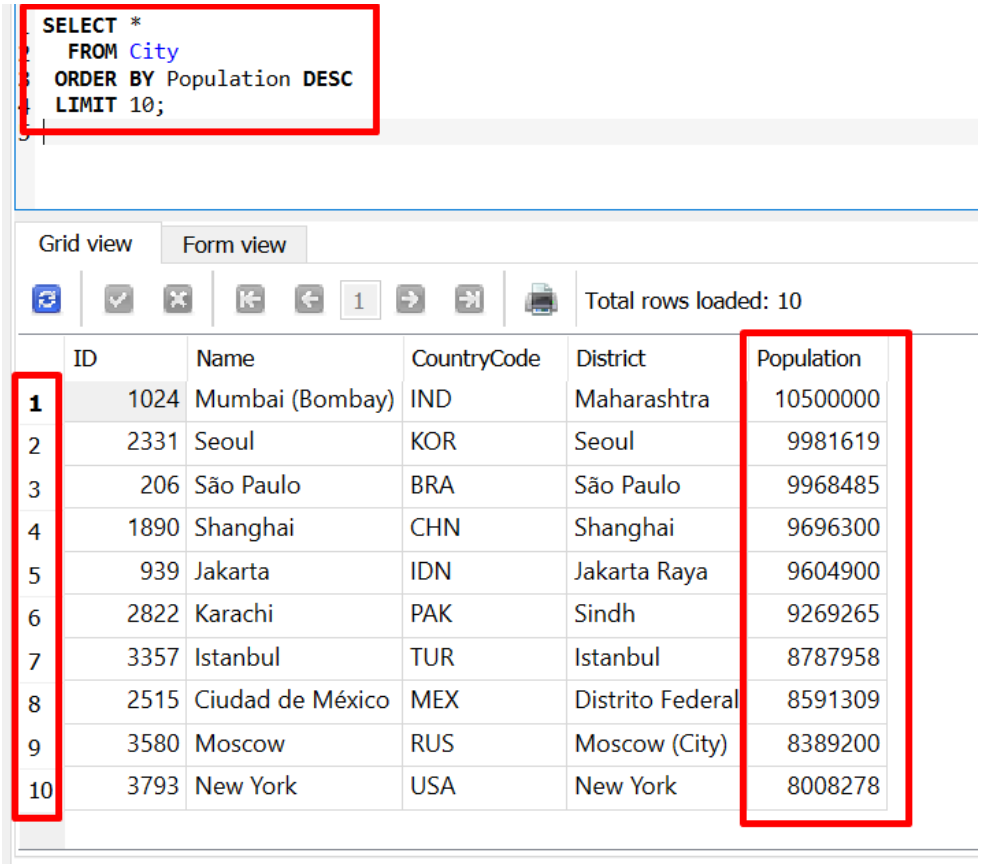
	Code	Name	Continent	Region	SurfaceAre	ndepYear	Population	LifeExpect	GNP	GNPOld	LocalName
1	VAT	Holy See (Vatican City State)	Europe	Southern Europe	0.4	1929	1000	NULL	9	NULL	Santa Sede/Città
2	MCO	Monaco	Europe	Western Europe	1.5	1861	34000	78.8	776	NULL	Monaco
3	GIB	Gibraltar	Europe	Southern Europe	6	NULL	25000	79	258	NULL	Gibraltar
4	TKL	Tokelau	Oceania	Polynesia	12	NULL	2000	NULL	0	NULL	Tokelau
5	CCK	Cocos (Keeling) Islands	Oceania	Australia and New Zealand	14	NULL	600	NULL	0	NULL	Cocos (Keeling) Is
6	UMI	United States Minor Outlying Islands	Oceania	Micronesia/Caribbean	16	NULL	NULL	NULL	0	NULL	United States Mir
7	MAC	Macao	Asia	Eastern Asia	18	NULL	473000	81.6	5749	5940	Macau/Aomen
8	NRU	Nauru	Oceania	Micronesia	21	1968	12000	60.8	197	NULL	Naoero/Nauru
9	TUV	Tuvalu	Oceania	Polynesia	26	1978	12000	66.3	6	NULL	Tuvalu
10	NFK	Norfolk Island	Oceania	Australia and New Zealand	36	NULL	2000	NULL	0	NULL	Norfolk Island

```
SELECT      *
FROM        Country
ORDER BY    SurfaceArea
LIMIT       10;
```

https://www.alvinang.sg/s/world.db

1. ACTIVITY QUESTION: SELECT DATA / LIMIT

- Select the Top 10 Cities Order by Population in Descending Order



```
SELECT *
  FROM City
ORDER BY Population DESC
LIMIT 10;
```

Grid view | Form view

Total rows loaded: 10

	ID	Name	CountryCode	District	Population
1	1024	Mumbai (Bombay)	IND	Maharashtra	10500000
2	2331	Seoul	KOR	Seoul	9981619
3	206	São Paulo	BRA	São Paulo	9968485
4	1890	Shanghai	CHN	Shanghai	9696300
5	939	Jakarta	IDN	Jakarta Raya	9604900
6	2822	Karachi	PAK	Sindh	9269265
7	3357	Istanbul	TUR	Istanbul	8787958
8	2515	Ciudad de México	MEX	Distrito Federal	8591309
9	3580	Moscow	RUS	Moscow (City)	8389200
10	3793	New York	USA	New York	8008278

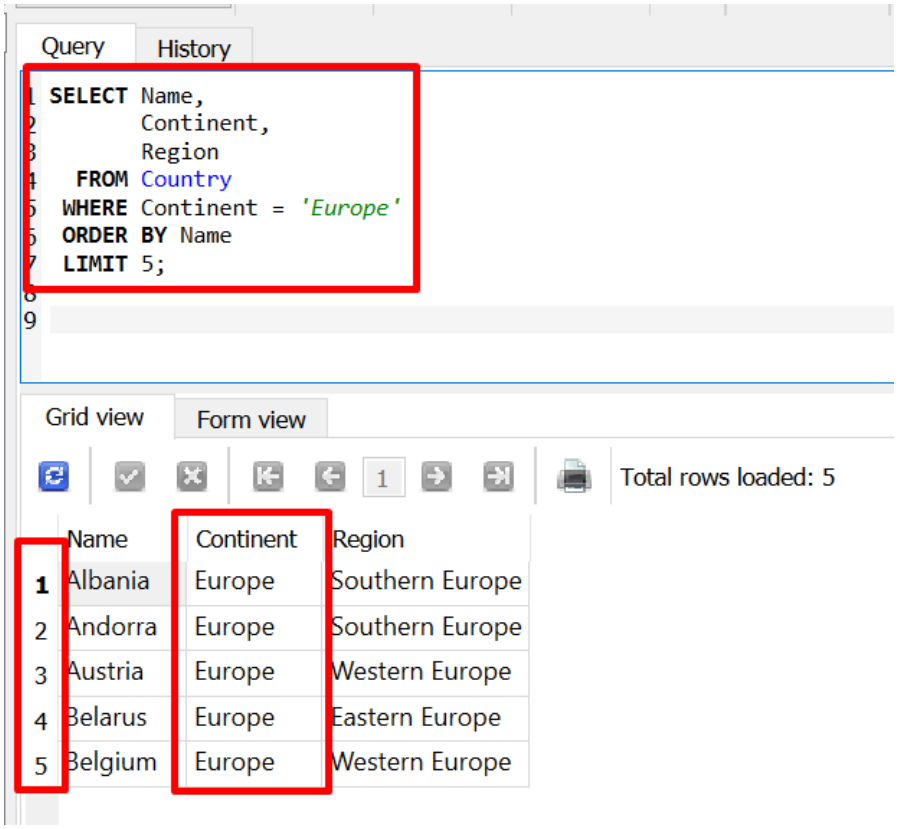
2. ACTIVITY ANSWER: SELECT DATA / LIMIT

```
SELECT *
FROM City
ORDER BY Population DESC
LIMIT 10;
```

3. ACTIVITY QUESTION: SELECT DATA / LIMIT

https://www.alvinang.sg/s/world.db

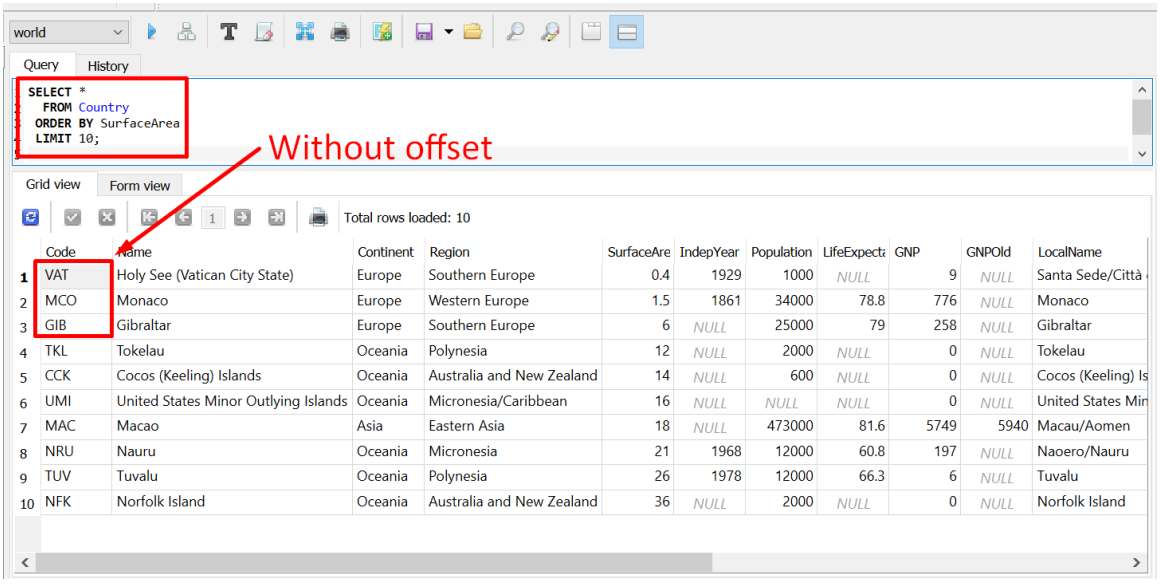
- Select 5 Name, Continent and Region
- Where Continent is Europe
- Order by Name



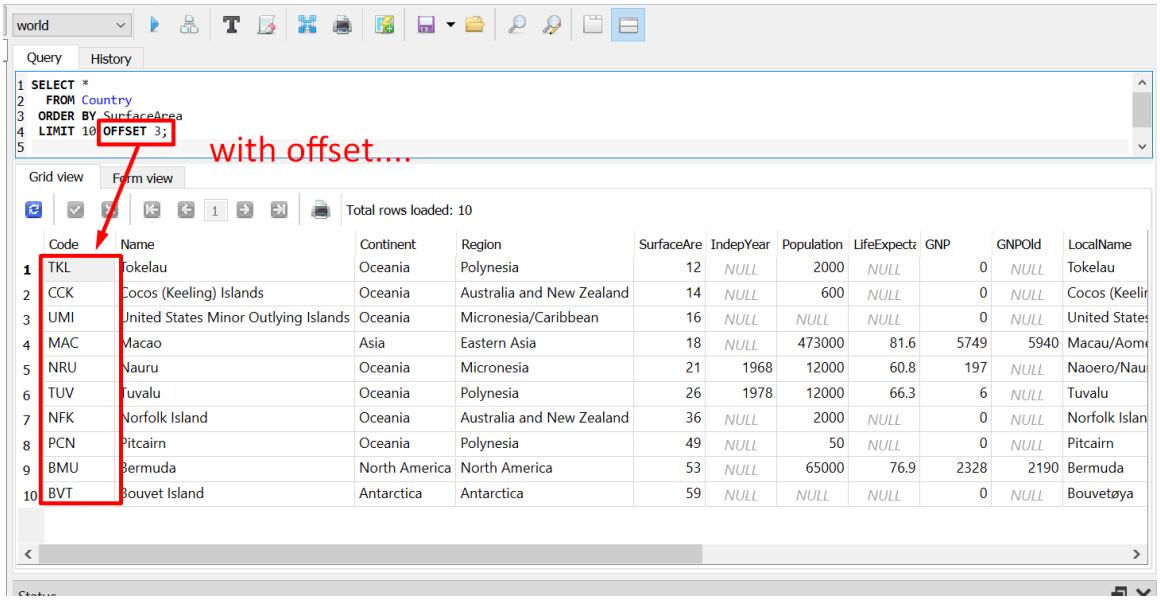
4. ACTIVITY ANSWER: SELECT DATA / LIMIT

```
SELECT   Name,
         Continent,
         Region
FROM     Country

WHERE    Continent = 'Europe'
ORDER BY Name
LIMIT 5;
```

