**mysql> USE WORLD;**

**Database changed**

**mysql> SHOW TABLES;**

+-----------------+

| Tables\_in\_world |

+-----------------+

| city |

| country |

| countrylanguage |

+-----------------+

3 rows in set (0.00 sec)

**mysql> DESC CITY;**

+-------------+----------+------+-----+---------+----------------+

| Field | Type | Null | Key | Default | Extra |

+-------------+----------+------+-----+---------+----------------+

| ID | int | NO | PRI | NULL | auto\_increment |

| Name | char(35) | NO | | | |

| CountryCode | char(3) | NO | MUL | | |

| District | char(20) | NO | MUL | | |

| Population | int | NO | | 0 | |

+-------------+----------+------+-----+---------+----------------+

5 rows in set (0.00 sec)

**mysql> DESC COUNTRYLANGUAGE;**

+-------------+---------------+------+-----+---------+-------+

| Field | Type | Null | Key | Default | Extra |

+-------------+---------------+------+-----+---------+-------+

| CountryCode | char(3) | NO | PRI | | |

| Language | char(30) | NO | PRI | | |

| IsOfficial | enum('T','F') | NO | | F | |

| Percentage | float(4,1) | NO | | 0.0 | |

+-------------+---------------+------+-----+---------+-------+

4 rows in set (0.00 sec)

**BASIC SUBQUERIES**

**SUBQUERIES IN WHERE CLAUSE**

**mysql> SELECT CODE, NAME, REGION, CONTINENT FROM COUNTRY WHERE CONTINENT = (SELECT CONTINENT FROM COUNTRY WHERE CODE = 'IND') LIMIT 10;**

+------+----------------------+---------------------------+-----------+

| CODE | NAME | REGION | CONTINENT |

+------+----------------------+---------------------------+-----------+

| AFG | Afghanistan | Southern and Central Asia | Asia |

| ARE | United Arab Emirates | Middle East | Asia |

| ARM | Armenia | Middle East | Asia |

| AZE | Azerbaijan | Middle East | Asia |

| BGD | Bangladesh | Southern and Central Asia | Asia |

| BHR | Bahrain | Middle East | Asia |

| BRN | Brunei | Southeast Asia | Asia |

| BTN | Bhutan | Southern and Central Asia | Asia |

| CHN | China | Eastern Asia | Asia |

| CYP | Cyprus | Middle East | Asia |

+------+----------------------+---------------------------+-----------+

10 rows in set (0.00 sec)

**SUBQUERIES USING SINGLE ROW OPERATORS (=, <, >, <>, <=, >=)**

**mysql> SELECT COUNTRYCODE,LANGUAGE,PERCENTAGE FROM COUNTRYLANGUAGE WHERE PERCENTAGE > (SELECT AVG(PERCENTAGE) FROM COUNTRYLANGUAGE) LIMIT 5;**

+-------------+------------+------------+

| COUNTRYCODE | LANGUAGE | PERCENTAGE |

+-------------+------------+------------+

| ABW | Papiamento | 76.7 |

| AFG | Dari | 32.1 |

| AFG | Pashto | 52.4 |

| AGO | Mbundu | 21.6 |

| AGO | Ovimbundu | 37.2 |

+-------------+------------+------------+

5 rows in set (0.00 sec)

**mysql> SELECT COUNTRYCODE,LANGUAGE,PERCENTAGE FROM COUNTRYLANGUAGE WHERE PERCENTAGE < (SELECT AVG(PERCENTAGE) FROM COUNTRYLANGUAGE) LIMIT 5;**

+-------------+------------+------------+

| COUNTRYCODE | LANGUAGE | PERCENTAGE |

+-------------+------------+------------+

| ABW | Dutch | 5.3 |

| ABW | English | 9.5 |

| ABW | Spanish | 7.4 |

| AFG | Balochi | 0.9 |

| AFG | Turkmenian | 1.9 |

+-------------+------------+------------+

5 rows in set (0.00 sec)

**mysql> SELECT COUNTRYCODE,LANGUAGE,PERCENTAGE FROM COUNTRYLANGUAGE WHERE PERCENTAGE <> (SELECT AVG(PERCENTAGE) FROM COUNTRYLANGUAGE) LIMIT 5;**

+-------------+------------+------------+

| COUNTRYCODE | LANGUAGE | PERCENTAGE |

+-------------+------------+------------+

| ABW | Dutch | 5.3 |

| ABW | English | 9.5 |

| ABW | Papiamento | 76.7 |

| ABW | Spanish | 7.4 |

| AFG | Balochi | 0.9 |

+-------------+------------+------------+

5 rows in set (0.00 sec)