5. OFFSET



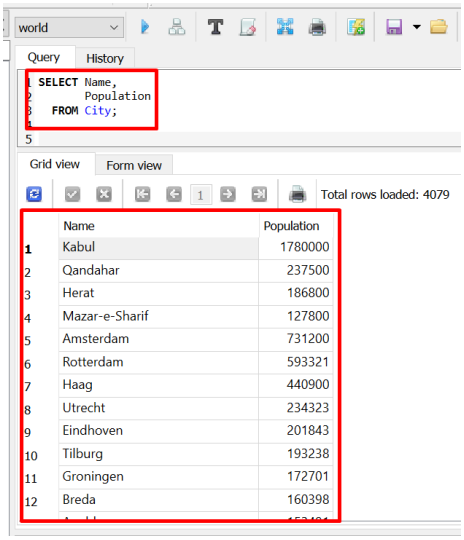
	Code	Name	Continent	Region	SurfaceAre	IndepYear	Population	LifeExpecta	GNP	GNPOld	LocalName
1	VAT	Holy See (Vatican City State)	Europe	Southern Europe	0.4	1929	1000	NULL	9	NULL	Santa Sede/Città
2	MCO	Monaco	Europe	Western Europe	1.5	1861	34000	78.8	776	NULL	Monaco
3	GIB	Gibraltar	Europe	Southern Europe	6	NULL	25000	79	258	NULL	Gibraltar
4	TKL	Tokelau	Oceania	Polynesia	12	NULL	2000	NULL	0	NULL	Tokelau
5	CCK	Cocos (Keeling) Islands	Oceania	Australia and New Zealand	14	NULL	600	NULL	0	NULL	Cocos (Keeling) Is
6	UMI	United States Minor Outlying Islands	Oceania	Micronesia/Caribbean	16	NULL	NULL	NULL	0	NULL	United States Mir
7	MAC	Macao	Asia	Eastern Asia	18	NULL	473000	81.6	5749	5940	Macau/Aomen
8	NRU	Nauru	Oceania	Micronesia	21	1968	12000	60.8	197	NULL	Naoero/Nauru
9	TUV	Tuvalu	Oceania	Polynesia	26	1978	12000	66.3	6	NULL	Tuvalu
10	NFK	Norfolk Island	Oceania	Australia and New Zealand	36	NULL	2000	NULL	0	NULL	Norfolk Island



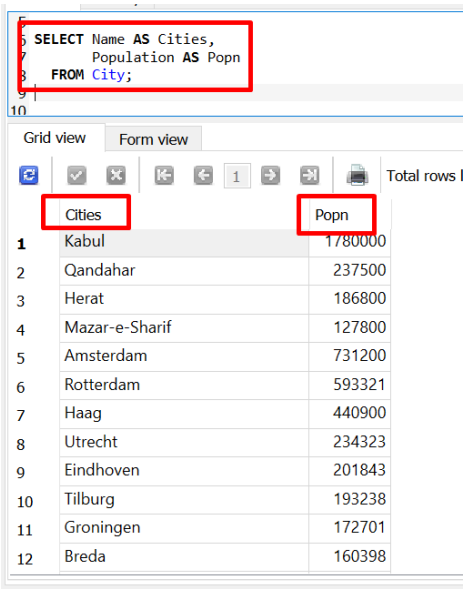
	Code	Name	Continent	Region	SurfaceAre	IndepYear	Population	LifeExpecta	GNP	GNPOld	LocalName
1	TKL	Tokelau	Oceania	Polynesia	12	NULL	2000	NULL	0	NULL	Tokelau
2	CCK	Cocos (Keeling) Islands	Oceania	Australia and New Zealand	14	NULL	600	NULL	0	NULL	Cocos (Keelir
3	UMI	United States Minor Outlying Islands	Oceania	Micronesia/Caribbean	16	NULL	NULL	NULL	0	NULL	United States
4	MAC	Macao	Asia	Eastern Asia	18	NULL	473000	81.6	5749	5940	Macau/Aom
5	NRU	Nauru	Oceania	Micronesia	21	1968	12000	60.8	197	NULL	Naoero/Nau
6	TUV	Tuvalu	Oceania	Polynesia	26	1978	12000	66.3	6	NULL	Tuvalu
7	NFK	Norfolk Island	Oceania	Australia and New Zealand	36	NULL	2000	NULL	0	NULL	Norfolk Islan
8	PCN	Pitcairn	Oceania	Polynesia	49	NULL	50	NULL	0	NULL	Pitcairn
9	BMU	Bermuda	North America	North America	53	NULL	65000	76.9	2328	2190	Bermuda
10	BVT	Bouvet Island	Antarctica	Antarctica	59	NULL	NULL	NULL	0	NULL	Bouvetøya

```
SELECT      *
FROM        Country
ORDER BY    SurfaceArea
LIMIT 10    OFFSET 3;
```

R. AS

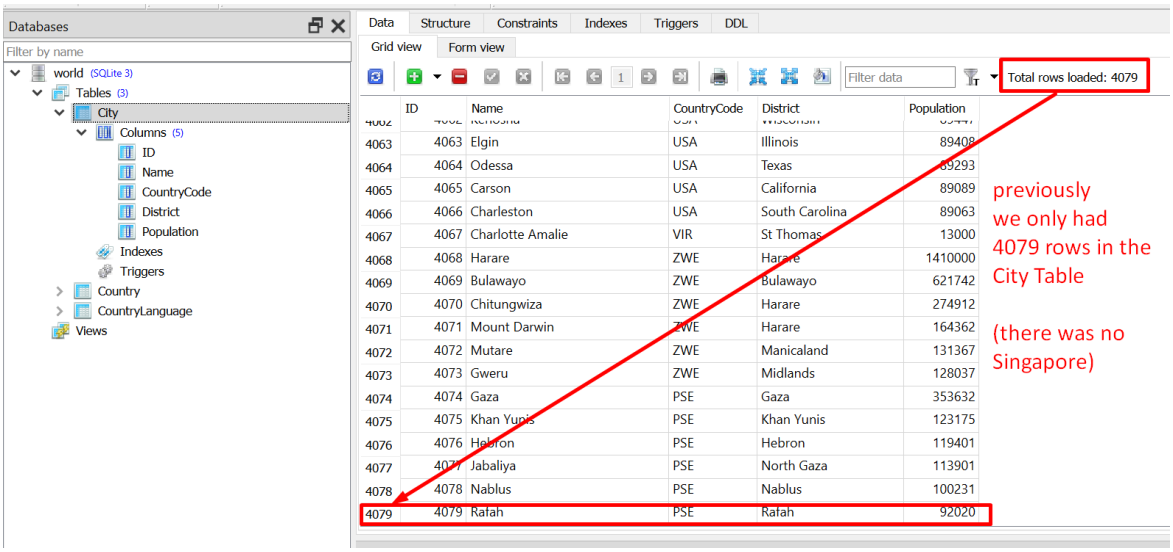


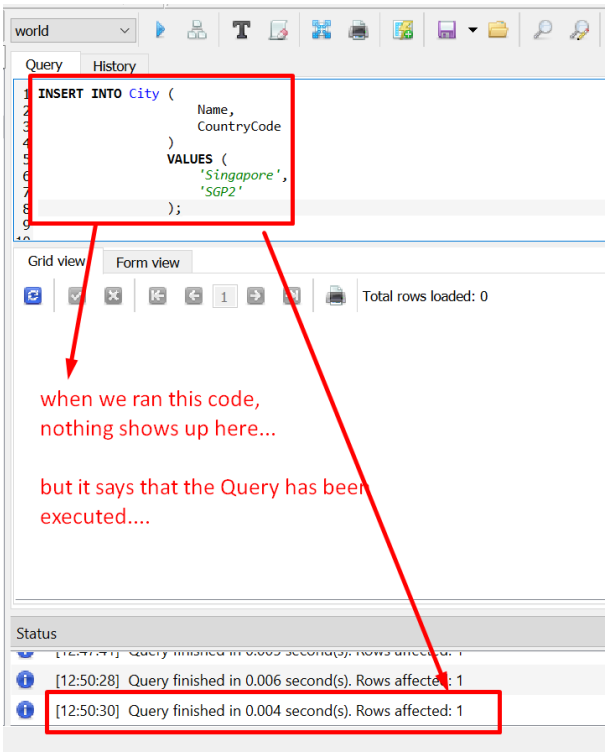

```
SELECT   Name,
         Population
FROM     City;
```

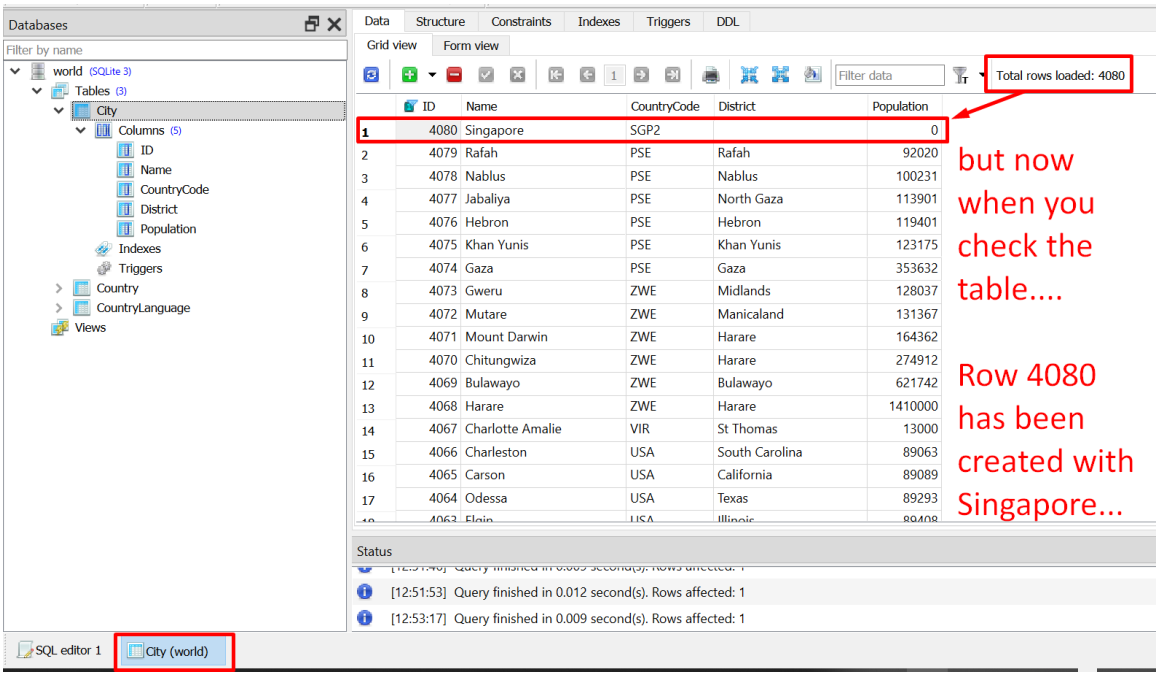



```
SELECT   Name AS Cities,
         Population AS Popn
FROM     City;
```

S. INSERT INTO

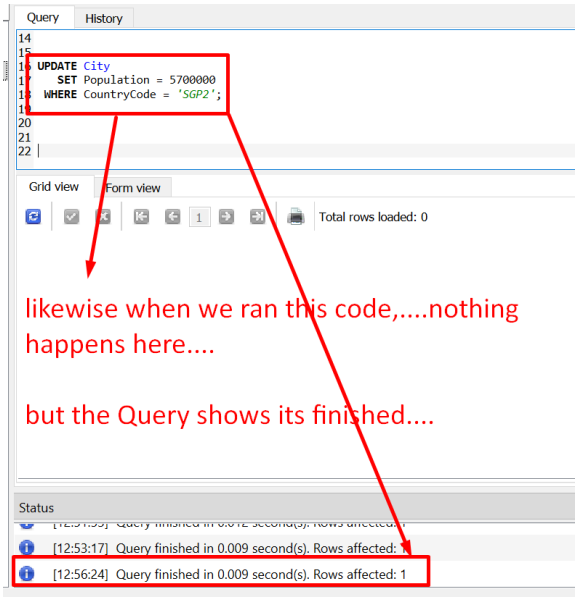


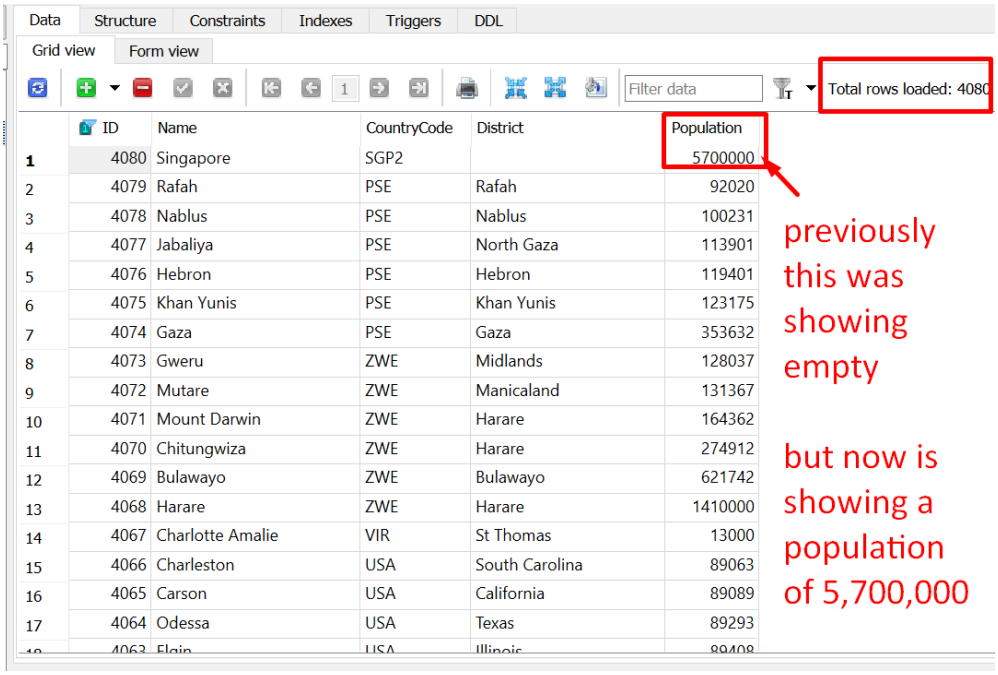





```
INSERT INTO     City (
                Name,
                CountryCode
)

VALUES (
                'Singapore',
                'SGP2'
);
```

T. UPDATE

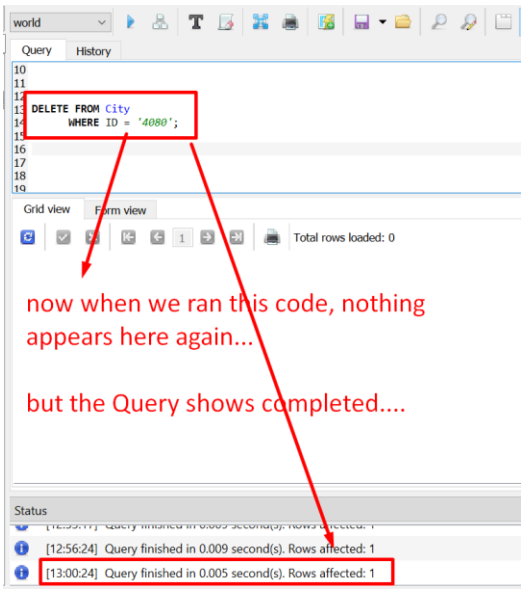


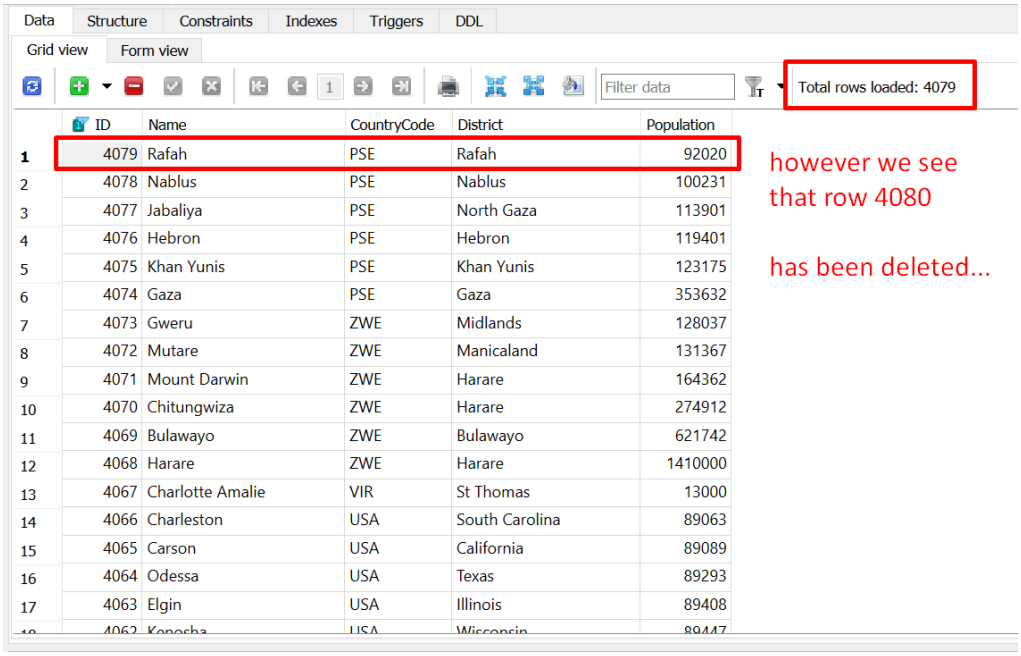


	ID	Name	CountryCode	District	Population
1	4080	Singapore	SGP2		5700000
2	4079	Rafah	PSE	Rafah	92020
3	4078	Nablus	PSE	Nablus	100231
4	4077	Jabaliya	PSE	North Gaza	113901
5	4076	Hebron	PSE	Hebron	119401
6	4075	Khan Yunis	PSE	Khan Yunis	123175
7	4074	Gaza	PSE	Gaza	353632
8	4073	Gweru	ZWE	Midlands	128037
9	4072	Mutare	ZWE	Manicaland	131367
10	4071	Mount Darwin	ZWE	Harare	164362
11	4070	Chitungwiza	ZWE	Harare	274912
12	4069	Bulawayo	ZWE	Bulawayo	621742
13	4068	Harare	ZWE	Harare	1410000
14	4067	Charlotte Amalie	VIR	St Thomas	13000
15	4066	Charleston	USA	South Carolina	89063
16	4065	Carson	USA	California	89089
17	4064	Odessa	USA	Texas	89293

```
UPDATE  City
SET     Population = 5700000
WHERE   CountryCode = 'SGP2';
```

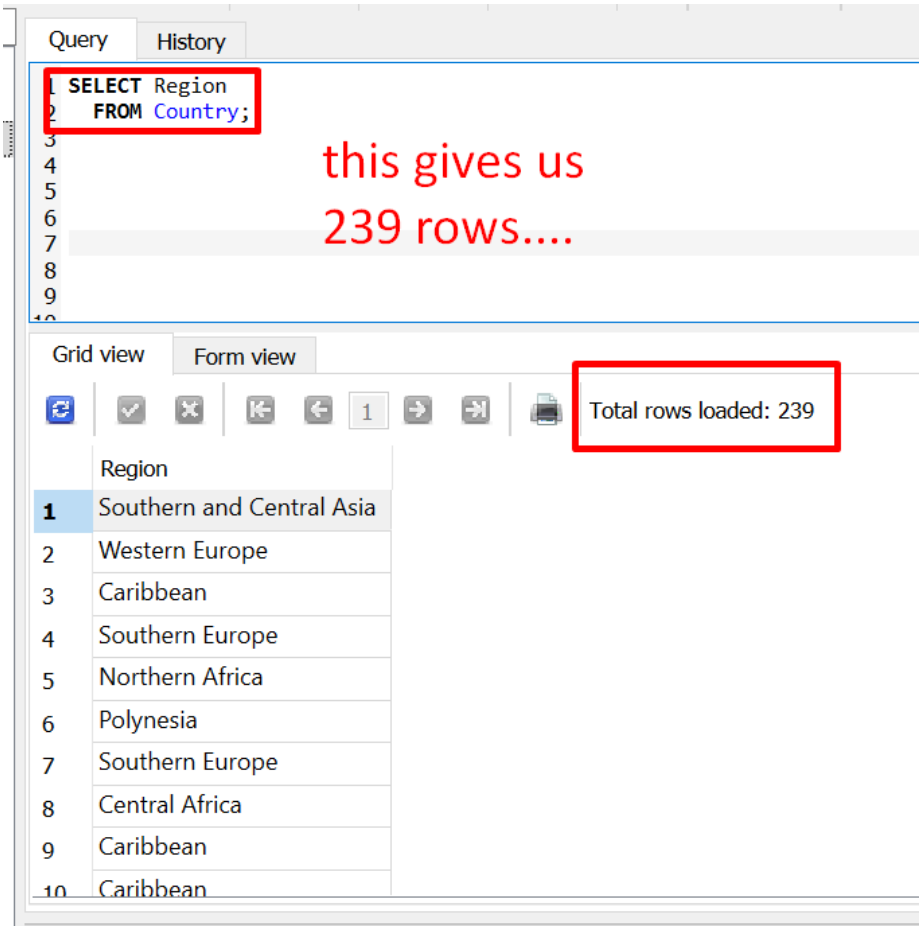
U. DELETE



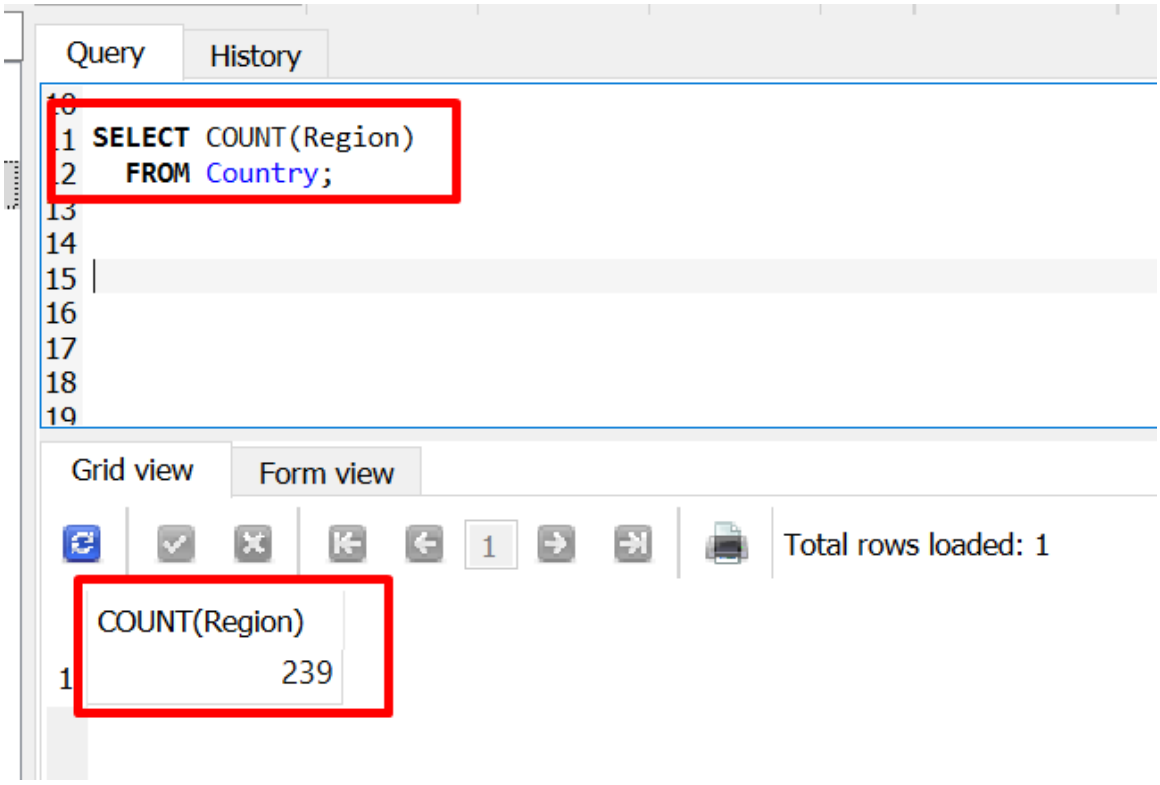


	ID	Name	CountryCode	District	Population
1	4079	Rafah	PSE	Rafah	92020
2	4078	Nablus	PSE	Nablus	100231
3	4077	Jabaliya	PSE	North Gaza	113901
4	4076	Hebron	PSE	Hebron	119401
5	4075	Khan Yunis	PSE	Khan Yunis	123175
6	4074	Gaza	PSE	Gaza	353632
7	4073	Gweru	ZWE	Midlands	128037
8	4072	Mutare	ZWE	Manicaland	131367
9	4071	Mount Darwin	ZWE	Harare	164362
10	4070	Chitungwiza	ZWE	Harare	274912
11	4069	Bulawayo	ZWE	Bulawayo	621742
12	4068	Harare	ZWE	Harare	1410000
13	4067	Charlotte Amalie	VIR	St Thomas	13000
14	4066	Charleston	USA	South Carolina	89063
15	4065	Carson	USA	California	89089
16	4064	Odessa	USA	Texas	89293
17	4063	Elgin	USA	Illinois	89408

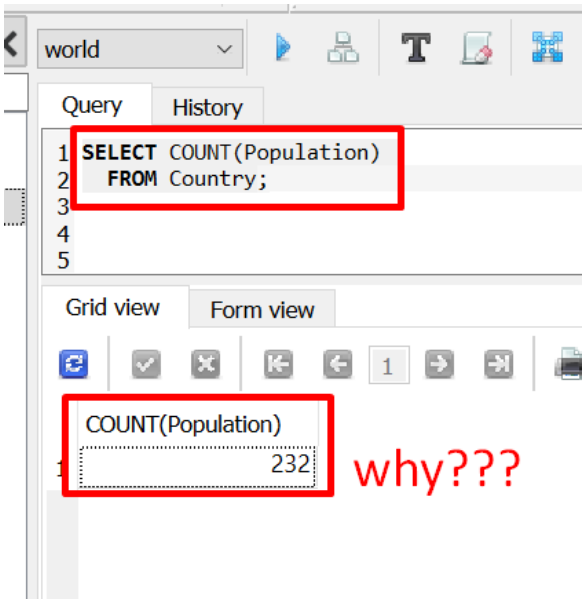
```
DELETE   FROM City
WHERE    ID = '4080';
```