**mysql> SELECT ID,NAME,DISTRICT,COUNTRYCODE FROM CITY WHERE POPULATION >= (SELECT MAX(POPULATION) FROM CITY);**

+------+-----------------+-------------+-------------+

| ID | NAME | DISTRICT | COUNTRYCODE |

+------+-----------------+-------------+-------------+

| 1024 | Mumbai (Bombay) | Maharashtra | IND |

+------+-----------------+-------------+-------------+

1 row in set (0.01 sec)

**mysql> SELECT ID,NAME,DISTRICT,COUNTRYCODE FROM CITY WHERE POPULATION >= (SELECT AVG(POPULATION) FROM CITY) LIMIT 5;**

+----+-----------+---------------+-------------+

| ID | NAME | DISTRICT | COUNTRYCODE |

+----+-----------+---------------+-------------+

| 1 | Kabul | Kabol | AFG |

| 5 | Amsterdam | Noord-Holland | NLD |

| 6 | Rotterdam | Zuid-Holland | NLD |

| 7 | Haag | Zuid-Holland | NLD |

| 35 | Alger | Alger | DZA |

+----+-----------+---------------+-------------+

5 rows in set (0.01 sec)

**mysql> SELECT ID,NAME,DISTRICT,COUNTRYCODE FROM CITY WHERE POPULATION <= (SELECT AVG(POPULATION) FROM CITY) LIMIT 5;**

+----+----------------+---------------+-------------+

| ID | NAME | DISTRICT | COUNTRYCODE |

+----+----------------+---------------+-------------+

| 2 | Qandahar | Qandahar | AFG |

| 3 | Herat | Herat | AFG |

| 4 | Mazar-e-Sharif | Balkh | AFG |

| 8 | Utrecht | Utrecht | NLD |

| 9 | Eindhoven | Noord-Brabant | NLD |

+----+----------------+---------------+-------------+

5 rows in set (0.01 sec)

**SUBQUERIES IN HAVING CLAUSE**

**mysql> SELECT ID,NAME,DISTRICT,POPULATION FROM CITY GROUP BY COUNTRYCODE HAVING POPULATION > (SELECT AVG(POPULATION) FROM CITY) LIMIT 5;**

+-----+--------------+------------------+------------+

| ID | NAME | DISTRICT | POPULATION |

+-----+--------------+------------------+------------+

| 1 | Kabul | Kabol | 1780000 |

| 56 | Luanda | Luanda | 2022000 |

| 64 | Dubai | Dubai | 669181 |

| 69 | Buenos Aires | Distrito Federal | 2982146 |

| 126 | Yerevan | Yerevan | 1248700 |

+-----+--------------+------------------+------------+

5 rows in set (0.01 sec)

**mysql> SELECT ID,NAME,DISTRICT,POPULATION,COUNTRYCODE FROM CITY GROUP BY COUNTRYCODE HAVING POPULATION > (SELECT AVG(POPULATION) FROM CITY) LIMIT 5;**

+-----+--------------+------------------+------------+-------------+

| ID | NAME | DISTRICT | POPULATION | COUNTRYCODE |

+-----+--------------+------------------+------------+-------------+

| 1 | Kabul | Kabol | 1780000 | AFG |

| 56 | Luanda | Luanda | 2022000 | AGO |

| 64 | Dubai | Dubai | 669181 | ARE |

| 69 | Buenos Aires | Distrito Federal | 2982146 | ARG |

| 126 | Yerevan | Yerevan | 1248700 | ARM |

+-----+--------------+------------------+------------+-------------+

5 rows in set (0.01 sec)

**SUBQUERIES IN FROM CLAUSE**

**mysql> SELECT COUNTRYCODE, LANGUAGE, ISOFFICIAL,PERCENTAGE FROM (SELECT \* FROM COUNTRYLANGUAGE WHERE PERCENTAGE > 50) AS TABLE1 LIMIT 10;**

+-------------+----------------+------------+------------+

| CountryCode | Language | IsOfficial | Percentage |

+-------------+----------------+------------+------------+

| ABW | Papiamento | F | 76.7 |

| AFG | Pashto | T | 52.4 |

| ALB | Albaniana | T | 97.9 |

| ANT | Papiamento | T | 86.2 |

| ARG | Spanish | T | 96.8 |

| ARM | Armenian | T | 93.4 |

| ASM | Samoan | T | 90.6 |

| ATG | Creole English | F | 95.7 |

| AUS | English | T | 81.2 |

| AUT | German | T | 92.0 |

+-------------+----------------+------------+------------+

10 rows in set (0.00 sec)