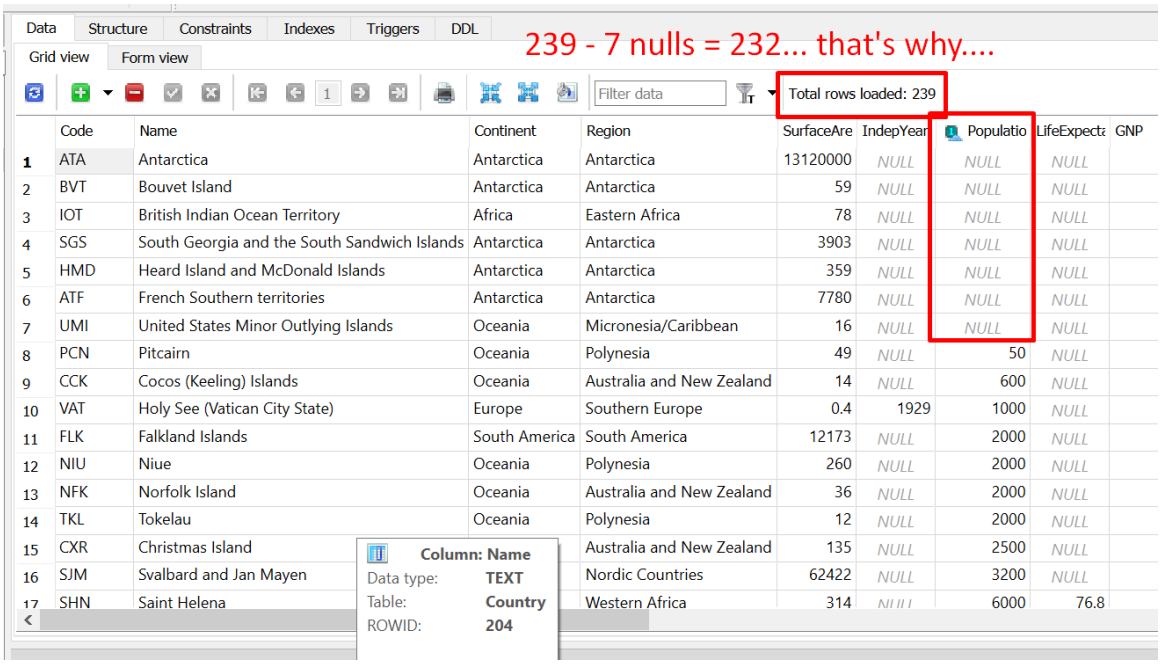


1. COUNT




```
SELECT   COUNT(Region)
FROM     Country;
```



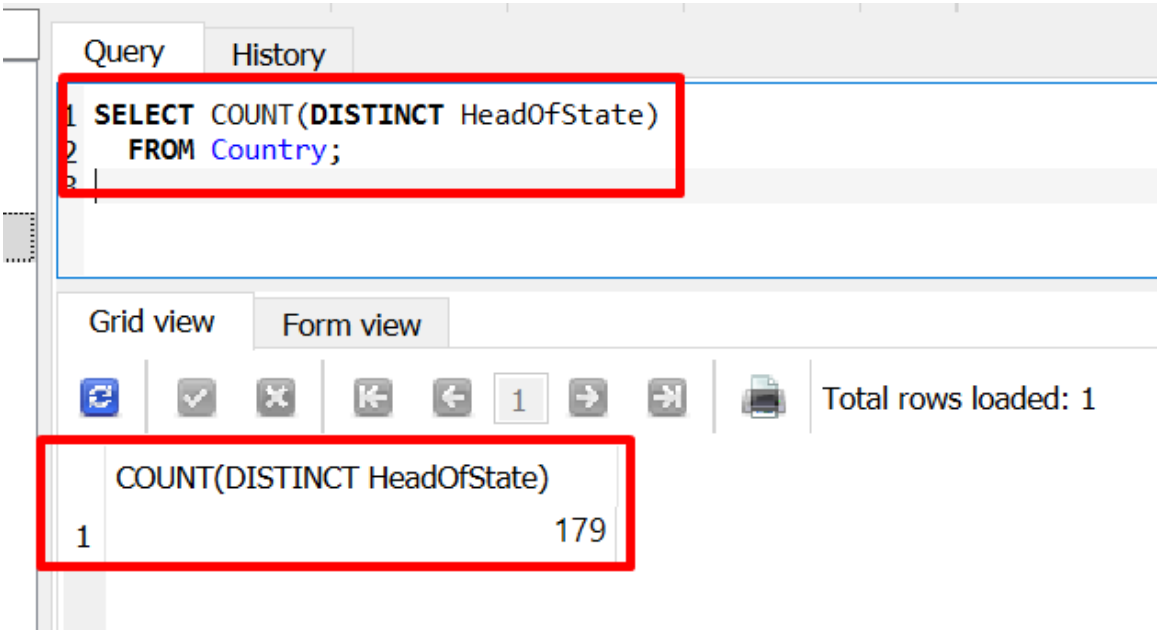


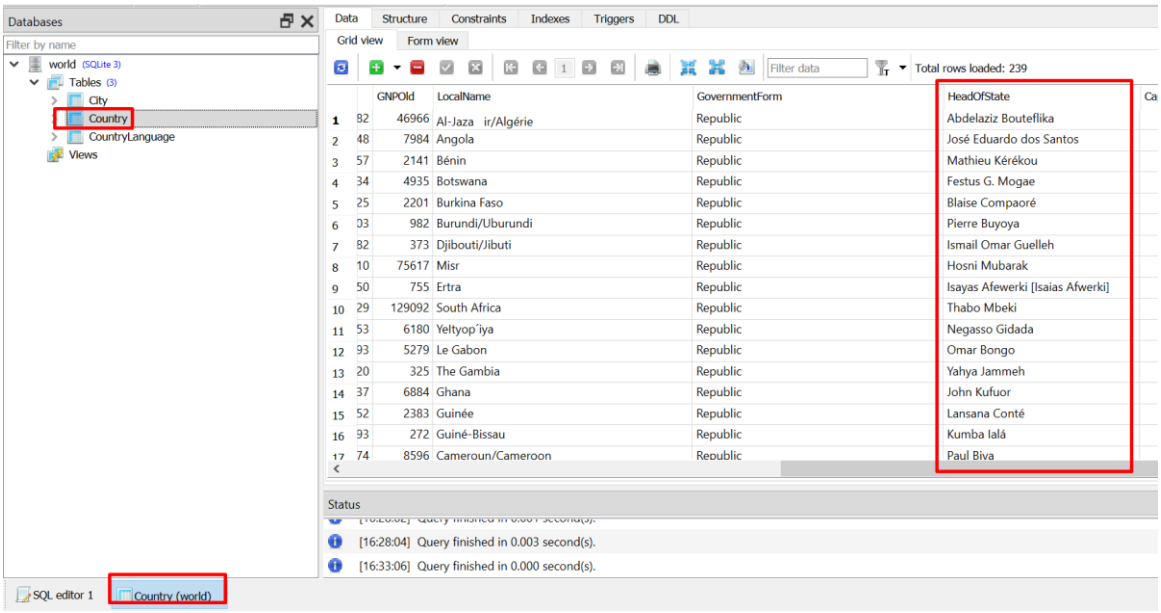
	Code	Name	Continent	Region	SurfaceAre	IndepYear	Populatio	LifeExpecta	GNP
1	ATA	Antarctica	Antarctica	Antarctica	13120000	NULL	NULL	NULL	
2	BVT	Bouvet Island	Antarctica	Antarctica	59	NULL	NULL	NULL	
3	IOT	British Indian Ocean Territory	Africa	Eastern Africa	78	NULL	NULL	NULL	
4	SGS	South Georgia and the South Sandwich Islands	Antarctica	Antarctica	3903	NULL	NULL	NULL	
5	HMD	Heard Island and McDonald Islands	Antarctica	Antarctica	359	NULL	NULL	NULL	
6	ATF	French Southern territories	Antarctica	Antarctica	7780	NULL	NULL	NULL	
7	UMI	United States Minor Outlying Islands	Oceania	Micronesia/Caribbean	16	NULL	NULL	NULL	
8	PCN	Pitcairn	Oceania	Polynesia	49	NULL	50	NULL	
9	CCK	Cocos (Keeling) Islands	Oceania	Australia and New Zealand	14	NULL	600	NULL	
10	VAT	Holy See (Vatican City State)	Europe	Southern Europe	0.4	1929	1000	NULL	
11	FLK	Falkland Islands	South America	South America	12173	NULL	2000	NULL	
12	NIU	Niue	Oceania	Polynesia	260	NULL	2000	NULL	
13	NFK	Norfolk Island	Oceania	Australia and New Zealand	36	NULL	2000	NULL	
14	TKL	Tokelau	Oceania	Polynesia	12	NULL	2000	NULL	
15	CXR	Christmas Island		Australia and New Zealand	135	NULL	2500	NULL	
16	SJM	Svalbard and Jan Mayen		Nordic Countries	62422	NULL	3200	NULL	
17	SHN	Saint Helena		Western Africa	314	NULL	6000	76.8	

https://www.alvinang.sg/s/world.db

a) ACTIVITY QUESTION: AGGREGATE FUNCTIONS

- Count the Number of Distinct Head Of State





b) ACTIVITY ANSWER: AGGREGATE FUNCTIONS

```
SELECT   COUNT(DISTINCT HeadOfState)
FROM     Country;
```

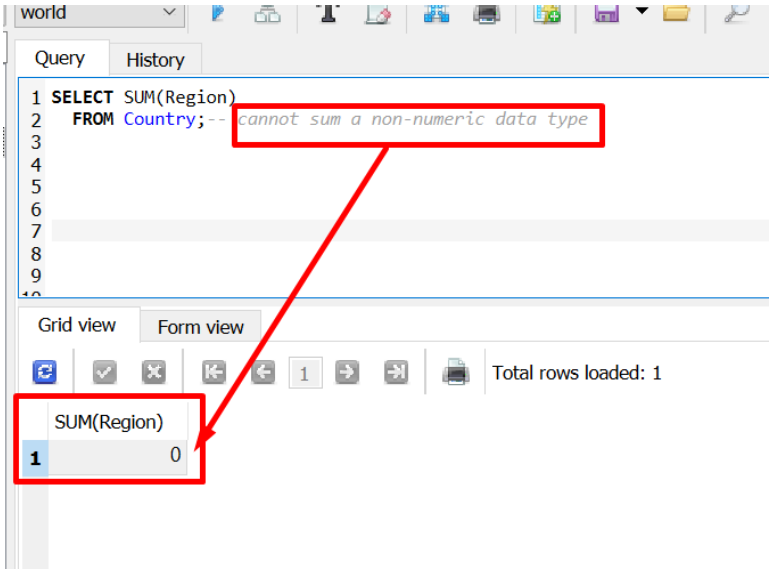
c) ACTIVITY QUESTION: AGGREGATE FUNCTIONS

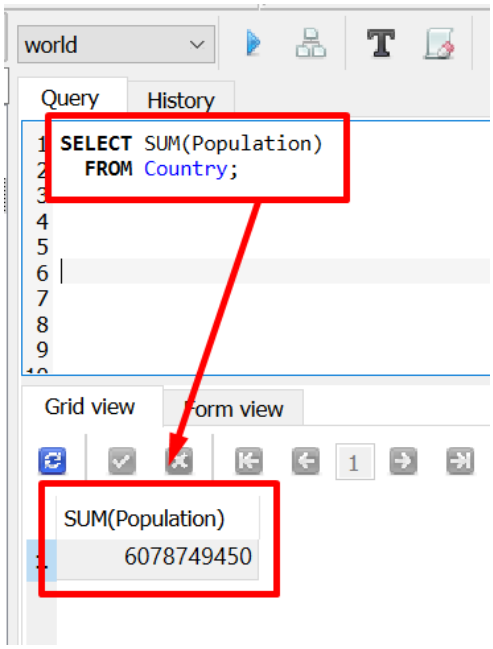
- Count the Number of Country where Population > 10,000,000 in Europe

d) ACTIVITY ANSWER: AGGREGATE FUNCTIONS

```
SELECT   COUNT(Name) AS [Country Count:]
FROM     Country
WHERE    (Population > 10000000 AND Continent = 'Europe');
```

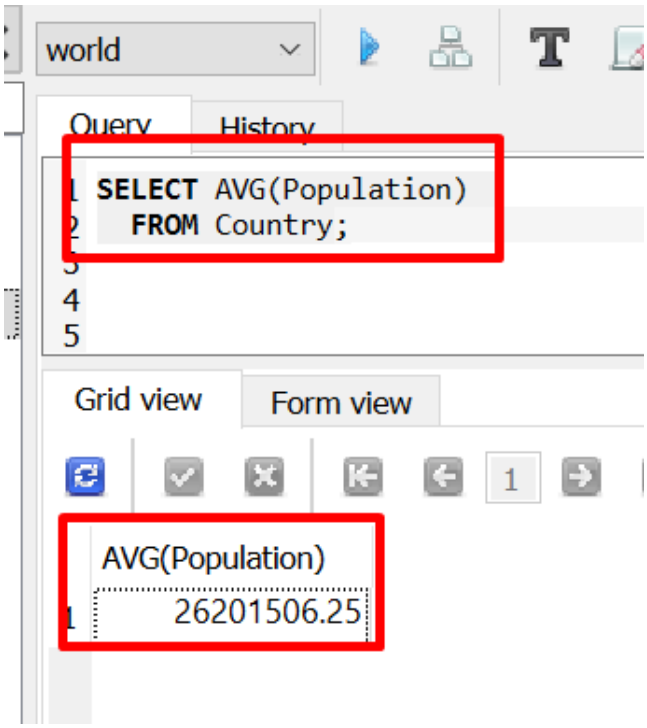
2. SUM

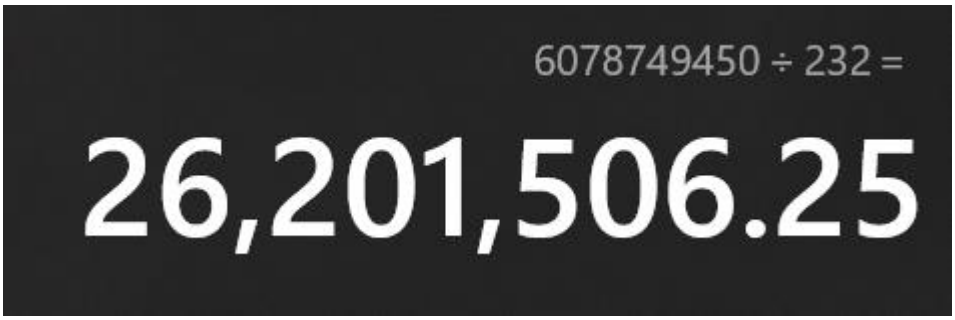





```
SELECT   SUM(Population)
FROM     Country;
```

3. AVERAGE

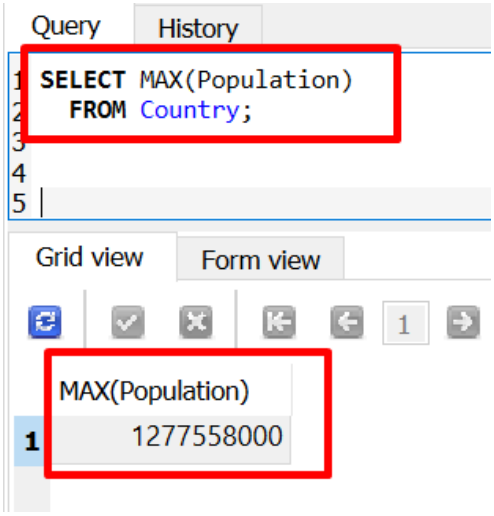




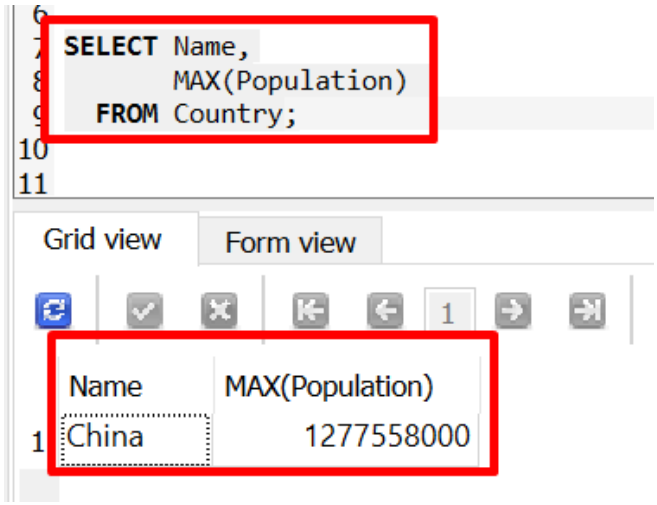
SELECT AVG(Population)

FROM Country;

4. MAX

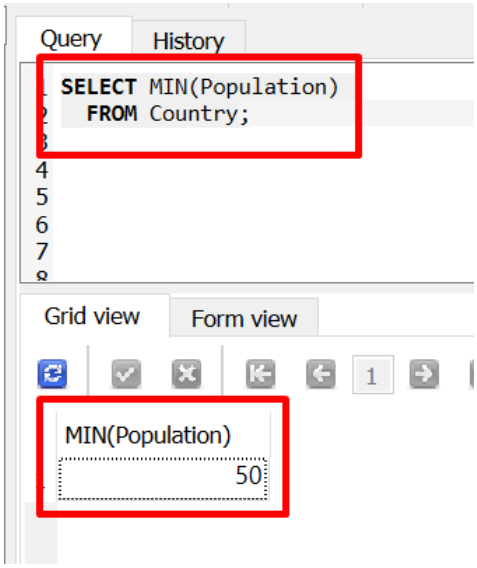



```
SELECT   MAX(Population)
FROM     Country;
```

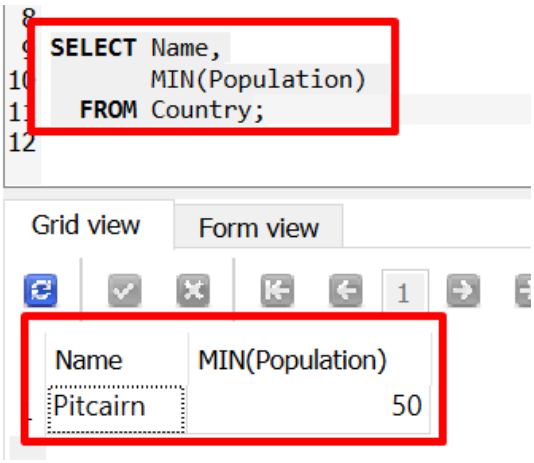



```
SELECT   Name,
         MAX(Population)
FROM     Country;
```

5. MIN

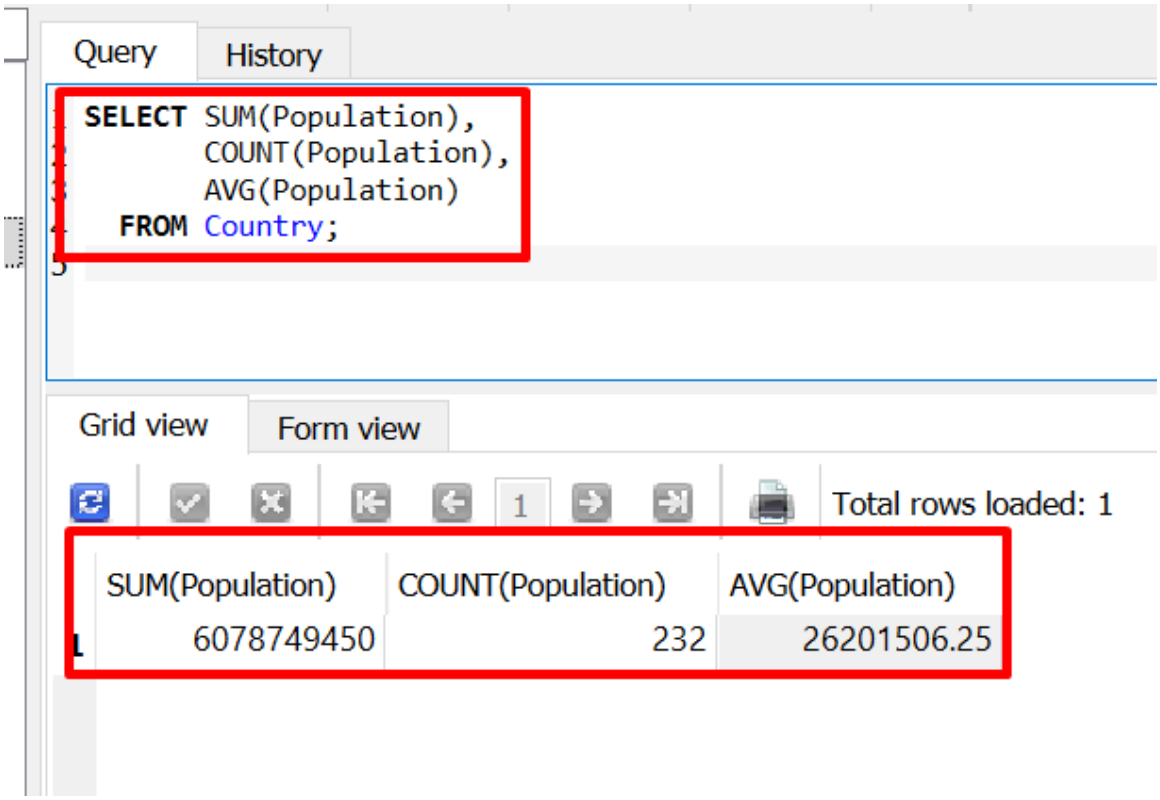



```
SELECT   MIN(Population)
FROM     Country;
```

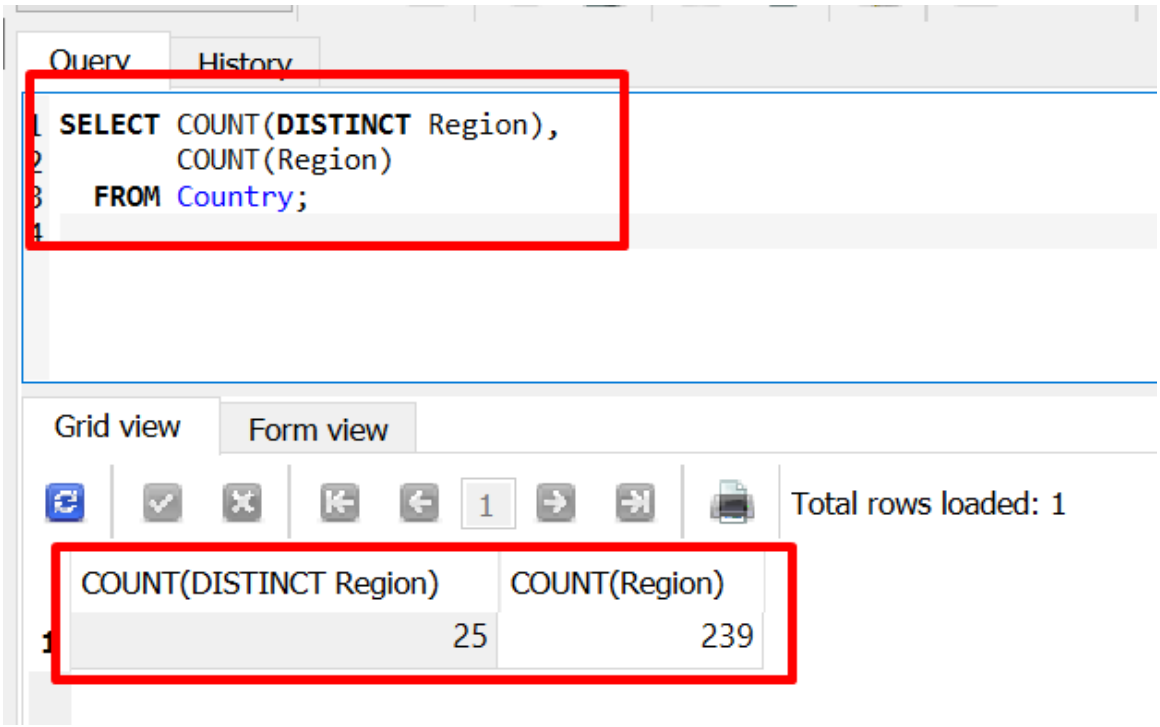



```
SELECT   Name,
         MIN(Population)
FROM     Country;
```

6. COMBINATIONS



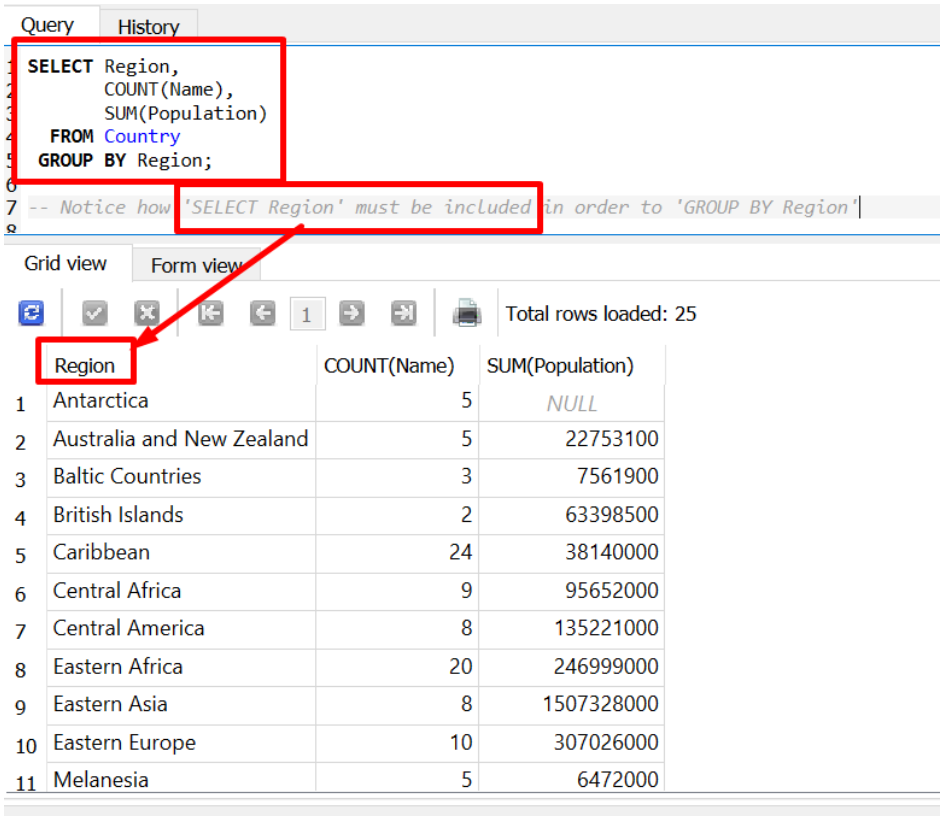

```
SELECT   SUM(Population),
         COUNT(Population),
         AVG(Population)
FROM     Country;
```




```
SELECT   COUNT(DISTINCT Region),
         COUNT(Region)
FROM     Country;
```