**SUBQUERIES RETURNING MORE THAN ONE ROW**

**mysql> SELECT ID,NAME, COUNTRYCODE FROM CITY WHERE COUNTRYCODE = (SELECT COUNTRYCODE = 'A%' FROM CITY);**

**ERROR 1242 (21000): Subquery returns more than 1 row**

**mysql> SELECT ID,NAME,DISTRICT FROM CITY WHERE COUNTRYCODE = (SELECT COUNTRYCODE FROM CITY WHERE POPULATION > (SELECT AVG(POPULATION) FROM CITY));**

**ERROR 1242 (21000): Subquery returns more than 1 row**

**SUBQUERIES USING ORDER BY CLAUSE**

**mysql> SELECT ID,NAME,POPULATION,COUNTRYCODE FROM CITY WHERE POPULATION > (SELECT AVG(POPULATION) FROM CITY ORDER BY POPULATION) LIMIT 10;**

+----+-------------+------------+-------------+

| ID | NAME | POPULATION | COUNTRYCODE |

+----+-------------+------------+-------------+

| 1 | Kabul | 1780000 | AFG |

| 5 | Amsterdam | 731200 | NLD |

| 6 | Rotterdam | 593321 | NLD |

| 7 | Haag | 440900 | NLD |

| 35 | Alger | 2168000 | DZA |

| 36 | Oran | 609823 | DZA |

| 37 | Constantine | 443727 | DZA |

| 56 | Luanda | 2022000 | AGO |

| 64 | Dubai | 669181 | ARE |

| 65 | Abu Dhabi | 398695 | ARE |

+----+-------------+------------+-------------+

10 rows in set (0.01 sec)

**mysql> SELECT ID,NAME,POPULATION,COUNTRYCODE FROM CITY WHERE POPULATION > (SELECT AVG(POPULATION) FROM CITY) ORDER BY POPULATION LIMIT 10;**

+------+-------------------------+------------+-------------+

| ID | NAME | POPULATION | COUNTRYCODE |

+------+-------------------------+------------+-------------+

| 1991 | Tai¶ïan | 350696 | CHN |

| 2349 | Kwangmyong | 350914 | KOR |

| 254 | SÇœo JosÇ¸ do Rio Preto | 351944 | BRA |

| 1990 | Xianyang | 352125 | CHN |

| 86 | Tres de Febrero | 352311 | ARG |

| 253 | Campina Grande | 352497 | BRA |

| 3439 | Herson | 353000 | UKR |

| 85 | Avellaneda | 353046 | ARG |

| 84 | Santa FÇ¸ | 353063 | ARG |

| 3630 | Smolensk | 353400 | RUS |

+------+-------------------------+------------+-------------+

10 rows in set (0.01 sec)

**MULTIPLE COLUMN SUBQUERIES**

**SUBQUERIES USING IN**

**mysql> SELECT ID,NAME, COUNTRYCODE FROM CITY WHERE COUNTRYCODE IN (SELECT COUNTRYCODE = 'A%' FROM CITY) LIMIT 10;**

+----+----------------+-------------+

| ID | NAME | COUNTRYCODE |

+----+----------------+-------------+

| 1 | Kabul | AFG |

| 2 | Qandahar | AFG |

| 3 | Herat | AFG |

| 4 | Mazar-e-Sharif | AFG |

| 5 | Amsterdam | NLD |

| 6 | Rotterdam | NLD |

| 7 | Haag | NLD |

| 8 | Utrecht | NLD |

| 9 | Eindhoven | NLD |

| 10 | Tilburg | NLD |

+----+----------------+-------------+

10 rows in set, 10 warnings (0.02 sec)

**mysql> SELECT ID,NAME, COUNTRYCODE FROM CITY WHERE COUNTRYCODE IN (SELECT COUNTRYCODE FROM CITY WHERE POPULATION > 100000) LIMIT 10;**

+----+----------------+-------------+

| ID | NAME | COUNTRYCODE |

+----+----------------+-------------+

| 1 | Kabul | AFG |

| 2 | Qandahar | AFG |

| 3 | Herat | AFG |

| 4 | Mazar-e-Sharif | AFG |

| 5 | Amsterdam | NLD |

| 6 | Rotterdam | NLD |

| 7 | Haag | NLD |

| 8 | Utrecht | NLD |

| 9 | Eindhoven | NLD |

| 10 | Tilburg | NLD |

+----+----------------+-------------+

10 rows in set (0.01 sec)