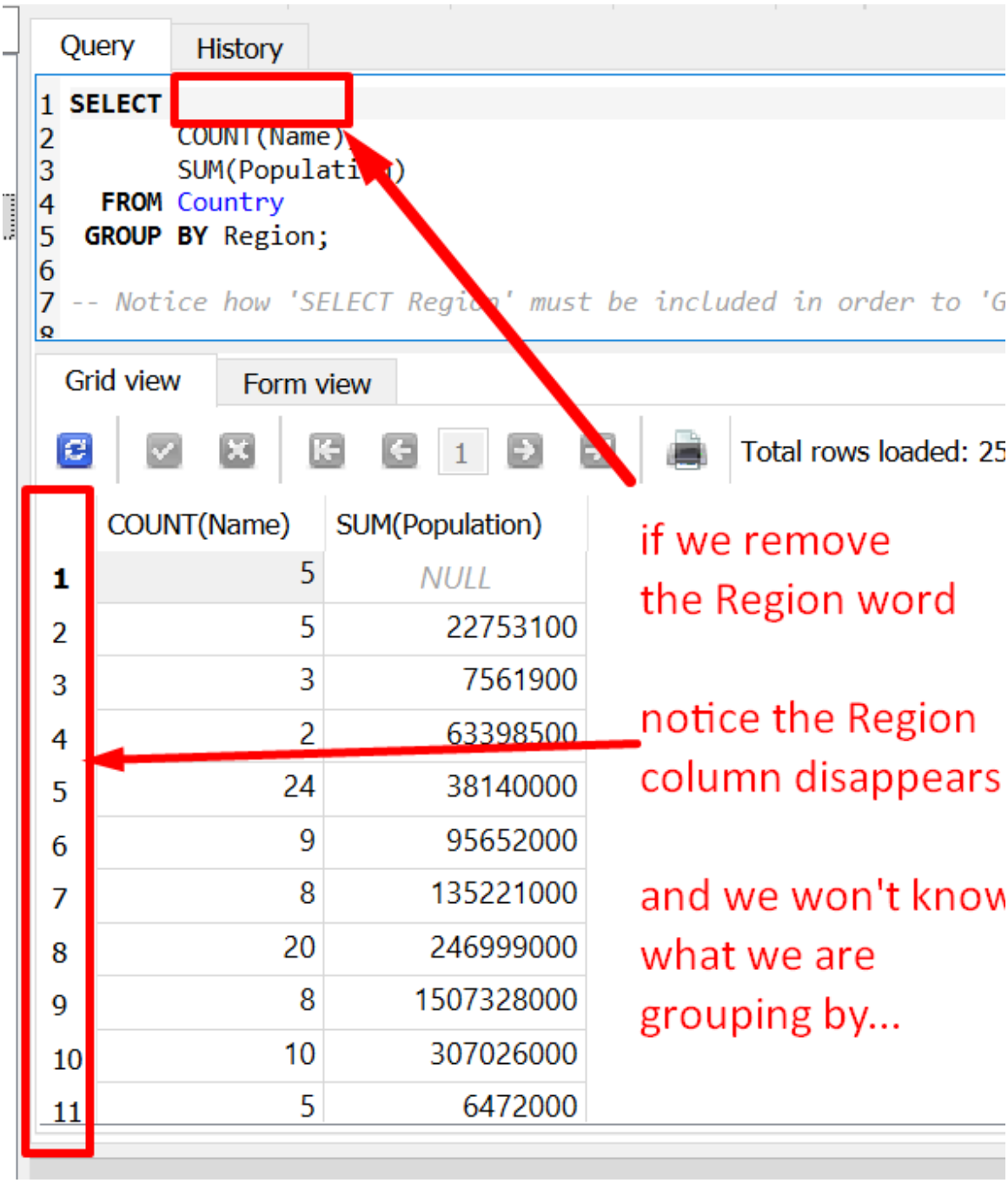
W. GROUP BY

https://www.alvinang.sg/s/world.db



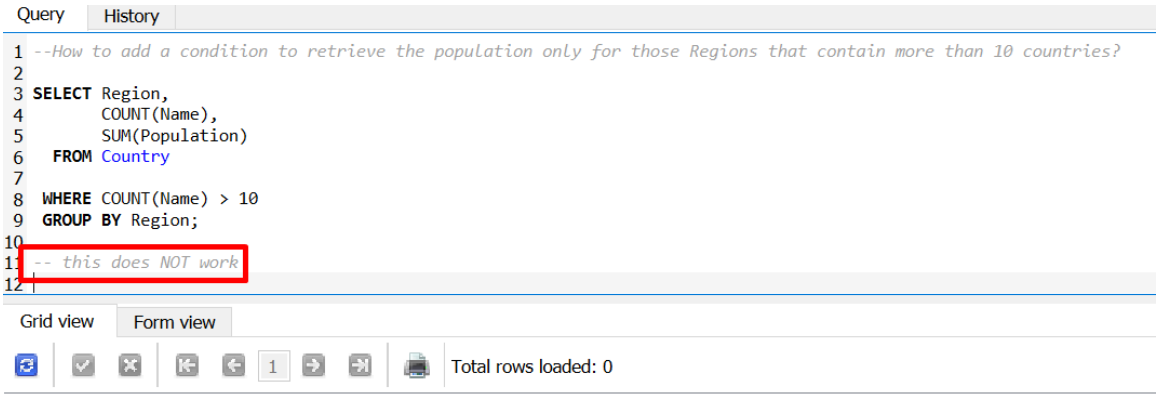
	Region	COUNT(Name)	SUM(Population)
1	Antarctica	5	NULL
2	Australia and New Zealand	5	22753100
3	Baltic Countries	3	7561900
4	British Islands	2	63398500
5	Caribbean	24	38140000
6	Central Africa	9	95652000
7	Central America	8	135221000
8	Eastern Africa	20	246999000
9	Eastern Asia	8	1507328000
10	Eastern Europe	10	307026000
11	Melanesia	5	6472000

```
SELECT      Region,
            COUNT   (Name),
            SUM     (Population)
FROM        Country
GROUP BY    Region;

-- Notice how 'SELECT Region' must be included in order to 'GROUP BY Region'
```

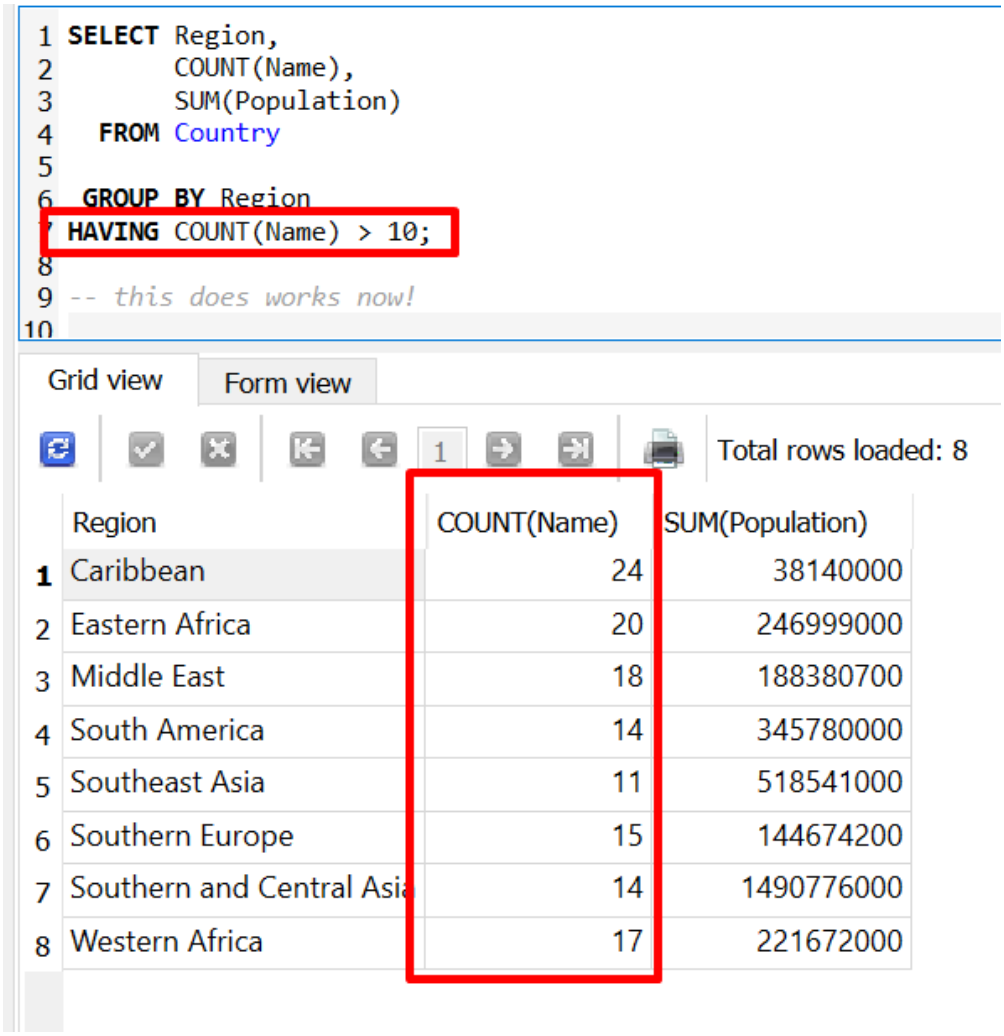


1. HAVING

--How to add a condition to retrieve the population only for those Regions that contain more than 10 countries?



you can see that it gives a blank result...

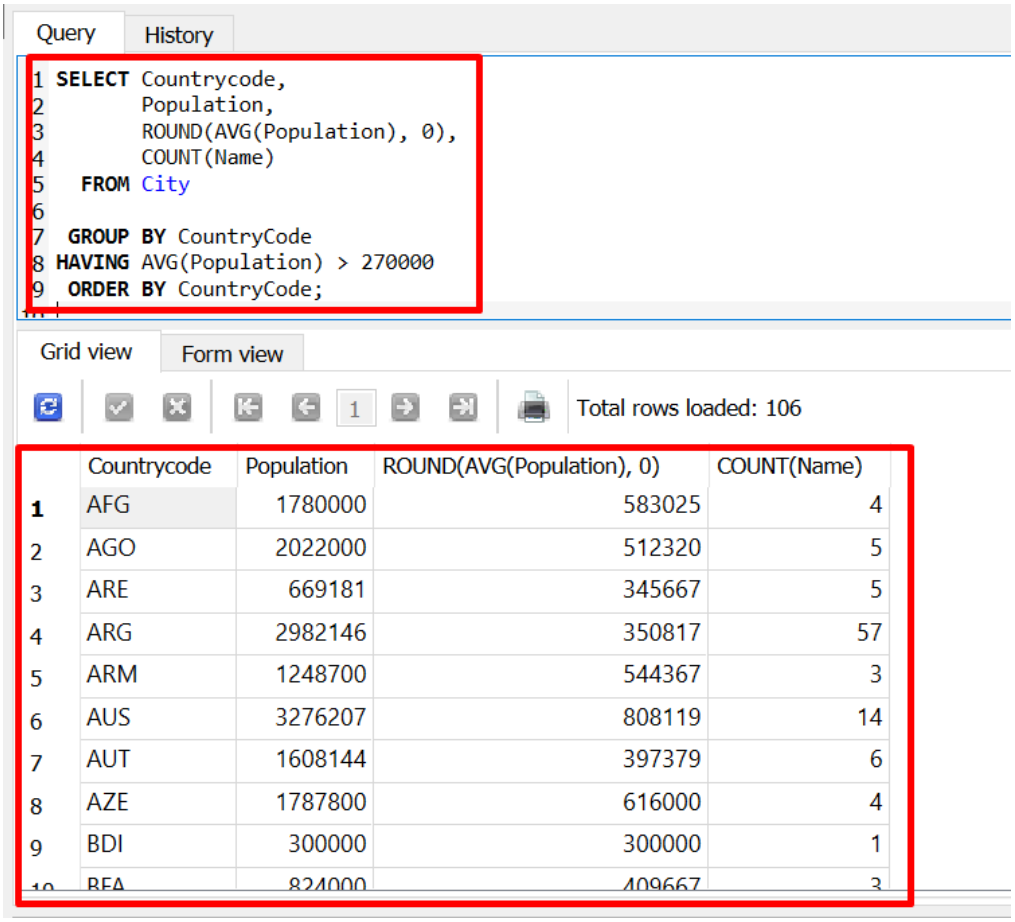



```
SELECT      Region,
            COUNT(Name),
            SUM(Population)
FROM        Country

GROUP BY    Region
HAVING COUNT(Name) > 10;

-- this does work now!
```

https://www.alvinang.sg/s/world.db

a) ACTIVITY QUESTION: GROUPBY AND HAVING

- Retrieve the Average Population (from the City Table),
- Group by the Country code having more than 270,000 average population

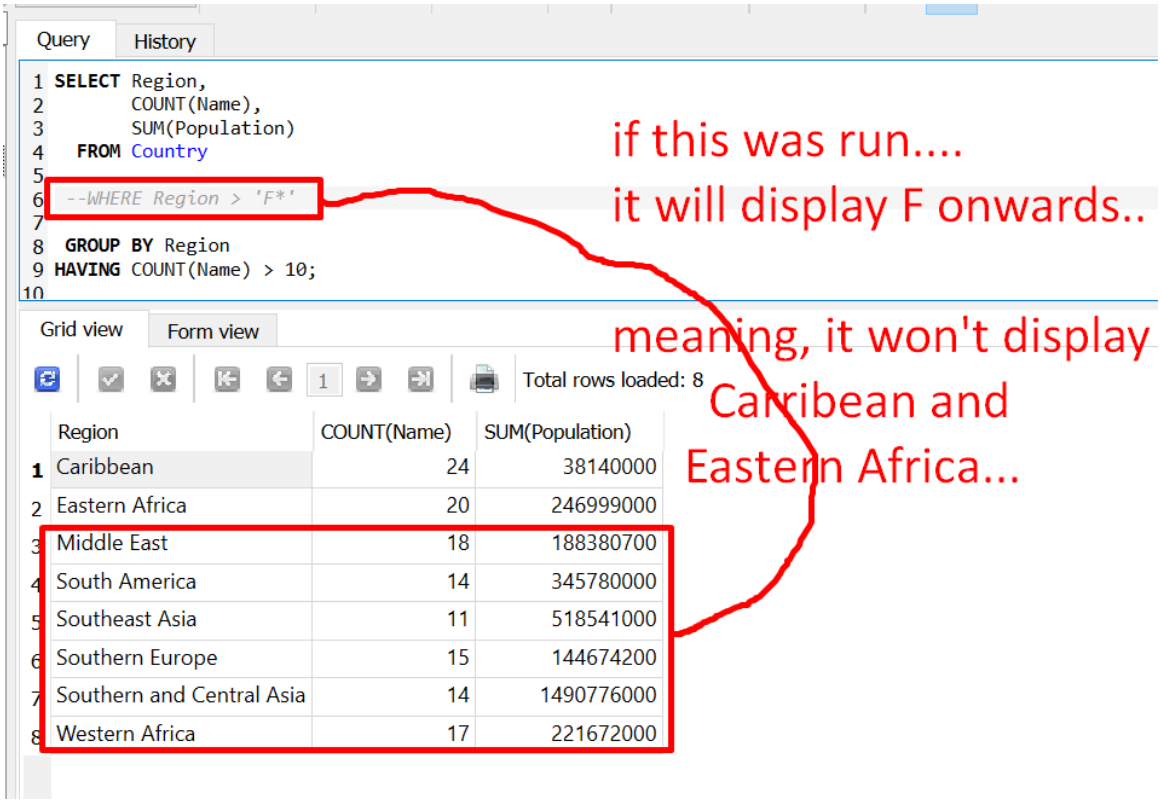


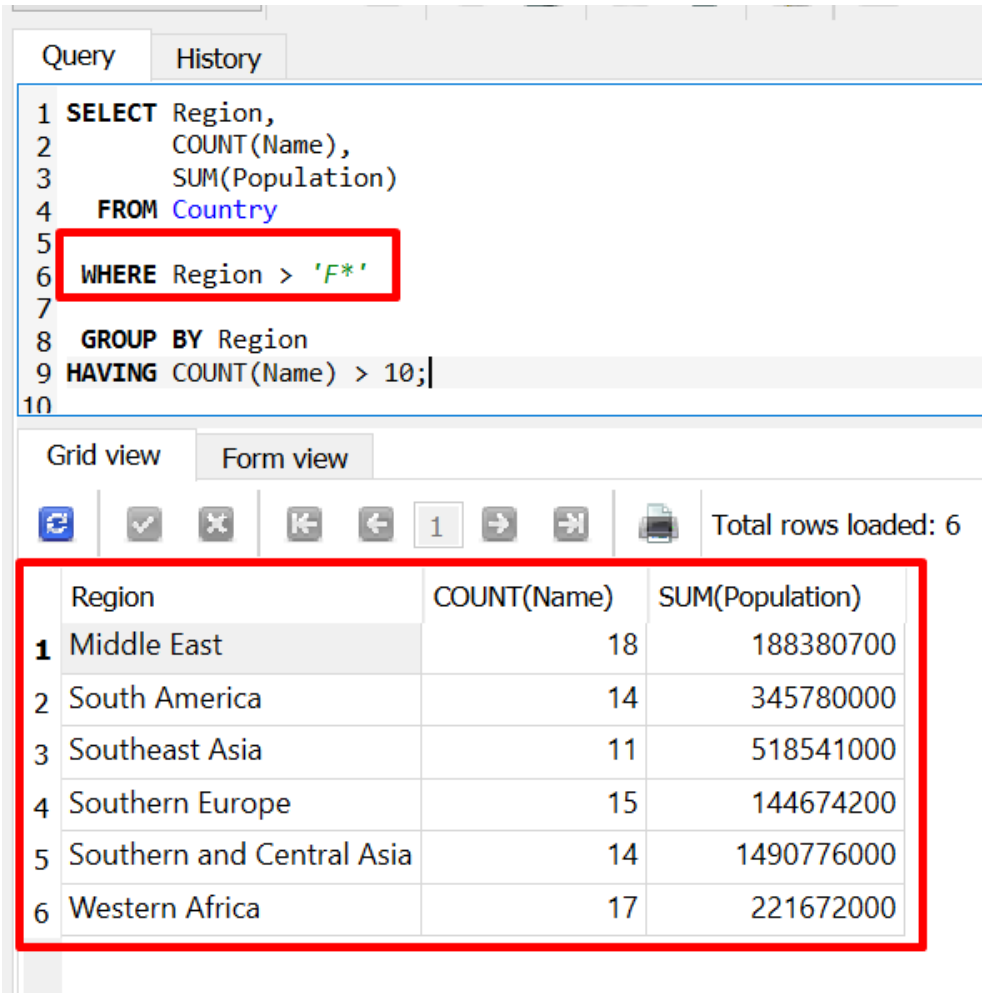
	Countrycode	Population	ROUND(AVG(Population), 0)	COUNT(Name)
1	AFG	1780000	583025	4
2	AGO	2022000	512320	5
3	ARE	669181	345667	5
4	ARG	2982146	350817	57
5	ARM	1248700	544367	3
6	AUS	3276207	808119	14
7	AUT	1608144	397379	6
8	AZE	1787800	616000	4
9	BDI	300000	300000	1
10	BEA	824000	409667	3

b) ACTIVITY ANSWER: GROUPBY AND HAVING

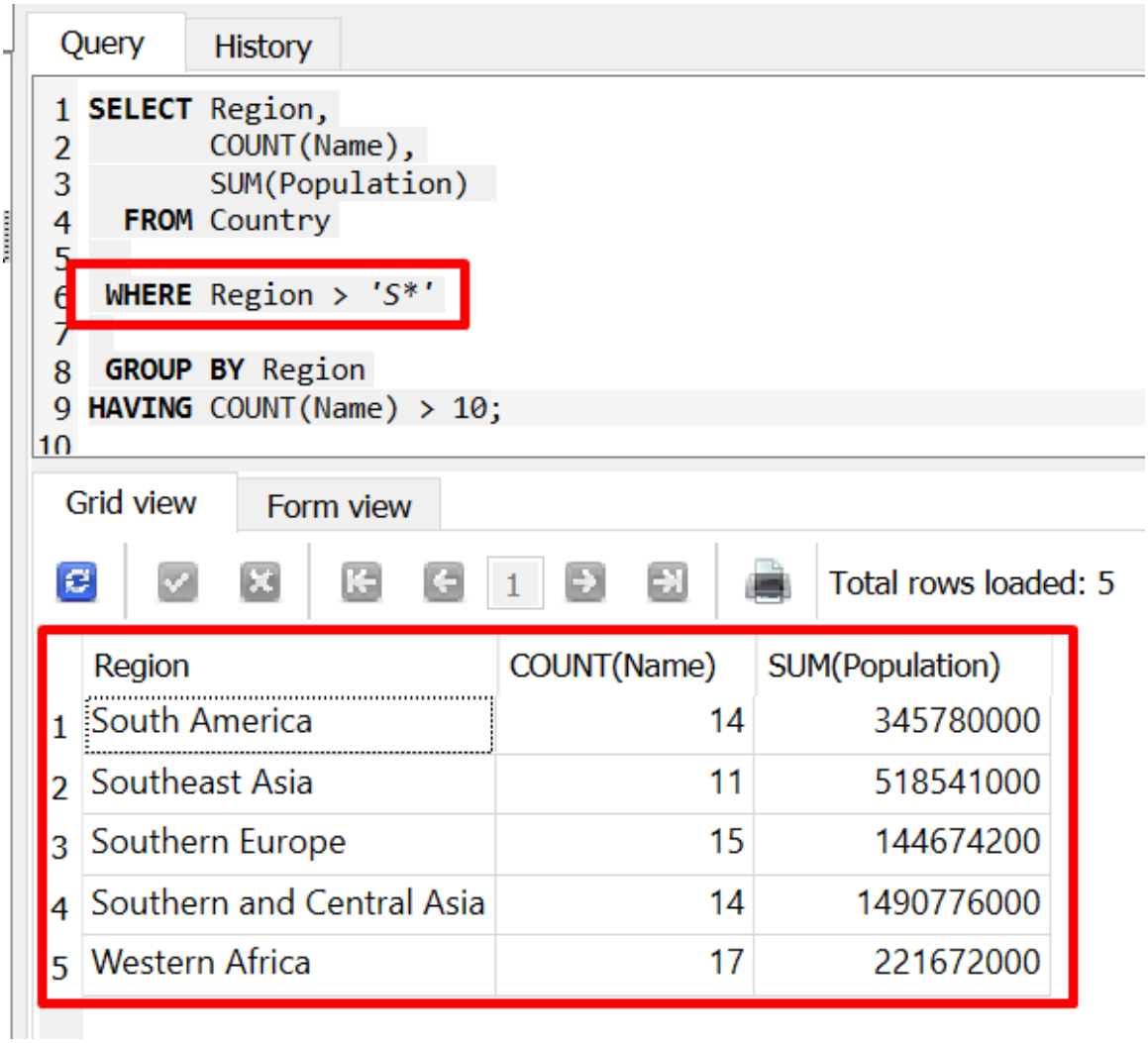
```
SELECT      Countrycode,
            Population,
ROUND       (AVG(Population), 0),
COUNT       (Name)

FROM City
GROUP BY    CountryCode
HAVING AVG  (Population) > 270000
ORDER BY    CountryCode;
```

2. WHERE






```
SELECT      Region,
            COUNT(Name),
            SUM(Population)
FROM        Country

WHERE       Region > 'F*'

GROUP BY    Region
HAVING COUNT(Name) > 10;
```




```
SELECT    Region,
          COUNT(Name),
          SUM(Population)
FROM      Country

WHERE     Region > 'S*'

GROUP BY  Region
HAVING COUNT(Name) > 10;
```

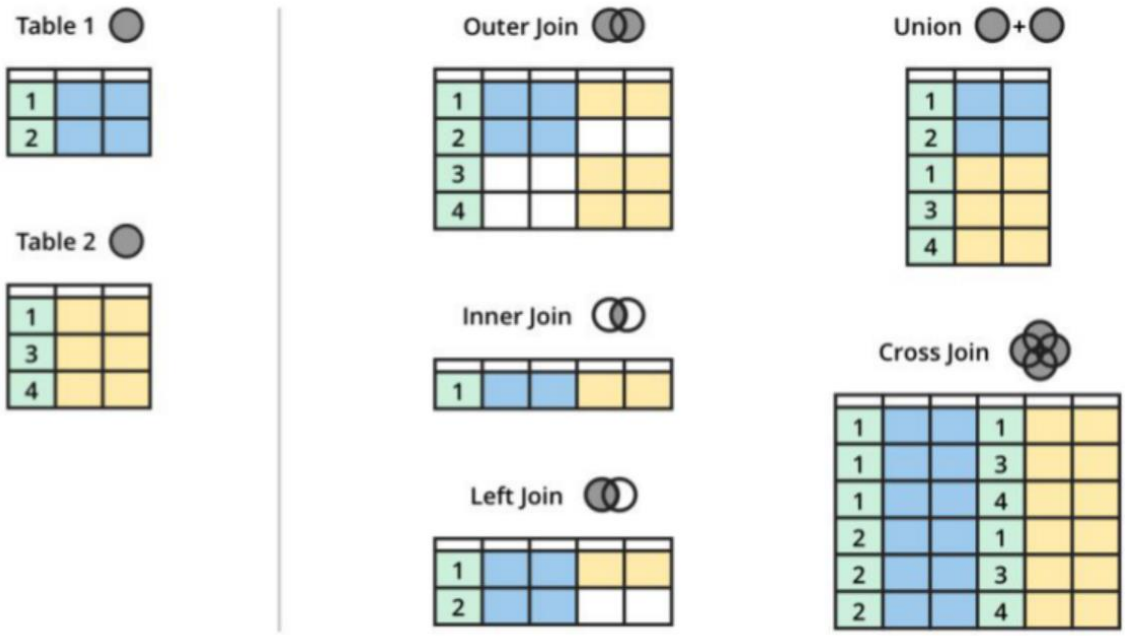


TABLE 1

ID	Colour	Gender
1	Red	F
2	Blue	M

TABLE 2

ID	Colour	Item
1	Red	Dress
3	Blue	Jeans
4	Green	Shoes

INNER JOIN

ID	Colour	Gender	Colour2	Item
1	Red	F	Red	Dress

OUTER JOIN

ID	Colour	Gender	Colour2	Item
1	Red	F	Red	Dress
2	Blue	M		
3			Blue	Jeans
4			Green	Shoes

LEFT JOIN

ID	Colour	Gender	Colour2	Item
1	Red	F	Red	Dress
2	Blue	M		

RIGHT JOIN

ID	Colour	Gender	Colour2	Item
1	Red	F	Red	Dress
3			Blue	Jeans
4			Green	Shoes

CROSS JOIN

ID	Colour	Gender	*ID2*	Colour2	Item
1	Red	F	*1*	Red	Dress
1	Red	F	*3*	Blue	Jeans
1	Red	F	*4*	Green	Shoes
2	Blue	M	*1*	Red	Dress
2	Blue	M	*3*	Blue	Jeans
2	Blue	M	*4*	Green	Shoes