**SUBQUERIES USING NOT IN**

**mysql> SELECT ID,NAME, COUNTRYCODE FROM CITY WHERE COUNTRYCODE NOT IN (SELECT COUNTRYCODE FROM CITY WHERE POPULATION > 100000) LIMIT 10;**

+-----+------------------+-------------+

| ID | NAME | COUNTRYCODE |

+-----+------------------+-------------+

| 33 | Willemstad | ANT |

| 53 | Tafuna | ASM |

| 54 | Fagatogo | ASM |

| 55 | Andorra la Vella | AND |

| 61 | South Hill | AIA |

| 62 | The Valley | AIA |

| 63 | Saint John¶ïs | ATG |

| 129 | Oranjestad | ABW |

| 174 | Bridgetown | BRB |

| 184 | Belize City | BLZ |

+-----+------------------+-------------+

**SUBQUERIES USING ANY**

**mysql> SELECT ID,NAME,COUNTRYCODE FROM CITY WHERE COUNTRYCODE = ANY (SELECT COUNTRYCODE FROM COUNTRYLANGUAGE WHERE LANGUAGE = 'Pashto') LIMIT 10;**

+------+----------------+-------------+

| ID | NAME | COUNTRYCODE |

+------+----------------+-------------+

| 1 | Kabul | AFG |

| 2 | Qandahar | AFG |

| 3 | Herat | AFG |

| 4 | Mazar-e-Sharif | AFG |

| 2822 | Karachi | PAK |

| 2823 | Lahore | PAK |

| 2824 | Faisalabad | PAK |

| 2825 | Rawalpindi | PAK |

| 2826 | Multan | PAK |

| 2827 | Hyderabad | PAK |

+------+----------------+-------------+

10 rows in set (0.00 sec)

**SUBQUERIES USING ALL**

**mysql> SELECT ID,NAME,COUNTRYCODE FROM CITY WHERE POPULATION < ALL (SELECT AVG(POPULATION) FROM CITY WHERE COUNTRYCODE = 'PAK') LIMIT 10;**

+----+----------------+-------------+

| ID | NAME | COUNTRYCODE |

+----+----------------+-------------+

| 2 | Qandahar | AFG |

| 3 | Herat | AFG |

| 4 | Mazar-e-Sharif | AFG |

| 7 | Haag | NLD |

| 8 | Utrecht | NLD |

| 9 | Eindhoven | NLD |

| 10 | Tilburg | NLD |

| 11 | Groningen | NLD |

| 12 | Breda | NLD |

| 13 | Apeldoorn | NLD |

+----+----------------+-------------+

10 rows in set (0.00 sec)

**CORRELATED SUBQUERIES**

**BASIC CORRELATED SUBQUERY**

**mysql> SELECT ID,NAME,POPULATION,COUNTRYCODE FROM CITY TABLE1 WHERE POPULATION = (SELECT MAX(POPULATION) FROM CITY TABLE2 WHERE TABLE1.COUNTRYCODE = TABLE2.COUNTRYCODE) LIMIT 10;**

+----+------------------+------------+-------------+

| ID | NAME | POPULATION | COUNTRYCODE |

+----+------------------+------------+-------------+

| 1 | Kabul | 1780000 | AFG |

| 5 | Amsterdam | 731200 | NLD |

| 33 | Willemstad | 2345 | ANT |

| 34 | Tirana | 270000 | ALB |

| 35 | Alger | 2168000 | DZA |

| 53 | Tafuna | 5200 | ASM |

| 55 | Andorra la Vella | 21189 | AND |

| 56 | Luanda | 2022000 | AGO |

| 61 | South Hill | 961 | AIA |

| 63 | Saint John¶ïs | 24000 | ATG |

+----+------------------+------------+-------------+

10 rows in set (0.00 sec)

**SUBQUERIES IN EXISTS CLAUSE**

**mysql> SELECT ID,NAME,COUNTRYCODE FROM CITY TABLE1 WHERE EXISTS (SELECT COUNTRYCODE FROM CITY TABLE2 WHERE TABLE1.COUNTRYCODE = TABLE2.COUNTRYCODE) LIMIT 10;**

+----+----------------+-------------+

| ID | NAME | COUNTRYCODE |

+----+----------------+-------------+

| 1 | Kabul | AFG |

| 2 | Qandahar | AFG |

| 3 | Herat | AFG |

| 4 | Mazar-e-Sharif | AFG |

| 5 | Amsterdam | NLD |

| 6 | Rotterdam | NLD |

| 7 | Haag | NLD |

| 8 | Utrecht | NLD |

| 9 | Eindhoven | NLD |

| 10 | Tilburg | NLD |

+----+----------------+-------------+

10 rows in set (0.01 sec)