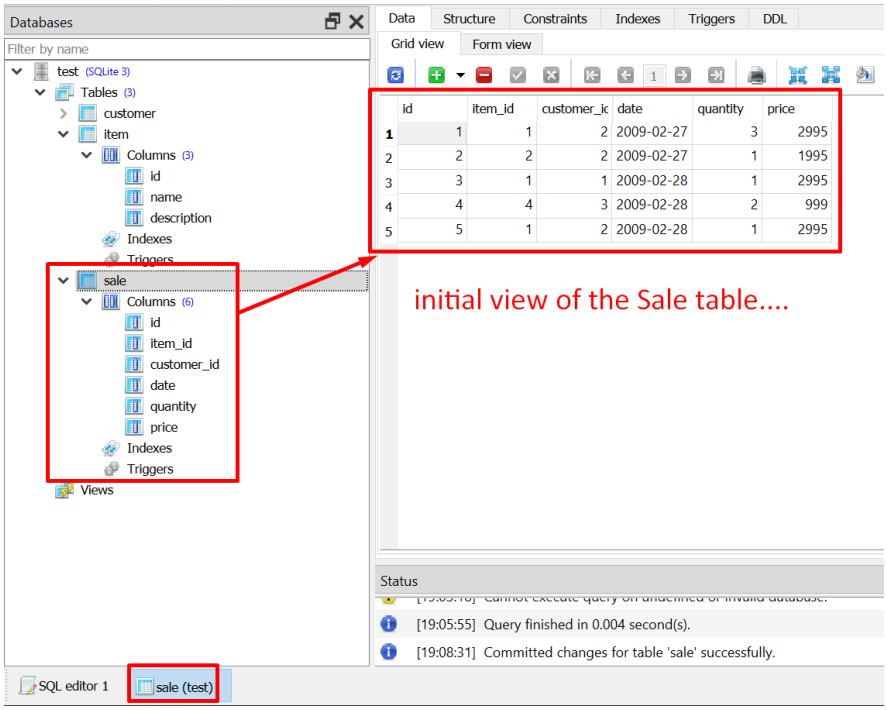
UNION

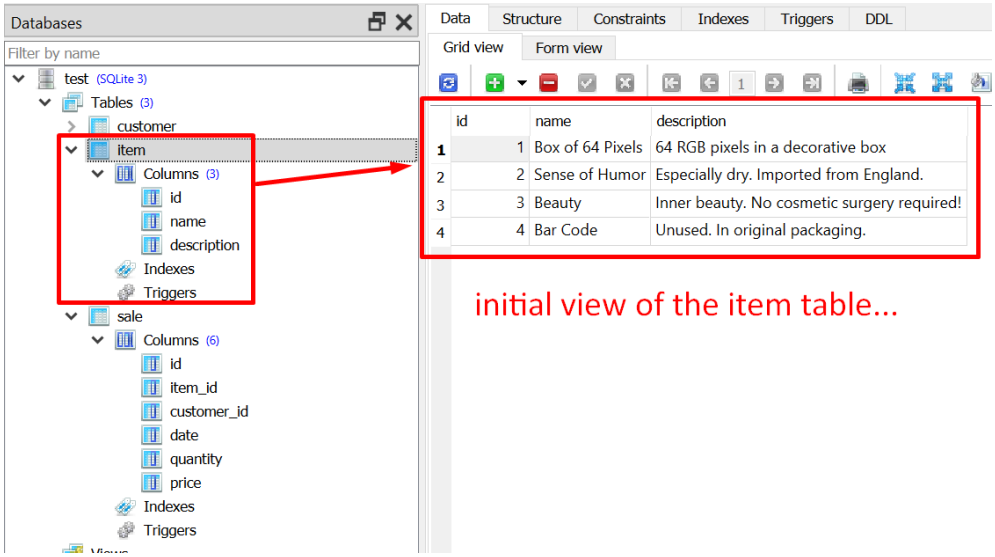
ID	Colour	Column2
1	Red	F
2	Blue	M
1	Red	Dress
3	Blue	Jeans
4	Green	Shoes

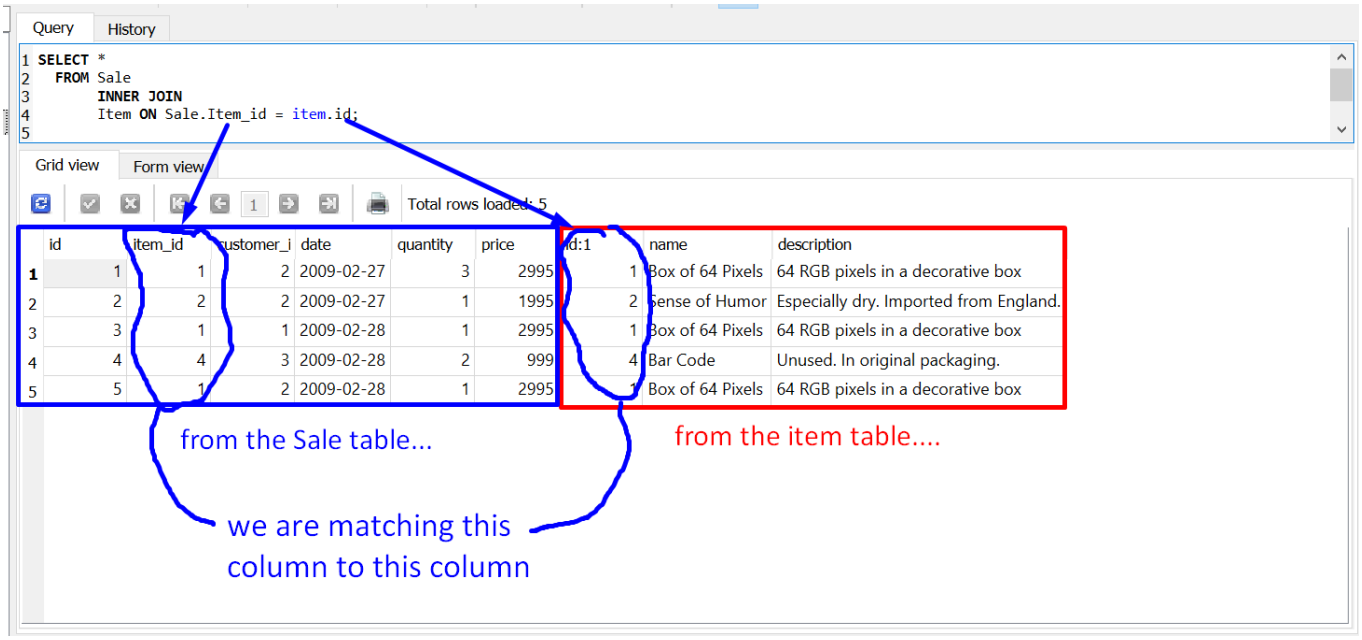
1. INNER JOIN

a) Test.DB

File can be found here: https://www.alvinang.sg/s/test.db







We see that the column that is inner joined is 1-2-1-4-1

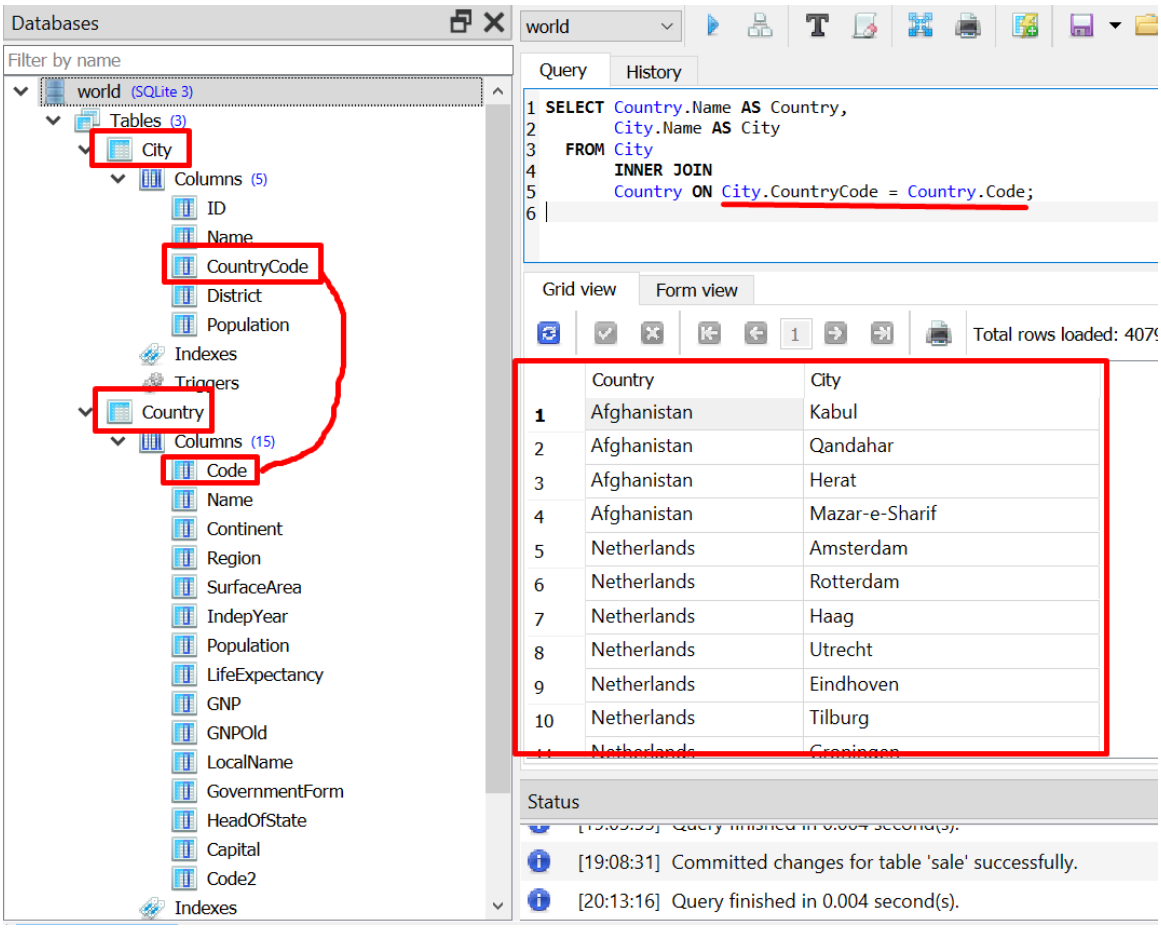
SELECT *
FROM Sale
INNER JOIN Item
ON Sale.Item_id = item.id;

b) World.DB

https://www.alvinang.sg/s/world.db

(1) ACTIVITY QUESTION: INNER JOIN

- Inner Join Country and City Tables.
- Retrieve the Country Name (as Country) and City Name (as City)



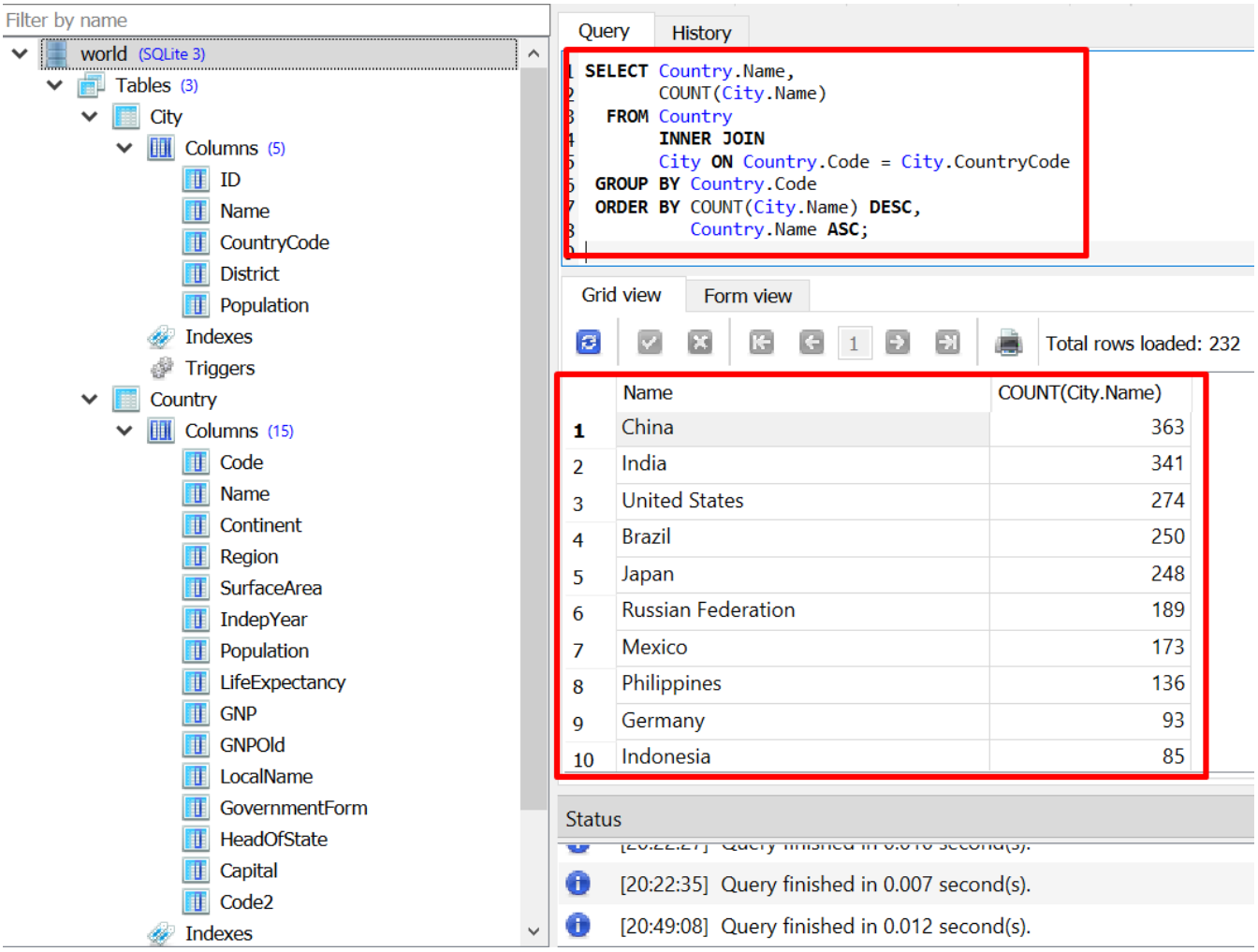
(2) ACTIVITY ANSWER: INNER JOIN

```
SELECT   Country.Name AS Country,
         City.Name AS City
FROM     City

INNER JOIN
Country ON City.CountryCode = Country.Code;
```

(3) ACTIVITY QUESTION: INNER JOIN

- Retrieve the Country Name and Number of Cities for each country, group by Country Code.

- Order by the Number of Cities in Descending Order, followed by Country Name.



(4) ACTIVITY ANSWER: INNER JOIN

```
SELECT      Country.Name,     COUNT(City.Name)
FROM        Country
INNER JOIN
            City ON Country.Code = City.CountryCode

GROUP BY    Country.Code
ORDER BY    COUNT(City.Name) DESC,  Country.Name ASC;
```

Dr. Alvin Ang earned his Ph.D., Masters and Bachelor degrees from NTU, Singapore. He was previously a Professor, Scientist and Financial Consultant. Currently, he owns multiple startups and is a Personal/Business Advisor.

More about him at www.AlvinAng.sg