**SUBQUERIES IN NOT EXISTS CLAUSE**

**mysql> SELECT ID,NAME,COUNTRYCODE FROM CITY TABLE1 WHERE NOT EXISTS (SELECT 1 FROM CITY TABLE2 WHERE TABLE1.POPULATION = TABLE2.POPULATION AND TABLE1.COUNTRYCODE != TABLE2.COUNTRYCODE) LIMIT 10;**

+----+----------------+-------------+

| ID | NAME | COUNTRYCODE |

+----+----------------+-------------+

| 1 | Kabul | AFG |

| 2 | Qandahar | AFG |

| 3 | Herat | AFG |

| 4 | Mazar-e-Sharif | AFG |

| 5 | Amsterdam | NLD |

| 6 | Rotterdam | NLD |

| 7 | Haag | NLD |

| 8 | Utrecht | NLD |

| 9 | Eindhoven | NLD |

| 10 | Tilburg | NLD |

+----+----------------+-------------+

10 rows in set (0.01 sec)

**mysql> SELECT COUNTRYCODE, LANGUAGE, PERCENTAGE FROM COUNTRYLANGUAGE TABLE1 WHERE EXISTS (SELECT 1 FROM COUNTRYLANGUAGE TABLE2 WHERE TABLE1.LANGUAGE = TABLE2.LANGUAGE) LIMIT 10;**

+-------------+------------+------------+

| COUNTRYCODE | LANGUAGE | PERCENTAGE |

+-------------+------------+------------+

| ABW | Dutch | 5.3 |

| ABW | English | 9.5 |

| ABW | Papiamento | 76.7 |

| ABW | Spanish | 7.4 |

| AFG | Balochi | 0.9 |

| AFG | Dari | 32.1 |

| AFG | Pashto | 52.4 |

| AFG | Turkmenian | 1.9 |

| AFG | Uzbek | 8.8 |

| AGO | Ambo | 2.4 |

+-------------+------------+------------+

10 rows in set (0.00 sec)

**mysql> SELECT COUNTRYCODE, LANGUAGE, PERCENTAGE FROM COUNTRYLANGUAGE TABLE1 WHERE NOT EXISTS (SELECT 1 FROM COUNTRYLANGUAGE TABLE2 WHERE TABLE1.LANGUAGE = TABLE2.LANGUAGE) LIMIT 10;**

Empty set (0.01 sec)

**NESTED SUBQUERIES**

**mysql> SELECT ID, NAME, NAME, COUNTRYCODE, POPULATION FROM (SELECT \* FROM CITY WHERE POPULATION < (SELECT AVG(POPULATION) FROM CITY)) AS TABLE2 LIMIT 10;**

+----+----------------+----------------+-------------+------------+

| ID | Name | Name | CountryCode | Population |

+----+----------------+----------------+-------------+------------+

| 2 | Qandahar | Qandahar | AFG | 237500 |

| 3 | Herat | Herat | AFG | 186800 |

| 4 | Mazar-e-Sharif | Mazar-e-Sharif | AFG | 127800 |

| 8 | Utrecht | Utrecht | NLD | 234323 |

| 9 | Eindhoven | Eindhoven | NLD | 201843 |

| 10 | Tilburg | Tilburg | NLD | 193238 |

| 11 | Groningen | Groningen | NLD | 172701 |

| 12 | Breda | Breda | NLD | 160398 |

| 13 | Apeldoorn | Apeldoorn | NLD | 153491 |

| 14 | Nijmegen | Nijmegen | NLD | 152463 |

+----+----------------+----------------+-------------+------------+

10 rows in set (0.01 sec)

**mysql> SELECT ID,NAME,DISTRICT FROM CITY WHERE COUNTRYCODE IN (SELECT COUNTRYCODE FROM CITY WHERE POPULATION > (SELECT AVG(POPULATION) FROM CITY)) LIMIT 10;**

+----+----------------+---------------+

| ID | NAME | DISTRICT |

+----+----------------+---------------+

| 1 | Kabul | Kabol |

| 2 | Qandahar | Qandahar |

| 3 | Herat | Herat |

| 4 | Mazar-e-Sharif | Balkh |

| 5 | Amsterdam | Noord-Holland |

| 6 | Rotterdam | Zuid-Holland |

| 7 | Haag | Zuid-Holland |

| 8 | Utrecht | Utrecht |

| 9 | Eindhoven | Noord-Brabant |

| 10 | Tilburg | Noord-Brabant |

+----+----------------+---------------+

10 rows in set (0.00 sec)